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## RESEARCH ARTICLE

# Knowledge, Attitude, and Practice toward Antibiotic use with Acute Respiratory Infection among Parents of Children under Five Years

Khwlah F. Shtayyat<sup>1,\*</sup> and Nesrin N. Abu-Baker<sup>1</sup>

<sup>1</sup>School of Nursing, Community and Mental Health Department, Jordan University of Science & Technology, Irbid 22110, Jordan

### Abstract:

#### Background:

Parents are the main caregivers of children with acute respiratory infection (ARI). However, some of them are still unable to differentiate between viral and bacterial infections, which may ultimately lead to the misuse of antibiotics.

#### Objective:

The objective of this study is to assess knowledge, attitudes, and practices (KAP) toward antibiotic use to treat ARI among Jordanian and Syrian refugee parents who have children under five years; and to examine the relationship between KAP and parental socio-demographic variables.

#### Methods:

A descriptive cross-sectional design was used, and a self-administered questionnaire was distributed to a convenience sample of 204 Jordanian and Syrian parents.

#### Results:

60.8% of participants in this study were Jordanians and 39.2% were Syrians. The total score of knowledge toward antibiotic use was 2.85 ( $SD=1.43$ ) out of 7, the score of attitudes was 46.13 ( $SD = 8.65$ ) out of 70, while the score of practice was 17.5 ( $SD = 2.59$ ) out of 25. Spearman's correlation showed that father's and mother's education were positively correlated with attitude and/ or practice scores toward antibiotic use ( $p \leq .05$ ). T-test showed that Jordanian parents had a significantly higher practice score toward antibiotic use than Syrian parents ( $p \leq .05$ ).

#### Conclusion:

There is a need to improve the awareness of parents through health education and to improve health insurance policy. Health education should target parents with low socio-economic status in general, and Syrian refugee parents in particular.

**Keywords:** Knowledge, Attitude, and Practice (KAP), Antibiotic use, Parents, Children under five years, ARI.

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## 1. INTRODUCTION

Antibiotics have saved millions of lives and changed the history of infectious diseases. However, in recent years, antibiotic resistance has become a major global public health problem [1]. Antibiotic resistance challenges the treatment of common infectious diseases and increases mortality rates and treatment costs [2]. Each year, approximately 700,000 deaths occur due to resistant infections [3].

Antibiotic resistance is a natural phenomenon. However, insufficient antibiotic use, poor patient adherence to antibiotics, and insufficient antibiotic regulation increase its prevalence [4]. The main reason for the development of resistance is the insufficient use of antibiotics, especially in developing countries where the use of antibiotics is often not well regulated, which allows self-treatment [5]. Worldwide, more than 50% of antibiotics are purchased from pharmacies or street vendors without a prescription [6].

In general, the Jordanian community has a lack of awareness regarding the use of antibiotics [7]. The public impression of antibiotic use is affected by socioeconomic

\* Address correspondence to this author at the Department of Community and Mental Health Nursing, Faculty of Nursing, Jordan University of Science and Technology, P.O Box 3030, Irbid 22110, Jordan; Tel. +962 2 7201000; Fax +962 2 7201065; E-mail: [kffshtayyat@gmail.com](mailto:kffshtayyat@gmail.com)

considerations [5]. The number of Jordanians who use antibiotics inappropriately and access antibiotics without a prescription has increased. Moreover, they often fail to finish the course of therapy, indicating that antibiotics are being misused. There is a real need for an evaluation study to be carried out in Jordan to avoid the occurrence of bacterial resistance among children. This evaluation should lead to the recommendation of necessary solutions if there is a problem in knowledge, attitudes, and practices (KAP) [7].

Previous studies have shown poor KAP toward antibiotic use among parents of children, where KAP was linked with the sociodemographic status of parents. For example, a cross-sectional study conducted among 239 parents in the United Arab Emirates revealed that 54.4% had a lack of knowledge regarding effectiveness, the role, and indications of antibiotics [8]. 67.2% of the parents believed that antibiotics are used to treat viral infections, and 44.5% believed that misuse of antibiotics could lead to antibiotic resistance. Furthermore, a cross-sectional study among 320 parents in Malaysia revealed that parents' KAP was significantly linked with parental education level and family income [9].

Due to the high prevalence of infectious diseases in children [10], they receive a lot of antibiotics, but parents often administer these drugs inappropriately [7, 10], which is influenced by their knowledge, attitudes, and practices towards these drugs [10]. Some studies indicate important gaps in parents' knowledge of antibiotics: parents believe that these drugs can treat viral infections [8], that antibiotics should be used whenever a child has a fever, and that shorter courses of antibiotics are better for the health of their children [8, 9].

