

Patterns in the use of medicines by university students in Maputo, Mozambique

Padrão de utilização de medicamentos por estudantes de uma universidade de Maputo, Moçambique

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Abstract

Patterns in the use of medicines are expected to reflect distinct health features between populations. This study aimed to describe the self-reported use of medication by a sample of university students in Maputo, Mozambique. We conducted a survey of 797 students in a private university in Maputo. Participants completed a questionnaire including socio-demographic data and pattern of medication use in the preceding month. Information was collected on the number and names of drugs, duration of use, and prescription. The drugs were grouped according to therapeutic indication. In the previous month, 56% of students had used at least one pharmaceutical drug, with higher prevalence for women (65.2% vs. 42.2%) and men attending health-related courses (67.4% vs. 53.2%). The most commonly used medicines were anti-inflammatory/analgesic drugs (62.2%), anti-infectives (25.9%), and vitamins/minerals (13.6%). The most frequently used single drugs were paracetamol (42.8%), amoxicillin (12.6%), and ibuprofen (8.4%). Duration of use was lowest for anti-inflammatory/analgesic drugs and highest for oral contraceptives. Use of medication by Mozambican students was similar to that observed in other university populations.

Drug Utilization; Drugs with Prescription; Students

Introduction

In the last twenty years the World Health Organization (WHO) has specifically emphasized the availability of essential drugs as a health indicator in developing countries ¹. Social, economic, and health dynamics shape patterns in the use of medicines. In developing economies, social class inequalities can have an additional impact on expanding the right to access to medicines and their rational use ².

Mozambique has a population of nearly 20 million ³; the infant mortality rate is 124 per 1,000 live births and life expectancy at birth is 46.7 years ⁴. Patterns in the use of medication by the general population are expected to reflect these health features. The description and evaluation of the use of medicines by African populations have mainly addressed specific therapeutic classes such as antiretroviral drugs and oral contraceptives ^{5,6}. Patterns in the use of antimalarial drugs have also been studied in several African countries ^{7,8,9}. Most of these studies have described samples from the deprived general population, reflecting the local burden of major health problems and needs, particularly considering perinatal disorders, malaria, and diarrheal diseases, the leading causes of mortality in recorded and autopsied deaths in 1994 ¹⁰. The burden of disease associated with AIDS is increasing, as suggested by an expected 15-year decrease in life expectancy due to AIDS from 1999 to 2010 ¹¹.

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Identification of patterns in the use of medicines by university students would provide an insight into the utilization of this health technology by a more privileged segment of the population. Additionally, as a result of this group's increased access to medicines and health information, such knowledge would ultimately help define strategies for promoting the rational use of medicines by the general population.

Use of medicines by samples of students has been studied in several European, American, and Asian countries, naturally focusing on self-medication as an issue with public health implications^{12,13,14,15,16,17}. However, research on African university students has focused more on the use of alcohol and illicit drugs^{19,20} than pharmaceutical drugs, with the exception of the specific setting of a student's health service in Zimbabwe¹⁸.

Self-reported use of pharmaceutical drugs by a sample of university students in Maputo, Mozambique, provided a unique opportunity to investigate prescription drug use beyond the data available on oral contraceptives from the 2003 National Demographic and Health Survey⁴. The current study thus aimed to describe the use of medication in the previous 30 days in a sample of university students in Maputo.

Methods

We conducted a cross-sectional survey of students enrolled at a private university in Maputo, selected so as to comprise a large number of students and a relatively wide range of courses, encompassed in a single campus. The university had a total of nearly 1,500 students enrolled in computer engineering, accounting and auditing, business administration, dentistry, sociology, public administration, pharmacy, and law.

In early 2004, 47 of the 55 classes in the institution were systematically approached, comprising 829 students, distributed among all the daytime classes and 21 of 26 night classes. In order to shorten the data collection period, a one-week time frame was set to synchronize the period relating to responses. During this time frame, absenteeism and schedule constraints prevented approaching all the classes and all students in each class. Additionally, 32 students (3.9%) refused to participate. The above-mentioned losses and refusals accounted for the final sample ($n = 797$), representing approximately 50% of the entire student body.

Students who agreed to participate were asked to complete a self-administered questionnaire during class with professors' consent. The 13-item questionnaire covered socio-demo-

graphic information, use of medication during the previous 30 days, and lifetime use of antimalarial drugs.

