



## Inappropriate Use of Antibiotics Among Dentists in Ecuador

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Article History	Abstract
Received: 06 June 2023 Revised: 15 August 2023 Accepted: 21 August 2023	<p>More than 50% of the use of antibiotics is considered inappropriate and dentists turn out to be part of the health professionals who misuse these drugs. Due to this, the objective of this study was to evaluate the prescription of antibiotics by Ecuadorian dentists after extraction of temporary teeth for systemic causes to determine the rational use of these drugs, among pediatric patients. This retrospective study used a survey of dentists in Ecuador as the primary database. The sample was obtained with the Epi Info application, with an expected frequency of 50%, a margin of error of 5% and a confidence level of 95%. Odd Ratio (OR) was used as a measure of association, obtained by logistic regression and Pearson's chi square to establish correlation. More than 11% of them mentioned having prescribed antibiotics after extracting a temporary tooth due to physiological causes. Those who most incurred this inappropriate use were male dentists, those under 30 years of age and those over 51 years of age, who work in urban areas and those who graduated from a public university and those who do not yet have a degree fourth level. The misuse or inappropriate use of antibiotics is a global problem in which many factors intervene, including the authorized prescribers of these drugs. Dentists are an important part of this problem and the factors identified in many studies are diverse.</p>
CC License CC-BY-NC-SA 4.0	<b>Keywords:</b> Antibiotic, Dentist, Equator

### 1. Introduction

According to the Pan American Health Organization, 50% of the use of antibiotics is inappropriate and this misuse is responsible for a worsening of the clinical pictures of patients, antimicrobial resistance and an increase in health spending of health systems in several countries (1). Among one of the most predominant causes of inappropriate use of antibiotics are failures in prescribing by health professionals and self-medication.

Dentists, as health professionals with powers to prescribe medicines, make up a group of professionals who contribute significantly to the increase in this statistic. In some countries around the world this reality has been evidenced (2–5). Among the main causes of this type of prescription errors among dentists is the lack of knowledge of the protocols established by the national health authorities (2) and shortcomings in the university education system, especially in Latin America (6).

In Ecuador, since 2013, the Ministry of Public Health (MSP) has been developing care protocols and clinical practice guidelines (CPG) to assist health professionals in the treatment of different groups of patients and pathologies in various specialties (7). Dental care is no exception, in 2015, the MSP launched the Dental Care Protocols to guide dentists in the country during the care of their patients. (8). It describes treatment plan options for various pathologies and procedures, including the use or not of antibiotics. For example, when the dentist faces an exodontia of a temporary tooth due to systemic causes or natural exfoliation, where the use of antibiotic therapy by extraction is not described.

The exfoliation of temporary teeth is a physiological process, in which, odontoclasts perform the phenomenon of rhizoclastism (wear of the roots of temporary teeth). This process is responsible for the mobility of temporary teeth in children and their subsequent physiological avulsion that allows replacement with permanent dentition (9). In this physiological process, many times the dentist intervenes to perform the extraction of this dentition, in order to ensure the eruption of permanent teeth or for other causes.

With this background, and in order to evaluate the correct use of antibiotics among Ecuadorian dentists, this study aimed to: evaluate the prescription of antibiotics by Ecuadorian dentists after extraction of temporary teeth for systemic causes to determine the rational use of these drugs among pediatric patients.

## 2. Materials And Methods

This retrospective study used as a primary database a survey of dentists in Ecuador through the Google Form application, which was sent by electronic means for filling out (mobile messaging applications, emails and social networks). The questionnaire of questions was prepared by students of the dentistry career of the Regional Autonomous University of the Andes – UNIANDES, and validated by teachers with expertise in the subject.

In the questionnaire, structured questions were established with two answer options such as: *do you prescribe antibiotics to your pediatric patients after performing an exodontia of a temporary tooth due to systemic causes?* Question that gave rise to the dependent variable of this study. The affirmative answer to this question was considered as misuse of antibiotics, since this procedure, by the experts evaluating the questionnaire, was considered unnecessary. The negative answer was considered as correct use of antibiotics. In addition, other questions were asked that contributed to the possible establishment of the causes of the inappropriate use of antibiotics and to know the economic, demographic and social data of the participants in the study.