Generally, children consume a large number of antibiotics to treat infections, most of which are acute respiratory infections. There are many reasons for inappropriate antibiotic use in children. In some cases, it may be because the child has previously suffered from an infection that should have been treated with antibiotics, and then, when a similar viral infection develops, it cannot be cured without antibiotics [9]. In addition, antibiotics are started even in cases where the infection is thought to be viral due to the poor geographical conditions of the area where the physician works, lack of equipment, the fear that the patient will not be able to reach the physician easily, or the sick child will not be brought to control [7, 10]. Furthermore, the indifference of parents in pediatric patients and the pressure on pediatricians to prescribe antibiotics also lead to inappropriate antibiotic use [11]. As a result, the administration of antibiotics provides minimal benefit, and sometimes even harm (side effects, resistance, *etc.*) [12, 13].

There is a shortage of research conducted to assess KAP among parents regarding antibiotic use in Jordan, whether among Jordanian nationals or Syrian refugees. Currently, Syrian refugees constitute a good proportion of Jordanian society; there are approximately 660,000 registered Syrian refugees in Jordan [22]. Hence, the objectives of this study were to (1) assess knowledge, attitudes, and practices towards antibiotic use to treat acute respiratory infections among Jordanian and Syrian refugee parents who have children under five years old; (2) examine the relationship between KAP toward antibiotic use and parental socio-demographic

variables, and to find the differences between Jordanian and Syrian refugee parents in terms of their KAP toward antibiotic use.

## 2. MATERIALS AND METHODS

This section presents the research methodology used to conduct this study, which includes research design, population, setting, sampling and sampling method, measurement, data collection and analytics procedures, and ethical considerations.

### 2.1. Study Design and Procedures

A descriptive cross-sectional correlational design was used as the data was collected at one point. The data collection started in December 2021 and finished in February 2022. The primary investigator visited the charity organizations periodically to collect the data.

A self-administered questionnaire was used to measure parents' KAP toward antibiotic use in children under five years in Jordan. The study instrument was adopted from a previous study after taking permission from the original authors Teck *et al* [9]. The tool was obtained in English from the authors and translated into Arabic by a qualified professional English-Arabic translator. The study questionnaire included two main parts; the first is the demographic data; the second is about knowledge, attitudes, and practices toward antibiotic use.

The first section contained 21 items related to parents' demographic characteristics, such as parent's age, gender, nationality, level of education, occupation, and marital status, family income, duration of marriage, total number of children, and family size. Additional items were added to the demographic section, such as the use of the internet and social media, the presence of second-hand smoker at home, and the availability of child health insurance.

The second section was about knowledge, attitudes, and practices toward the use of antibiotics to treat acute respiratory infection. The knowledge part included 7 items with three responses (true, uncertain, and false). The total score was 7 points, as each correct answer receives one point. The attitude part included seven main questions with a total of 14 items. It was measured by a Likert scale ranging from 1 to 5 with a total score of 70 points. Some of the questions were answered by (strongly agree, agree, undecided, disagree, or strongly disagree), while other questions were answered by (always, most of the time, often, sometimes, or never). Finally, the practice part included five items. It was measured by a Likert scale ranging from 1 to 5 with a total score of 25 points according to five responses (always, most of the time, often, sometimes, and never).

### 2.2. Population and Samples

The accessible population is Jordanian and Syrian parents who have children under five years, living in the local community in the city of Irbid and those who attended the local community charities. The inclusion criteria were (1) mothers and/or fathers of Jordanian or Syrian nationality who have at least one child under five years, and (2) live in the city of Irbid in the northern part of Jordan.

The sample size was calculated using the number of variables rule (10 to 20 subjects per variable). However, a total of 216 participants were approached to cover 20% of dropout and missing data. 204 participants were recruited with a 94.4% response rate.

**2.3. Data Management and Statistical Analysis**

The data was analyzed using Statistical Package for Social Science (SPSS) version 22. Descriptive analysis was used to describe the demographic data (means, standard deviations, percentages, and frequencies). Spearman tests were used to examine the correlation between demographic data and parents' KAP toward antibiotic use to treat ARI. Finally, an independent sample t-test was used to compare KAP scores toward antibiotic use between Jordanian and Syrian refugee parents. The level of significance was 0.05.

**3. RESULTS**

**3.1. Study Population and Participant's Characteristics**

Jordanian parents represented 60.8% of the sample (n=124), while Syrian parents represented 39.2% (n=80). Participants' ages ranged from 19 to 56 years, with a mean age of 32.0 years (SD = 6.06). The mothers comprised the largest proportion of the study sample at 70.1% (n=143) (Table 1).

**3.2. Knowledge toward the Use of Antibiotics to Treat Acute Respiratory Infection among Parents of Children Under Five Years**

The results showed that the total mean score of knowledge for both groups (Jordanians and Syrians) was only 2.85 (SD = 1.43) out of 7. The Jordanian mean score was 2.94 (SD = 1.37) whereas the Syrian mean score was 2.73 (SD = 1.51). (Table 2).