Use of any medication in the previous month was assessed with the closed question "*In the last month, did you use any medicine (including pills, capsules, injections, ointments, syrups, etc.)?*". If the answer was yes, subjects were asked to complete an open-ended table with the following information for each drug: brand or generic name, duration of treatment, self-medication (including pharmacy-counseled) versus physician-prescription, and intended purpose.

Instructions for completion of the questionnaire included examples of pharmaceutical drugs for each group, namely analgesics, steroidal and non-steroidal anti-inflammatory drugs, antihistamines, laxatives, vitamins, oral contraceptives, and anti-infectives.

Each medicine was coded to the corresponding level of WHO Anatomical Therapeutic Chemical classification (ATC)²¹. For purposes of analysis, the degree of specificity within this classification was chosen as appropriate according to the extent of information obtained. Classes were flexibly combined to assemble similar therapeutic indications. As a result, the following larger groups were considered: anti-inflammatory and anti-rheumatic drugs, non-steroids (M01A) plus paracetamol (N02BE01); anti-infectives for systemic use (J); antimalarials (P01B); vitamins (A11) plus minerals (A12), excluding iron preparations (B03A); and hormonal contraceptives for systemic use (G03A). An additional group included medicines for women's health conditions, comprising hormonal contraceptives and iron preparations or analgesics when part of reproductive health management, as stated by the participants.

Subjects were grouped for analysis according to enrollment in health-related versus non-health-related courses, the former including Pharmacy and Dentistry. Proportions of users and non-users of medication were compared according to gender, age, course, and class period using χ^2 or Fisher exact non-parametric tests, as appropriate, at a 95% confidence level. Data analysis used Stata 8.0 software (Stata Corp., College Station, U.S.A.).

The study allowed estimating a prevalence of utilization of medicines as low as 5%, with 1% precision and 95% confidence level.

The National Ethics Committee of Mozambique approved the study protocol.

Students were asked to read an informed consent form stating the study objectives and data collection methods, in agreement with the *Declaration of Helsinki*. Only students who

signed the informed consent form were allowed to participate and were asked to complete the questionnaire.

Results

Among the 797 respondents, median age was 23 years (18-51), with 58.7% females and 18.3% attending health-related courses.

Use of at least one pharmaceutical drug in the previous month was reported by 55.8% of subjects. Among users, the median number of medicines was one and the maximum seven.

Fifteen percent of women used at least one of the products for women's health as defined above, and 4.8% specifically reported taking oral contraceptives. Women used medicines more frequently than men (65.2% vs. 42.2%, $p < 0.001$), even after excluding drugs related to reproductive health (59.4% vs. 42%, $p < 0.001$).

Similar results were obtained for anti-inflammatory drugs/analgesics (40.4% vs. 26%, $p < 0.001$), anti-infectives excluding antimalarials (17.8% vs. 9.7%, $p < 0.05$), and vitamins/minerals (10.2% vs. 4.2%, $p < 0.05$). For use of antimalarials, no significant differences were found for gender (6.9% in females vs. 5.2% in males, $p = 0.48$) or type of university course (9.3% for health-related vs. 4.5% for non-health-related, $p = 0.07$).

Male students in health-related courses used medicines more frequently (60% vs. 40.3%, $p < 0.05$), but at a proportion similar to that estimated for women attending health-related courses (60% vs. 69.6%, $p = 0.32$). When considering specific groups of medicines, significant differences in utilization according to type of course were only observed for anti-inflammatory/analgesic drugs (44.4% vs. 32.5%, $p < 0.05$). There were no statistically significant differences across age groups or between daytime versus night classes (Table 1).

Among users of medicines, anti-inflammatory and analgesic drugs were the most frequently reported, followed by systemic anti-infectives, vitamins/minerals, oral contraceptives, and antimalarials. When analyzed individually, paracetamol, amoxicillin, and ibuprofen were the single most frequently used drugs (42.8%, 12.6% and 8.4%, respectively).

The proportion of subjects using physician-prescribed medication was 35.7% for anti-inflammatory and analgesic drugs, 80.9% for anti-infectives, 78.2% for vitamin and mineral supplements, and 72.2% for oral contraceptives. The highest proportions of prescription treatment were for antimalarials (91.7%) and iron supplements (100%) (Table 2).