The sample was obtained with the Epi Info application, using as a universe the total of dentists with a degree registered in the Agency for Quality Assurance of Medical Services and Prepaid Medicine – ACESS, where the database rests. It was used as expected frequency 50%, margin of error of 5% and confidence level of 95%, the result of the calculation of the sample was 376 dentists.

The data were consolidated in a Microsoft Excel sheet and transformed to the Stata 12 database; a statistical program used to establish correlations between the variables. *Odds Ratio* (OR) was used as a measure of association, obtained by logistic regression and Pearson's chi-square to establish correlation. Variables with significance level with p-value <0.05 and 95% confidence interval were added to the multivariate analysis.

## 3. Results and Discussion

**Table 1.** Socioeconomic and demographic characteristics of Ecuadorian dentists who prescribe antibiotics or not in pediatric patients after extraction of primary teeth

	No		Yes		Total	
	N	%	N	%	N	%
<b>Total</b>	206	88,79	26	11,21	232	100
	<b>Sex</b>					
Male	90	38,79	18	7,76	108	46,55
Female	116	50,00	8	3,45	124	53,45
	<b>Age</b>					

< 30 years	80	34,48	8	3,45	88	37,93
31 to 40 years	67	28,88	4	1,72	71	30,60
41 to 50 years	30	12,93	6	2,59	36	15,52
> 51 years	29	12,50	8	3,45	37	15,95
<b>Workplace</b>						
Private company	136	58,62	16	6,90	152	65,52
Public institution	35	15,09	6	2,59	41	17,67
Both	35	15,09	4	1,72	39	16,81
<b>Monthly income</b>						
< 1000	61	26,29	4	1,72	65	28,02
1000 to 1500	72	31,03	8	3,45	80	34,48
1500 to 2000	38	16,38	9	3,88	47	20,26
> 2000	35	15,09	5	2,16	40	17,24
<b>Work area</b>						
Urban	171	73,71	15	6,47	186	80,17
Marginal urban	14	6,03	3	1,29	17	7,33
Rural	21	9,05	8	3,45	29	12,50
<b>Type of undergraduate university</b>						
Public	128	55,17	18	7,76	146	62,93
Private	73	31,47	7	3,02	80	34,48
Outside	5	2,16	1	0,43	6	2,59
<b>Years since joining</b>						
< 5	53	22,84	8	3,45	61	26,29
5 to 10	75	32,33	5	2,16	80	34,48
10 to 15	28	12,07	3	1,29	31	13,36
> 15	50	21,55	10	4,31	60	25,86
<b>Holds a fourth-level degree</b>						
No	106	45,69	14	6,03	120	51,72
Yes	100	43,10	12	5,17	112	48,28
<b>Fourth-level degree type</b>						
None	120	51,72	14	6,03	134	57,76
Specialist	66	28,45	7	3,02	73	31,47
Mastery	19	8,19	4	1,72	23	9,91
Doctorate	1	0,43	1	0,43	2	0,86

Table 1 shows that 232 dentists from Ecuador answered the survey sent, not reaching the minimum number of respondents required according to the sample calculation, which does not allow a statistical inference from the results of this study for all dentists in the country. However, participation was obtained in 20 of the 24 provinces of Ecuador, giving the results a desirable robustness to know the reality of the phenomenon studied.

The largest number of surveys were women and they were included in the age group under 30 years. The majority of respondents are engaged in private practice and are located in urban areas of the country. Among the dentists surveyed, more than 11% of them mentioned having prescribed antibiotics after performing a temporary tooth extraction due to physiological causes. Those who most incurred in this inappropriate use were male dentists, those under 30 years of age and those over 51 years of age, those who work in urban areas and those who graduated from a public university and those who do not yet have a fourth-level degree.

In Table 2, we can observe the correlations between variables where OR was used as an association measure to try to explain the possible causes of those who inappropriately prescribe antibiotics to their pediatric patients.

As expected, because male dentists were the ones who most prescribed antibiotics after extracting a temporary tooth, in the multivariate analysis, it was a protective factor that the care is performed by a female dentist, that is, it is 71% more likely that a female dentist does not prescribe an antibiotic to his pediatric patient after the procedure in question.

The income level of dentists in the first *gross OR* analysis lost significance when adjusted for all significant variables.

Although the largest number of dentists located in the urban area are those who most prescribed antibiotics inappropriately (Table 1), in the multivariate analysis (Table 2), it can be observed that there is 4 times more chance that a dentist in the rural area inappropriately prescribes an antibiotic than a dentist located in the urban area.