**3.3. Attitudes toward the Use of Antibiotics to Treat Acute Respiratory Infection among Parents of Children Under Five Years**

The results showed that the total mean score of attitudes for both groups was 46.13 (SD = 8.65) out of 70. The mean score of Jordanian parents was 46.56 (SD = 8.43), whereas the Syrian mean score was 45.44 (SD = 8.99). (Table 3).

**3.4. Practices toward the Use of Antibiotics to Treat Acute Respiratory Infection among Parents of Children Under Five Years**

The results showed that the total mean score of practices for both groups was 17.5 (SD = 2.59) out of 25. The Jordanian mean score was 17.92 (SD = 2.44) and the Syrian mean score was 16.87 (SD = 2.69) (Table 4).

**Table 1. The socio-demographic characteristics of the study sample (frequencies and percentages of the socio-demographic variables among Jordanian and Syrian parents) (N= 204).**

Socio-demographic Characteristics	Jordanian n (%)	Syrian n (%)	Total n (%)
<b>Father's occupation</b>	-	-	-
Governmental	29 (23.4)	3 (3.8)	32 (15.7)
Private	44 (35.5)	18 (22.5)	62 (30.4)
Military	35 (28.2)	0 (0)	35 (17.2)
Own business	13 (10.5)	23 (28.7)	36 (17.6)
Not working	2 (1.6)	29 (36.3)	31 (15.2)
Day labor	1 (.8)	7 (8.8)	8 (3.9)
<b>Mother's occupation</b>	-	-	-
Working	61 (49.2)	6 (7.6)	67 (32.8)
Not working	63 (50.8)	74 (92.5)	137 (67.2)
<b>Father's educational level</b>	-	-	-
School-level	40 (32.3)	66 (82.5)	106 (51.9)
College level or higher	84 (67.8)	14 (17.5)	98 (48.1)
<b>Mother's educational level</b>	-	-	-
School level	20 (16.1)	59 (73.8)	79 (38.7)
College level or higher	104 (83.9)	21 (26.3)	125 (61.3)
<b>Family income</b>	-	-	-
Less than 500 JD	48 (38.7)	76 (95)	124 (60.8)
Between 500 - 1000 JD	58 (46.8)	3 (3.8)	61 (29.9)
More than 1000 JD	18 (14.5)	1 (1.3)	19 (9.3)
<b>Presence of a smoker in the family household</b>	-	-	-
Yes	74 (59.7)	50 (62.5)	124 (60.8)
No	50 (40.3)	30 (37.5)	80 (39.2)
<b>Presence of health insurance for children</b>	-	-	-
Yes	103 (83.1)	8 (10)	111 (54.4)
No	21 (16.9)	72 (90)	93 (45.6)
<b>Sources of health information</b>	-	-	-

(Table 1) contd....

Socio-demographic Characteristics	Jordanian n (%)	Syrian n (%)	Total n (%)
Doctors	108 (87.1)	70 (87.5)	178 (87.3)
Nurses	60 (48.4)	20 (25)	80 (39.2)
Pharmacist	61 (49.2)	46 (57.5)	107 (52.5)
Social media	49 (39.5)	22 (27.5)	71 (34.8)
Internet	69 (55.6)	39 (48.8)	108 (52.9)
Family relative	36 (29)	27 (33.8)	63 (30.9)
Friends	32 (25.8)	21 (26.3)	53 (26)
Brochures	7 (5.6)	6 (7.5)	13 (6.4)
TV	24 (19.4)	5 (6.3)	29 (14.2)
Other resources	12 (9.7)	14 (17.5)	26 (12.7)
<b>When did you last give your children antibiotics for upper respiratory tract infections?</b>	-	-	-
Never	0 (0)	3 (3.8)	3 (1.5)
Less than 3 months	77 (62.1)	58 (72.5)	135 (66.2)
3 months to less than 6 months	30 (24.2)	6 (7.5)	36 (17.6)
6 months to less than one year	10 (8.1)	9 (11.3)	19 (9.3)
More than one year	7 (5.6)	4 (5)	11 (5.4)
<b>Last time your child had upper respiratory tract infections?</b>	-	-	-
Never	0 (0)	3 (3.8)	3 (1.5)
Less than 3 months	75 (60.5)	59 (73.8)	134 (65.7)
3 months to less than 6 months	31 (25)	4 (5)	35 (17.2)
6 months to less than one year	8 (6.5)	8 (10)	16 (7.8)
More than one year	10 (8.1)	6 (7.5)	16 (7.8)
<b>How frequently has your child had upper respiratory tract infections during the last year?</b>	-	-	-
Never	4 (3.2)	8 (10)	12 (5.9)
Once	31 (25)	11 (13.8)	42 (20.6)
Twice	33 (26.6)	25 (31.3)	58 (28.4)
>2 times	56 (45.2)	36 (45)	92 (45.1)
<b>What kind of therapy would you expect from your pediatrician to suggest when your child has upper respiratory tract infections?</b>	-	-	-
Antibiotics	94 (75.8)	63 (78.8)	157 (77)
Analgesics- Antipyretics	95 (76.6)	62 (77.5)	157 (77)
Antihistamines	41 (33.1)	24 (30)	65 (31.9)
Inhalers	47 (37.9)	42 (52.5)	89 (43.6)
Cough syrup	73 (58.9)	53 (66.3)	126 (61.8)
Other therapies	7 (5.6)	4 (5)	11 (5.4)