Women on oral contraceptives remained exposed to this medication throughout the entire recall period. For other drug groups, the longest median duration of use was for vitamins/minerals (median: 15 days; inter-quartile range or IQR: 7-30 days) followed by iron supplements (median: 15 days; IQR: 8-30 days), and anti-infectives, excluding antimalarials (median: 8 days; IQR: 7-15 days). Treatment was shorter for anti-inflammatory/analgesic drugs (median: 3 days; IQR: 1-7 days). Both paracetamol and ibuprofen had a median duration of treatment of 3 days, while treatment was longer for amoxicillin (median: 8 days) (Table 2).

Discussion

Fifty-six per cent of adult students in this sample recalled the use of at least one pharmaceutical drug during the previous month. The proportion was significantly higher in women and in men attending health-related courses. The students used mostly anti-inflammatory/analgesic drugs (62.2%), anti-infectives other than antimalarials (25.9%), and vitamin/mineral supplements (13.6%).

In our study, although we approached students from all daytime and most night classes and the refusal rate was low, information was obtained from only half of the student body. Women were thus over-represented in the sample (58.7% vs. 50% of total enrollment), which may have contributed to overestimation of the use of most medicines. We may also expect a slight overestimation in the use of medicines by men, since a proportionally larger number of male students in health-related courses were included. Median student age at this university (27 years), as collected from university statistics, was higher than in our sample, but these differences are not likely to affect our estimates, since no statistically significant association was observed between age and use of medicines.

The so-called "healthy worker effect" is another important limitation in the validity of our findings. In the present methodological approach, we collected data on campus, so that absent students were not sampled. Considering that poorer health may partially account for absenteeism, and that unhealthy status is associated with higher consumption of pharmaceuticals, our findings probably underestimate the actual use of medicines by this population group. In fact, poor health was probably a prior selective factor for entering the university in the first place. Although this type of bias could lead to underestimation of the overall prevalence of pharmaceu-

Table 1

Prevalence of pharmaceutical drug use according to gender, age, and type of university course for the most frequently reported therapeutic classes used in the previous month by 797 university students in Maputo, Mozambique.

	n *	Prevalence of pharmaceutical drug use											
		All medicines		Anti-inflammatory/Analgesic drugs		Anti-infectives **		Vitamins/Minerals		Antimalarials		Oral contraceptives	
		n	%	n	%	n	%	n	%	n	%	n	%
All subjects	766	428	55.8	266	34.7	111	14.5	58	7.6	43	5.6	22	4.8
Gender													
Male	308	130 ***	42.2	80 ***	26.0	30 #	9.7	13 #	4.2	21	6.9	-	-
Female	443	289	65.2	179	40.4	79	17.8	45	10.2	23	5.2	22	4.8
Age (years)													
18-25	432	246	56.9	158	36.6	55	12.7	34	7.9	23	5.3	9	3.3
26-35	146	76	52.0	43	29.4	27	18.5	8	5.5	10	6.6	6	7.8
≥ 36	122	65	53.3	43	35.2	20	16.4	9	7.4	7	6.2	4	7.0
Course													
Health-related	144	97 #	67.4	64 #	44.4	20	13.8	13	9.0	13	9.3	18	5.2
Non-health-related	622	331	53.2	202	32.5	108	17.4	45	7.2	28	4.5	4	3.5
Class period													
Daytime	489	287	58.6	183	37.4	63	12.9	40	8.3	28	5.8	14	4.5
Night	269	144	53.5	85	31.5	46	17.3	18	6.7	16	5.9	8	6.4

* The number of subjects may not reflect the total (n = 766), due to missing data;

** Excluding antimalarials;

*** p < 0.001;

p < 0.05.

Table 2

Medical prescription and duration of therapy for the most frequent therapeutic classes and pharmaceutical drugs used in the previous month by 797 university students in Maputo, Mozambique.

	Medically-prescribed		Median (P25-P75 *) duration (days)
	n	%	
Anti-inflammatory/Analgesic drugs	91	35.7	3 (1-7)
Paracetamol	60	34.3	3 (1-5)
Ibuprofen	15	45.5	3 (2-7)
Anti-infectives (excluding antimalarials)	89	80.9	8 (7-15)
Amoxicillin	44	83.0	8 (7-10)
Vitamins/Minerals	43	78.2	15 (7-30)
Iron supplements	21	100.0	15 (8-30)
Antimalarials	22	91.7	3 (1-3)
Oral contraceptives	13	72.2	30 (30-30) **

* Percentile 25-Percentile 75;

** In order to avoid non-response, questionnaire completion examples included oral contraceptives with an exposure period defined as daily. This example probably induced respondents to frame a 30-day duration of treatment. However, even considering that exposure periods for oral contraceptives are usually 21 days per month, the actual treatment may be considered to last the entire month.

tical drug use and to inaccuracy in the evaluation of the relative weight of some pharmaceutical drugs or drug groups, it does not impair comparisons with studies conducted under similar conditions.