It was also a protective factor that the surveyed dentist had completed his undergraduate studies in a city different from his home. In this way, there is a 74% probability that a dentist who has studied in a city other than his home will make appropriate use of antibiotics in his pediatric patients.

**Table 2.** Multivariate analysis of variables with statistical significance with p value < 0.05

	Odds Ratio	P>z	[95% Conf. Interval]	
<b>Sex</b>				
Male	1	1	1	
Female	0,2934097	0,012	0,1121704	0,767486
<b>Monthly income</b>				
< 1000	1	1	1	
1000 to 1500	1,795043	0,38	0,4861993	6,627283
1500 to 2000	0,317191	0,084	0,8558987	1,175491
> 2000	1,758.273	0,454	0,4010818	7,707961
<b>Work area</b>				
Urban	1	1	1	
Marginal urban	2,488352	0,216	0,5876684	1.053638
Rural	4,314522	0,007	1,490916	1,248568
<b>Studied in a different city</b>				
No	1	1	1	
Yes	0,2663157	0,006	0,1045143	0,6786064

The data of this study corroborate that, in Ecuador, part of the dentists surveyed, are part of the health professionals who misuse antibiotics, being a risk for the pathologies of the patients they attend and contributing to the increase of antimicrobial resistance and the consequent higher health expenditure.

It may seem little that 11% of respondents misuse antibiotics, the results of this study can be considered as a sign that Ecuador joins other countries where this type of medication is inadequately prescribed. (4,5,10). The problem seems to be global, independent of the quality of education and the income level of the countries, apparently, not prescribing frequently due to the fact that in dental practice, infectious problems are resolved with the elimination of the origin of the pathological process, is one of the factors responsible for dentists making inappropriate use of these drugs (11).

Although in Ecuador, as in other countries, most dental professionals are female (12), and this would increase the likelihood that it is this group who are most wrong in the use of antibiotics, the data presented here demonstrate the opposite. A study that analyzed the equality between men and women dentists in the United States, showed that despite the inequality that exists between genders to occupy leadership positions in that country, women dentists are equal and / or more qualified than their male colleagues (13). There are several studies around the world that demonstrate the iniquity suffered by women in the dental area despite their majority presence in this profession (14–16). The aforementioned studies, together with what is evidenced in this work, which shows that being attended by a woman dentist, raises to more than 70% the probability of being well prescribed, allows

to ensure that it is safer and more reliable to be attended by a female professional when a dental intervention that requires prescription of antibiotics is necessary.

Rural Ecuador, as in other countries, is often the most unprotected or vulnerable. With regard to dental practice, the data of this study reveal an increase in this problem. Being 4 times more likely to be poorly prescribed in rural areas than in urban areas, it puts patients living in these areas at a greater disadvantage, who probably do not have the economic conditions to travel to urban centers to get better quality dental care. It is also a matter of concern that, in Ecuador, health services in rural areas are represented by public institutions such as the Ministry of Health, where the majority of dentists who are completing their year of compulsory rural service after having completed their university careers work. This data is corroborated in Table 1 of this document, where it can be seen that dentists with less than 5 years of graduation are in the group that mostly misused antibiotics.

The data of the study also revealed that the fact of having studied in a city other than that of the dentist's home, turned out to be a protective factor in the use of antibiotics, that is, it is much more likely that a dentist who studied in his city of home misuses antibiotics. This result is quite interesting and worthy of being deepened. Perhaps, the fact of living in a different city and dedicating oneself exclusively to study, increases the possibility of learning to prescribe in a better way and consequently make better use of antibiotics when the student becomes a professional. In addition, the responsibility of being away from home and valuing the effort of those who finance your stay and studies is a determining factor to make a greater effort to be a better professional. Of course, these are not assertions, just conjectures that could be investigated in the future.

#### 4. Conclusion

The misuse or inappropriate use of antibiotics is a global problem involving many factors, including the authorized prescribers of these drugs. Dentists are an important part of this problem and the factors identified in many studies are diverse. In general, the lack of a constant practice of prescriptions and gaps in university education would be the most determining factors in this problem. The factors involved in the problem studied do not seem to be difficult to solve, however, they require great support from some decision makers. Studies such as the one presented now, contribute greatly to identify specific problems and places where better action is required by different government entities or not. In addition, the participation of dental professionals is important so that patients seeking their care receive it with the expected quality.

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