

Conference Paper

Factors Associated with Parental Self-medication of Antibiotics in Health Centers of Manila

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Abstract

The practice of self-medication is widespread around the world and misuse of medications may lead to serious adverse effects and drug interactions. The study aimed to identify factors associated with antimicrobial self-medication practices of mothers with children aged 18 years old and below. In conducting the research, cross sectional descriptive study and purposive sampling were followed. A total of 390 mothers were included in the study and data were collected using questionnaire-guided interview. The results suggest that parental self-medication using antibiotics was prevalent (42.05%) and age of mothers was found associated with it ($p < 0.029$, OR = 1.02). Mothers were giving antibiotics to their children without prescription mainly for cough (33.54%). Amoxicillin (50.25%) was the preferred antibiotic, with 54.08% incorrect use. Other antibiotics abused were cephalexin (8.46%), co-amoxiclav (6.15%), erythromycin (4.87%), co-trimoxazole (4.10%), cloxacillin (3.59%), cefuroxime (1.79%) and penicillin (1.79%). Mothers declared that they get antimicrobial information from health centers and other sources (42.68%) followed by old prescriptions (28.66%) and relatives (23.17%). Community pharmacies (85.37%) were the main source of antibiotics followed by health centers (23.17%). Despite the understanding of the mothers regarding the use of antibiotics, it is notable that there is an increased misuse of antibiotics. This can be attributed to the limited understanding of viruses, for only 36.41% of respondents identified that antibiotics should not be used for viral infections. Therefore, the findings may help the government to implement strict implementation of the pharmacy regulations regarding the sale of antibiotics and educational interventions about rational use of antibiotics.

Keywords: Antibiotics, Children, Manila, Mothers, Parental self-medication

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1. Introduction

In both developed and developing countries, there have been increasing trend of practicing self-medication. [1] Self-medication involves the use of medicinal products by the consumer to treat self-recognized disorders or symptoms, or the intermittent or continued use of a medication prescribed for chronic or recurring diseases or symptoms. [2]

Improper self-medication may lead to adverse effects and undesired drug interactions. To prevent this, correct use of medicines should be observed and one class of drug that is of great concern are antibiotics. Antibiotics are pharmacological agents used to treat infections caused by bacteria that selectively kill or inhibit the growth of bacterial cells. [3] Self-medication with antibiotics is particularly problematic, as it has been cited as a major contributor to antibiotic resistance. Recent meta-analyses have estimated that 38% of the world's population engages in self-medication with antibiotics. [4] Antibiotic resistance is considered a global threat due to reasons such as increased morbidity and mortality rates due to uncontrolled infectious diseases as the standard treatments become ineffective. [5]

Due to higher susceptibility of children to illnesses and adverse drug reactions, monitoring the medications used for this particular group is of great importance. Within the context of children's ailments, the responsibility to make medical decisions will usually be on the children's parents because young children are not able to make complex decisions for themselves. [5] Majority of caretakers/parents in both developed and developing countries prefer to treat their children with common symptoms of fever, cough or diarrhea without consulting a licensed prescriber or physician. [6] However, it was discovered from some previous studies that parents' knowledge about treatment for minor ailment is still inaccurate. Most parents are confused about which medicine should be given to their children to manage the pain and fever. [8] Studies in some Asian countries revealed that some determinants using non-prescribed antibiotics for children are child's age, availability of antibiotics, severity of diseases, caretaker's educational level and medical fees. [9, 10]

Knowing the culture in the Philippines, mothers are usually the ones responsible in dealing with children's illnesses. Consequences of antibiotic misuse are well studied in the Philippines but there are limited studies determining the factors affecting it. With that, this study will be focused on the medication practices of mothers, specifically, in giving unprescribed antibiotics to their children.

2. Objectives of the Study

The main objective of this study was to identify the factors that were associated with parental self-medication using antibiotics among Filipino mothers who visit health centers in Manila.

3. Materials and Methods

3.1. Research design and methods

A cross-sectional, descriptive design was employed by the study to describe the factors associated with parental self-medication using antibiotics among Filipino mothers visiting the health centers in Manila. The population of the study was mothers who are residents of the six districts of Manila City. The inclusion criteria are mothers with children 18 years old and below who were in the health center for consultation, willingness to participate in the study, a resident of any district in Manila and able to comprehend questions and express information.