Overall prevalence of the use of medicines showed significant gender-related differences for every drug group except antimalarials. Conversely, the observed course-related prevalence of all-drug use is explained mainly by differences in the use of anti-inflammatory/analgesic drugs. Differences in the use of health care services and specific health knowledge may account for this gender and course-related prevalence.

Analogous studies in other countries (Table 3) showed similar prevalence of pharmaceutical drug use, with the exception of the 83% prevalence in a North American sample²². In all of these studies, women tended to use medicines more frequently, as did students in health-related course^{23,24}. However, Mozambican stu-

dents used antimalarial and other anti-infective medications more often. These differences reflect distinct disease patterns between populations, namely regarding endemic malaria, but may also relate to differences in data collection instruments. In addition, two previous studies only included students attending health-related courses, which probably produced more accurate recall^{23,25}.

An important finding is that psychotropic drugs are practically absent from our data. Similar results have been described in a Brazilian sample of students, in which the non-medical use of psychotropic medicines in the previous month varied from 0.2% for barbiturates to 2.1% for tranquilizers¹⁷. In Cape Town, 18% of fifth-year medical students reported using these substances in their pre-examination period¹⁹. A French study found that 28% of female and 14% of male students had used psychotropic drugs¹². In the present study, the lack of an ex-

Table 3

Characteristics and results of studies on the prevalence of use of medicines by different university populations.

Study	Year	Country (sample)	Subjects in health-related courses	Recall period	Prevalence (%)	Females vs. males	Health vs. non-health-related courses	Most frequent classes of pharmaceutical drugs
Lopez et al. ²³	1997	Spain (N = 380)	100% (Pharmacy)	Previous two weeks	64.2	68.5% vs. 56.5 (p < 0.05)	NA	Oral contraceptives; NSAIDs; antibiotics
Cabrita et al. ²⁴	2001	Portugal (N = 1.147)	18.1%	Previous two weeks	57.0	62.9% vs. 42.6% (p < 0.001)	More frequent in health-related courses (NS), especially pharmacy (NS)	Oral contraceptives (7.8%); NSAIDs (37.4%); antibacterials (5.9%)
Marques-Vidal et al. ²⁵	2005	Portugal (N = 588)	100%	Previous month	48.0	52% vs. 41% (p = 0.001)	Pharmacy vs. other (no statistically significant difference further specified)	Oral contraceptives (12.5%); NSAIDs (30%); antibiotics (8%)
Acoccela et al. ²²	2005	United States (N = 183)	NS	Previous week	83.1 (self-medication)	87.5% vs. 70.2% (p = 0.006)	NS	Analgesics (68.3%); cold/allergy medication (33.3%)
Present study	2004	Mozambique (N = 797)	18.3%	Previous month	55.8	Non-health courses: 63.8% vs. 40.3% (p < 0.001); health courses: 69.6% vs. 60.0% (p = 0.32)	67.4% vs. 53.2% (p < 0.002)	Oral contraceptives (4.8%); NSAIDs (34.7%); antimalarials (5.6%); other anti-infectives (14.5%)

NS: not specified; NA: not applicable; NSAIDs: non-steroidal anti-inflammatory drugs.

ample of these substances in the questionnaire instructions may help explain our results.

Regarding vitamin/mineral supplements, which were listed among the questionnaire examples, we found a relatively low prevalence of use. North American medical students used these medications more frequently (53% for multivitamin/multimineral supplements, 23% for calcium, and 22% for other vitamin/mineral supplements)²⁶. Another study in Florida showed 47% prevalence in the use of vitamin and mineral supplements in the previous two weeks²⁷. The rate was also higher among Korean 17 and 18-year-olds (54%)²⁸.