The sampling technique used was purposive sampling and the sample size was computed from the total number of households in Manila. A sample size of 384 respondents was computed. The sample size was divided into six representing the six districts of the city to make the study representative. It was further divided into three, pertaining to the three health centers of each district

3.2. Instrumentation

A four-page questionnaire served as the instrument for the study. A list of drugs was also presented to the respondents to serve as guide in answering the questions that require the name of drugs used. Some questions on the questionnaire were formulated by the researchers and some were adapted and integrated from Reference 11 and 12. It involved questions with multiple choice and "yes" or "no" questions, and items requiring the respondents to give specific answers. The questionnaire was divided into five parts, which are designed to measure the different variables in the study. The first part of the questionnaire represents the socio-demographic characteristics of mothers. The second part was about the symptoms experienced by their children and the medicines given to them by their mothers. The third part of the questionnaire was devoted on the way the mothers administer the drugs. The fourth part was about the

sources of information and drug procurement of antibiotic used by the mothers. Lastly, the fifth part was assigned to the knowledge of mother about antibiotics. Prior to data collection proper, the questionnaire was pre-tested on ten randomly selected mothers in Sta. Maria, Bulacan.

3.3. Data collection

The purpose and scope of the study was presented to the respondents and the mothers signed a consent form before starting the interview. The method of data collection was conducted through questionnaire-guided interview to the mothers. The interviews were held in the health centers of the barangays selected by the staff of the planning office department of Manila City Hall. The investigators hired student assistants to help in facilitating the data collection process. Prior to engagement with the said interview, student assistants underwent standardized training to avoid deviation of approach on the way of the survey.

3.4. Data analysis

Data analysis was done using descriptive and inferential statistics specifically frequency distribution description, Chi-square test and logistic regression using Stata 13. Logistic Regression was used to test the relationship of factors with continuous variables with parental self-medication. This includes the age of the mothers, monthly income, number of children and the age of their youngest child. Frequency distribution description was used to determine the prevalence of parental self-medication specifically for each symptom and for each antibiotic used in parental self-medication. Chi-square was used to test the association of employment and educational attainment of mothers, sex of children and knowledge on antibiotic use.

3.5. Ethical consideration

This study had undergone the approval of the University of the Philippines Manila Review Ethics Board. Interview using a survey tool tailored for the study was utilized which includes questions that are only within the context of this research. The name of the respondent was not included in the questionnaire proper, instead a case number was written to ensure confidentiality. Respondents' identities or personal details were not disclosed to others, except for research purposes, and all data collected in the

report were not linked to any respondents. The informed consent consists the following elements such as the content and purpose of the study, expected duration of the interview, foreseeable risks and expected benefits to the subjects, which were presented to the respondents so that they may make an informed judgment before continuing with the survey. The researcher maintained any assurances, such as confidentiality or anonymity. One copy of the informed consent was given to the respondents and the researchers kept another copy.

4. Results and Discussion

4.1. Prevalence of antimicrobial parental self-medication

From the 390 mothers from 6 districts of Manila who participated in the study, it was determined that the mean age of mothers was 30.10 years \pm 0.543. Majority (60.00%) of respondents were high school graduate and 72.82% of them were not employed. The mean monthly family income was Php 13,526.10 + 566.258 with 65.64% of the respondents having income less than the minimum wage in Manila (Php 14,730). More than half (55.38%) of the mothers had 1-2 children in the family and the mean number of children was 3. Tables 1 and 2 show the socio-demographic characteristics of 390 Filipino mothers included in the study and the attributes of their youngest children. Among the 390 mothers, 164 declared that they were using antibiotics for their children in treating common illnesses without prescription of a physician. The prevalence of antimicrobial self-medication among the participants of the study was 42.05%. The result of the study was higher than the overall estimate of antimicrobial self-medication in low and middle income countries, which is 38.8 %. [1] However, self-medication patterns vary among different populations, and were influenced by many factors. Such factors include socioeconomic factors, lifestyle, ready access to drugs, increased potential to manage certain illnesses through self-care, and greater availability of medicinal products. [13]

4.2. Antibiotic parental self-medication practices of mothers

Common Symptoms Experienced by Children. As shown in Table 3. fever (97.95%), cough (95.64%) and common colds (94.62%) were the top three illnesses experienced by the children. More than

TABLE 1: Socio-demographic characteristics of 390 Filipino mothers visiting the health centers in Manila.

Sociodemographic characteristics	f	% (n = 390)
Age ($\bar{x} = 30.10 + 0.543$)		
15-29 years old	175	44.87
30-44 years old	157	40.26
45-59 years old	51	13.08
> 60 years old	7	1.79
Educational attainment		
Elementary Graduate	61	15.64
HighSchool Graduate	234	60
College Graduate	94	24.1
Not Mentioned	1	0.26
Employment		
Not Employed	284	72.82
Employed	106	27.18
Monthly income		
< Minimum Wage	256	65.64
Minimum Wage	9	2.31
> Minimum Wage	125	32.05
No. of children		
1-2	216	55.38
4-Mar	116	29.74
> 5	58	14.87

TABLE 2: Attributes of the youngest children of 390 Filipino mothers visiting the health centers in Manila.

Children's attributes	Frequency	% (n = 390)
Sex of Children		
Male	191	48.97
Female	199	51.03
Age of Children		
0-1 month (neonates)	10	2.56
2 months -2 years (infants)	190	48.72
3-6 years (Children)	104	26.67
7-12 (Children)	51	13.08
13-18 (Children)	35	8.97

half of the children experienced wound (70.77%), diarrhea (67.69%), and sore throat (50.51%). This study revealed that fever and upper respiratory diseases such as cough and colds were commonly experienced by the children. Gastrointestinal tract diseases

TABLE 3: Common symptoms experienced by children.

Symptoms	f	% (n = 390)
Fever	383	97.95
Cough	373	95.64
Common colds	369	94.62
Wound	276	70.77
Diarrhea	264	67.69
Sore throat	197	50.51
Vomiting	174	44.62
Other symptoms	48	12.31

TABLE 4: Prevalence of parental self-medication of mothers for each symptom experienced by children.

Symptoms	f	% (n = 164)
Cough	52	33.54
Wound	47	28.66
Sore throat	44	26.83
Common colds	10	6.10
Diarrhea	5	3.05
Fever	3	1.83
Other symptoms	3	1.83
Vomiting	2	1.22

such as diarrhea and vomiting were also recorded. This was consistent with the study conducted in Barangay Tandang Sora, Quezon City, where fever, throat irritation and cough reflex were found as common symptoms experienced by the children. [12] Antimicrobial self-medication was practiced by mothers mainly for cough (33.54%) followed by wound (28.66%), sore throat (26.83%), common colds (6.10%), diarrhea (3.05%), fever (1.83%), other symptoms (1.83%) and lastly, vomiting (2%) as shown in Table 4. This was in accordance to the results in Ethiopia wherein the most common health problem reported was respiratory tract symptoms (30.2%). Parallel with this, respiratory tract symptoms (74.6%), diarrhea (74.4%), and physical injury/wound (64.3%) were the three main reasons that the respondents had used antibiotics inappropriately. [14] In an earlier study, parents tend to practice self-medication for their children in cases of URTI such as cough, sore throat and flu or common cold. [15]

TABLE 5: Common OTC medicines used by mothers to treat each symptom experienced by children.

Symptoms	Generic name	f	%
Fever	Paracetamol	363	95.03
	Ibuprofen	1	0.26
	Phenylephrine/Chlorphenamine/ /Paracetamol	1	0.26
Cough	Ambroxol	81	21.72
	Carbocisteine	67	17.96
	Salbutamol	52	13.94
Common colds	Phenylephrine/ Chlorphenamine/ Paracetamol	107	29
	Phenylephrine/ Chlorphenamine	54	14.63
	Cetirizine	22	5.96
	Mefenamic Acid	3	1.09
	Cetirizine	2	0.72
Wound	Carbocisteine	1	0.36
	Oral Rehydration Solution	71	26.89
	Loperamide	25	9.47
Diarrhea	<i>Bacillus clausii</i>	5	1.89
	Dichlorobenzyl alcohol/Amylmetacresol	5	2.54
	Ambroxol	4	2.03
	Diphehydramine	1	0.51
Sore throat	Oral Rehydration Salts	31	17.82
	Albendazole	1	0.57
	Aluminum hydroxide/Magnesium hydroxide	1	0.57
Vomiting	Salbutamol	4	8.33
	Cetirizine	1	2.08
	Ferrous Sulfate	1	2.08

4.2.1. Drugs used in treating the symptoms experienced by the children

Table 5 presents the list of the common over-the-counter (OTC) drugs used by mothers to treat common conditions of their children. The primary drug used for fever was paracetamol (95.03%). In managing cough and common colds, the most common OTC

drugs used were ambroxol (21.72%) and combination drug of phenylephrine, chlorphenamine, and paracetamol (29.0%), respectively.