Prevalence of self-medication in our sample was relatively low, especially compared to the 94% estimate for cold preparations, analgesics, and anti-inflammatory drugs among university students in Hong Kong¹³. Additionally, pharmacy and medical students in Croatia frequently reported self-medication at home with non-steroidal anti-inflammatory drugs (NSAIDs) (88%) and antibiotics (37%)¹⁴. Moreover, in a population-based Sudanese sample, 74% of adults had used antibiotics or antimalarials without a medical prescription within one month prior to the study⁸. A high prevalence of self-treatment of malaria has also been described in Kenya, where 60% of episodes of febrile illness were treated at home⁹. In keeping with these findings, poor knowledge on self-medication was found in Bahrain¹⁶, and incorrect beliefs about antibiotic use among college students were highly prevalent in Turkey¹⁵ and North America²⁹.

Overall, the median period of use for each group of medicines appears to match the length of treatment for the most common therapeutic regimens. For anti-infectives (excluding antimalarials), most subjects were under treatment for a week or more, suggesting high treatment adherence in this population.

Prevalence of oral contraceptive use in our sample was relatively low (4.8%) compared to European studies and the 16.8% rate in a less educated population in Maputo (only 25% of whom had secondary level education)⁴. A study published in 1995 showed 23.5% prevalence of oral contraceptive use among Nigerian university students⁶, nearly five times that of our sample. Recall bias should not be expected to play a specific role in this study, since the questionnaire contained examples of the most widely used drug classes, including oral contraceptives, subjects were well educated, and the time frame was narrow. The difference might be explained by selective under-reporting of this drug group due to cultural or social constraints, even though the questionnaire was anonymous. Meanwhile, a more likely hy-

pothesis is that differences show that university students do not represent the general Mozambican population, namely because of their level of schooling and social and cultural backgrounds. The fact that our sample was drawn from a private university further limits the representativeness of the country's university population.

In population groups with presumed access to medication beyond essential drugs, as in the case of university students, the analysis of self-reported pharmaceutical drug use has the advantages of including both self-prescribed and physician-prescribed drugs and providing a realistic estimate of actual consumption patterns³⁰. As expected, the proportion of self-prescribed use of NSAIDs was high (64.3%) compared to the rates for antibiotics (19.1%), antimalarials (8.3%), or iron supplements (0%). Legislation, along with awareness of therapeutic indications and safety profiles, can account for these findings, but national health policies regarding reimbursements may also be part of the explanation.

Conclusion

Prevalence of pharmaceutical drug use during the previous month by Mozambican university students was similar to recent Southern European findings concerning gender differences, therapeutic classes, and individual drugs. These results suggest similar utilization of medicines for managing minor health problems in university students across populations, regardless of overall access to medicines and professional-level information. However, some situations present specific local weights, and contraceptive use may reflect important cultural constraints.

Resumo

O padrão de utilização de medicamentos nas populações pode refletir diferenças na sua saúde. O objetivo deste estudo foi descrever o uso de medicamentos numa população universitária em Maputo, Moçambique. Foram avaliados 797 estudantes de uma universidade privada. Os participantes preencheram um questionário que incluía variáveis sócio-demográficas e de utilização de medicamentos no mês anterior. Foi colhida informação relativa ao número e nome dos medicamentos, duração da utilização e prescrição. Os fármacos foram classificados conforme a indicação terapêutica. Entre os estudantes, 56% tinham utilizado pelo menos um fármaco, com maior prevalência nas mulheres (65,2% vs. 42,2%) e nos homens que frequentavam cursos de saúde (67,4% vs. 53,2%). Os estudantes usaram principalmente antiinflamatórios/analgésicos (62,2%), anti-infecciosos (25,9%) e vitaminas/minerais (13,6%). Os fármacos mais frequentemente utilizados foram paracetamol (42,8%), amoxicilina (12,6%) e ibuprofeno (8,4%). A duração da terapêutica foi menor para antiinflamatórios/analgésicos e maior para contraceptivos orais. O padrão de utilização de medicamentos por estudantes moçambicanos foi semelhante ao observado noutras populações universitárias.

Uso de Medicamentos; Medicamentos com Prescrição; Estudantes

Contributors

R. Lucas contributed to the data analysis and interpretation and production of the first version of the manuscript. N. Lunet contributed to the study conceptualization and design, data analysis, and critical review of the manuscript. R. Carvalho contributed substantially to the data analysis and interpretation. J. Langa, M. Muanantatha, and L.-P. Nkunda contributed substantially to the data acquisition. H. Barros critically reviewed the manuscript for content. All the authors approved the final version for publication.

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