TABLE 6: Common Antibiotics used by mothers to treat each symptom experienced by children.

Symptoms	Generic name	f	%
Fever	Amoxicillin	6	1.57
	Cephalexin	1	0.26
Cough	Amoxicillin	78	20.91
	Cephalexin	17	4.56
	Co-Amoxiclav	13	3.49
Common colds	Amoxicillin	7	1.9
	Cephalexin	3	0.81
	Azithromycin	1	0.27
Wound	Amoxicillin	47	17.03
	Cloxacillin	8	2.9
	Penicillin	7	2.54
Diarrhea	Co-trimoxazole	7	2.65
Sore throat	Amoxicillin	55	27.92
	Erythromycin	18	9.14
	Cephalexin	10	5.08
Vomiting	Amoxicillin	3	1.72
	Co-trimoxazole	2	1.15
	Cefuroxime	1	0.57
Others	Co-Amoxiclav	1	2.08
	Cephalexin	1	2.08

Misconceptions were observed especially on medications used for cough and common colds. Salbutamol, a selective beta-2 adrenoceptor agonist, was used by the respondents in managing cough and colds of their children. Salbutamol is indicated for treatment of and prevention of bronchospasm in asthma, bronchitis and emphysema and incorrect use may cause palpitations and muscle cramps. Table 6 shows the antibiotics used by mothers either prescribed or not prescribed by doctor in managing diseases of their children. Amoxicillin was the top antibiotic used for cough (20.91%), wound (17.03%) and sore throat (27.92%). The second common antibiotic used was cephalexin. The said drug was used for fever (0.26%), cough (4.56%), common colds (1.90%), sore throat (5.08%), vomiting (1.72%) and other symptoms (2.08%). Amoxicillin and cephalexin were used for simple fever and common colds which are not common indications of the said drugs. Inappropriate use of antibiotics often arises from failure to define accurately the objectives for which the agent is given or from

lack of knowledge of the properties of the drug. Oregano was the most common herbal medicine for fever (0.52%), cough (1.08%) and common colds (5.90%).

TABLE 7: Common Herbal medicines used by mothers to treat each symptom experienced by children.

Symptoms	Herbal medicine	f	%
Fever	Oregano	2	0.52
	Ampalaya	1	0.26
Common cold	Oregano	4	1.08
	Calamansi	3	0.81
	Lagundi	2	0.54
Wounds	Malunggay	3	1.09
	Bayabas	1	0.36
	Oregano	1	0.36
Vomiting	N/A	0	0
Cough	Oregano	22	5.9
	Lagundi	11	2.95
	Bresol (Turmeric – Curcuma Longa)	1	0.27
		1	0.27
Diarrhea	Bayabas	2	0.76
	Avocado	1	0.38
Sore throat	Papaya	1	0.5
	Ginger	1	0.5
Other symptoms	N/A	0	0

4.2.2. Common antibiotics used in parental self-medication

Among the mothers who self-medicated using antibiotics, amoxicillin was most commonly used to treat common symptoms of their children such as sore throat (13.20%), cough (9.92%), wound (9.78%), common cold (1.36%) and fever (0.52%). Majority of the mothers preferred amoxicillin in treating symptoms like sore throat, cough, common cold, fever and wounds. This is consistent with a study of parental self-medication made in Baghdad, where amoxicillin and other broad spectrum antibiotics were the most commonly used by parents because of the low cost and the wide prescription of this drug by the doctors. [15] Amoxicillin was followed erythromycin for treating sore throat (5.08%) then followed by penicillin and cephalixin for treatment of wound (2.90%) and cough (2.14%), respectively. Various studies in Saudi Arabi and Europe stated that, penicillins, cephalosporins and macrolides were also found to be the most commonly used antibiotics. They also stated that other antibiotics were also

TABLE 8: Common Antibiotics used by mothers in self-medicating the symptoms experienced by children.

Symptoms	Generic Name	F	%
Fever	Amoxicillin	2	0.52
	Cephalexin	1	0.26
Common Cold	Amoxicillin	5	1.36
	Cephalexin	3	0.81
	Cloxacillin	1	0.27
Wound	Amoxicillin	27	9.78
	Penicillin	8	2.9
	Co-trimoxazole	2	0.72
Vomiting	Cephalexin	1	0.57
	Cloxacillin	1	0.57
Cough	Amoxicillin	37	9.92
	Cephalexin	8	2.14
	Co-trimoxazole	4	1.072
Diarrhea	Co-trimoxazole	4	1.52
	Metronidazole	2	0.75
Sore Throat	Amoxicillin Erythromycin	26	13.2
	Co-Amoxiclav	10	5.08
	Cephalexin	2	1.02
Other symptoms	Cloxacillin	1	2.08
	Co-Amoxiclav	1	2.08
	Co-trimoxazole	1	2.08

consumed despite its higher cost than many antibiotics because the parents might be satisfied of its action after short term use against many infectious conditions. [16]

4.2.3. Correct or incorrect use of antibiotics

This study found that incorrect usage is always higher than the proper administration in all antibiotics utilized by the mothers to treat the symptoms of their children as shown in Table 9.

It is also notable that incorrect use of penicillin is due to the wrong practice of using the powder inside of a capsule and applies it topically. The indication, duration and frequency of each antibiotic used were assessed based from Monthly Index of Medical Specialties (MIMS), if it were correctly or incorrectly used by the mothers. The effectiveness of antibiotics is threatened by antimicrobial resistance that can arise from not optimizing the therapy through discontinuation of the full course of treatment.

TABLE 9: Proportions of mothers with correct and incorrect use of the most common antibiotics in treating the illness of their children.

Generic name	f	Correct use	%	Incorrect use	%
Amoxicillin	196	90	45.92	102	54.08
Cephalexin	33	12	36.34	21	63.64
Co-amoxiclav	24	13	54.17	11	45.83
Erythromycin	19	9	47.37	10	52.63
Co-trimoxazole	16	7	43.75	9	56.25
Cloxacillin	14	4	28.57	8	57.14
Penicillin	8	0	0.00	8	100.00
Cefuroxime	7	2	40.00	5	71.43

Several studies found that the reasons for discontinuation of antibiotics may be due to lack of knowledge and awareness regarding antibiotic use. In a study conducted in Ethiopia, 27% of the respondents discontinued their antibiotics once the symptoms subside. [14] In accordance to this, incorrect use of antibiotics can be attributed to the lack of understanding that inadequate and misuse of the said group of medicines is related to antibiotic resistance. In an Italian study, it was found that only 9.8% of the population in rural areas of Sindh were aware about the correct definition of antibiotic resistance and only 21.2% knew the appropriate consumption of antibiotics. [16] Another study conducted in Jordan revealed that a significant percentage of their population (38.5%) agreed that antibiotics effectiveness would not be affected by antibiotic misuse, which is defined as not completing the full course of antibiotic, and only 36.0% agreed that antibiotics would not be effective if they were overused. [17]

4.3. Sources of antibiotic information of mothers

From the results of this study, it was revealed that most of the mothers pertained this to the previous consultations to physicians and health centers which represented as other sources (42.68%) were the most common sources of health information. A study conducted in Palestine supported this result as they found that physicians (61.6 %) were the main source of information regarding antibiotics of parents, followed by their pharmacist (34.3 %); other sources, such as television, newspapers, and family members and friends accounted only for 2.8 % of parents' sources of information. [18] Another study conducted in Abu Dhabi, showed that health care professionals were the main source of antibiotic information. [19] Other sources were followed by old prescriptions (28.66%) and advice of relatives (23.17%). In an earlier study, 41.1%

TABLE 10: Sources of antibiotic information of mothers who practice parental self-medication using antibiotics.

Sources of knowledge	f	% (n = 164)
Other sources	70	42.68
Old prescriptions	47	28.66
Relatives	38	23.17
Prescription of other people with the same condition	13	7.93
Medical books	5	3.05
Commercials	2	1.22
Internet	1	0.61

of the parents had the perception that their child was exposed previously to the same current ailment, therefore they considered that they will be having the same prescription if they visited the physician. This makes them considered that they had good experience and became familiar with the appropriate antibiotics for managing this current condition. The less frequently sources of information of mothers in this study were medical books, commercials and internet. Xiang et al. identified media (e.g., television) as the main source of such information about use or misuse of antibiotics. [20]

4.4. Sources of antibiotics of mothers

TABLE 11: Sources of antibiotics of mothers who practice parental self-medication.

Sources of antibiotics	f	% (n = 164)
Community pharmacy	140	85.37
Health center	38	23.17
Grocery	2	1.22
Excess medicine	1	0.61
Relatives	1	0.61
Medical mission	2	1.22
Other sources	2	1.22

Table 11 shows that community pharmacies (85.37%) were the main source of antibiotics by mothers who practice parental self-medication. This implies that mothers can purchase antibiotics in pharmacies even without the prescription of the physicians. Moreover, our study presented that the antibiotics used for self-medication of the mothers were gathered from the health centers of their respective barangays. In

the study carried out in Guatemala City, they also found that most of the antibiotics were obtained from the pharmacies. These results were mirrored by a study carried out in Greece. [16] Also on an earlier study in Abu Dhabi, results showed that there is still an easy access to antibiotics, as 27.8% of the respondents had bought or used antibiotics without prescription, despite the national regulation that strictly enforces antibiotics as prescription-only medicines. Similar condition has been reported by many previous studies and community pharmacies remain the main source of nonprescription antibiotic supply, proving that there is a need for effective tools, enforcing stricter supervision of antibiotic sale. [19] In a similar study about self-medication with antibiotics, it was evaluated that almost one third (28.5%) of parents kept antibiotics at home for emergency use for their children younger than 12 years of age, and almost half (49.0%) of parents indicated that they did use left-over antibiotics (antibiotics remaining from uncompleted previously prescribed courses) without physician consultation. [17] This is congruent to a study where few parents used medications kept at home for the treatment of their children. [15] This finding implies the risk of reduced potency of the antibiotic or even toxicity because in hot climates like Iraq, the stability and shelf life of drugs stored at home may decrease with time. [15] Antibiotic procurement was followed by the health centers (23.17%) from the respective barangays. The rest of the sources of drug procurement were less frequently utilized by the mothers.

4.5. Knowledge of mothers about antibiotics

The questions regarding antibiotics composed was composed of 10 questions about proper antibiotic use (n = 6), antibiotic safety (n = 3), and bacterial resistance (n = 1) that was adapted from a study by Barber (2016). [11] Participants understood that antibiotics are safe to use (79.0%) and are used for treating infection (90.7%) specifically caused by bacteria (77.7%). However, only 36.4 % believed that antibiotics are not used against viral infection and 55.9% understood that antibiotics are not useful in all types of common cold and cough. The mean score of mothers was 7.63 and 63.6% believed that antibiotics can be used against viral infection which is lower percentage than was found in the study conducted in China (79%). [21] Moreover, 44.1% believed that antibiotics are useful against all types of common cold and cough which is like the findings of the study conducted in China (43%). A Mongolian study also has similar results in which most of their respondents believed that antibiotics

TABLE 12: Mothers' knowledge of antibiotics.

Questions (correct response)	Correct response	% (n = 390)
Antibiotics are safe to use (true)	309	79.23
Antibiotics are used for treating infection (true)	354	90.77
Antibiotics are useful against all types of common cold and cough (false)	218	55.90
Antibiotics can help someone who is infected with bacteria (true)	303	77.69
Antibiotics can help someone who is infected with a virus (false)	142	36.41
A person should start antibiotics as soon as they have a fever (false)	290	74.36
Some people are allergic to antibiotics (true)	321	82.31
Antibiotics can cause bad side effects (true)	298	76.41
Antibiotics are like vitamins (false)	345	88.46
When someone takes antibiotics very frequently, it can become more difficult to cure their future infections with antibiotics (true)	202	51.79

TABLE 13: Proportion of mothers with their corresponding scores on knowledge about antibiotics.

Score	f	(%) n = 390
2	1	0.26
3	2	0.51
4	13	3.33
5	14	3.59
6	50	12.82
7	85	21.79
8	102	26.15
9	94	24.10
10	29	7.44

were needed for colds or flu and cough. Past exposure may influence when an antibiotic was previously prescribed for an infection and the child later developed similar

symptoms then mothers might likely use antibiotics. 74.4% believed that a person should not start antibiotics as soon as they have fever. 82.3% knew that antibiotics can cause some people to be allergic and 76.4% knew that antibiotics can cause side effects. Mostly knew that antibiotics are not the same as vitamins (88.4%). Only 51.8% understand the potential of developing antibiotic resistance from improper use of antibiotics. It is notable that even though mothers have good knowledge on antibiotics and understand the concept of antimicrobial resistance, they still choose to practice parental self-medication. This is due to their misconceptions that antibiotics are used for viral infections and all types of colds and cough.

4.6. Factors associated with parental self-medication of antibiotics among mothers

In logistic regression analysis, age of mother was the only factor significantly associated with antibiotic self-medication ($p < 0.029$ OR = 1.02). As the age of the mother increases, the mothers' tendency to self-medicate her child also increases. Similarly, a study conducted in India found that self-medication was 2.07 times more common among 35 years of age and above and the association was statistically significant ($p < 0.016$). [22] However, a Lithuanian study found no significant difference among different age groups. [23] Older mothers have greater experience of consulting physicians thus, there is greater tendency to use previously prescribed medicines to manage the symptoms experienced by their children. The number of children ($p < 0.064$) was not significantly associated with parental self-medication using antibiotics. However, previous studies in Sri Lanka found that the frequency of self-medication positively correlated with number of children in which the incidence of self-medication was significantly lower among mothers with one child compared with mothers having two or more children. [24] Other factors such as children's age ($p < 0.516$) and children's sex ($p < 0.496$) were not significantly associated with antibiotic self-medication. Togoobaatar et al (2010) found that likelihood of treating the child with non-prescribed antibiotics increased with children's age. It was explained by Alele (2015) that antibiotic self-medication increases with the child's age because mothers are more cautious about administering drugs to very young children with various fears or reservations. [25] For the children's sex, a study in Yemen reported that female children were more exposed to self-medication than males because Yemen families prefer male children than females so they only seek medical advice for boys. [26] In this study, monthly income ($p < 0.722$), employment ($p < 0.717$), and educational level ($p < 0.270$) were

not significantly associated with antibiotic self-medication. In other studies, monthly income was significantly associated with self-medication. Parents with low economic status tend to self-medicate their children because of high cost clinic visits and lack of medical insurance. [2, 7] Also, studies reported that unemployed mothers tend to self-medicate their children than employed while increase in the education level of mothers tends to increase the practice of self-medicating their children. Knowledge of mothers on antibiotics ($p < 0.161$) was not significantly associated with antibiotic self-medication. Similarly, a Lithuania study found no association between knowledge on antibiotics and self-medication. [23] However, a study in USA reported that poor knowledge on antibiotics was associated with self-medication. [24] In Magnolia, it was found that higher level of knowledge was associated with less likelihood of antibiotic self-medication in children. Studies also showed that parents experience and knowledge level influences antibiotic self-medication which means that parents who medicated themselves with antibiotic were more likely to self-medicate their children. [28]

4.7. Limitations of the study

This study has several limitations. The results of this study are limited only in the sample population studied and cannot be generalized to the whole population of Philippines since the study employed convenience sampling. Furthermore, the data was collected from mothers attending the health care center which limits the generalizability of the results to other types of health services such as the private sectors. Recall bias is also present in this study since the respondents may not accurately recall the symptoms experienced and medication used by their children. To minimize this bias, the researchers provided a list of the most commonly used over the counter drugs and antibiotics. Limitation in the analysis on the correctness of dosage regimen was also present because dosage regimen analysis was based only on the appropriateness of the age of children due to lack of data on the weight of the children.

5. Conclusion and Recommendation

This study found that the prevalence of parental self-medication using antibiotics among mothers visiting the health centers in Manila City was 42.05%. The age of the mother ($p < 0.029$ OR = 1.02) was the only factor significantly associated with antibiotic self-medication, indicating that as the age of the mother increases, the

mothers' tendency to self-medicate her child also increases. Among the symptoms experienced by children, cough was the most frequent condition, which motivated the mothers to practice self-medication. Amoxicillin was the preferred antibiotic of mothers in treating symptoms like sore throat, cough, common cold, fever and wounds. With the list of antibiotics used by mothers, all had a higher frequency of incorrect use than the appropriate consumption. Thus, the effectiveness of antibiotics is threatened by antimicrobial resistance that can arise from not optimizing the therapy through discontinuation of the full course of treatment. Most of the mothers pertained to the previous consultation to physicians and health centers as the most common sources of antibiotic information and community pharmacies as the main source of antibiotics. The easy access of antibiotics within the pharmacies may indicate that the health care system continues to struggle in enhancing rational antibiotic use. Thus, physicians and pharmacists must act an important role to increase the knowledge about rational antibiotic use in the society and to improve patients' behavior regarding antibiotic use.

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