Note: n=number, %=percentages

**Table 2. Responses to questions used to measure knowledge score toward antibiotics use with acute respiratory infection among parents (frequencies and percentages of Jordanian and Syrian parents' responses) (N= 204).**

Question in the Questionnaire	Response	Jordanian n (%)	Syrian n (%)	Total n (%)
<b>Q1. Antibiotics should be given to all children who develop a fever.</b>	True	22 (17.7)	17 (21.3)	39 (19.1)
	Uncertain	45 (36.3)	21 (26.3)	66 (32.4)
	False	57 (46)	42 (52.5)	99 (48.5)
<b>Q2. As most of the upper respiratory tract infections (like cold, flu, sore throat, ear infection) are of viral origin, antibiotics should not be given because they are self-limited.</b>	True	48 (38.7)	32 (40)	80 (39.2)
	Uncertain	55 (44.4)	34 (42.5)	89 (43.6)
	False	21 (16.9)	14 (17.5)	35 (17.2)
<b>Q3. Children with flu-like symptoms get better faster when antibiotics are given.</b>	True	54 (43.5)	37 (46.3)	91 (44.6)
	Uncertain	47 (37.9)	32 (40)	79 (38.7)
	False	23 (18.5)	11 (13.8)	34 (16.7)
<b>Q4. Scientists can produce new antibiotics that can kill resistant bacteria.</b>	True	51 (41.1)	36 (45)	87 (42.6)
	Uncertain	63 (50.8)	41 (51.2)	104 (51)
	False	10 (8.1)	3 (3.8)	13 (6.4)
<b>Q5. Antibiotics do not have any side effects.</b>	True	8 (6.5)	12 (15)	20 (9.8)
	Uncertain	23 (18.5)	23 (28.7)	46 (22.5)
	False	93 (75)	45 (56.3)	138 (67.6)
<b>Q6. Inappropriate use of antibiotics reduces their efficacy and drives bacterial resistance.</b>	True	80 (64.5)	39 (48.8)	119 (58.3)
	Uncertain	31 (25)	26 (32.5)	57 (27.9)
	False	13 (10.5)	15 (18.8)	28 (13.7)

(Table 2) contd....

Question in the Questionnaire	Response	Jordanian n (%)	Syrian n (%)	Total n (%)
Q7. Antibiotic use can prevent complications from upper respiratory tract infections.	True	65 (52.4)	38 (47.5)	103 (50.5)
	Uncertain	47 (37.9)	29 (36.3)	76 (37.3)
	False	12 (9.7)	13 (16.3)	25 (12.3)

Note : n=number, %=percentages Right Response highlighted in Bold( B )

Table 3. Responses to questions used to measure attitude score toward antibiotics use with acute respiratory infection among parents (frequencies and percentages of jordanian and syrian parents' attitude responses) (N= 204)

Question in the Questionnaire	Response	Jordanian n (%)	Syrian n (%)	Total n (%)
Q1. How often would you like your pediatrician to prescribe antibiotics for your child when he/she suffers from:	-	-	-	-
A. Cold	Always	19 (15.3)	5 (6.3)	24 (11.8)
	Most of the time	10 (8.1)	14 (17.5)	24 (11.8)
	Often	19 (15.3)	16 (20.1)	35 (17.2)
	Sometimes	43 (34.7)	28 (35.0)	71 (34.8)
	<b>Never</b>	33 (26.6)	17 (21.3)	50 (24.5)
B. Nose drainage	Always	8 (6.5)	7 (8.8)	15 (7.4)
	Most of the time	12 (9.7)	10 (12.5)	22 (10.8)
	Often	17 (13.7)	9 (11.3)	26 (12.7)
	Sometimes	36 (29)	22 (27.5)	58 (28.5)
	<b>Never</b>	51 (41.1)	32 (40)	83 (40.7)
C. Sore throat	Always	30 (24.2)	17 (21.3)	47 (23)
	Most of the time	31 (25)	18 (22.5)	49 (24)
	Often	33 (26.6)	24 (30.1)	57 (27.9)
	<b>Sometimes</b>	29 (23.4)	19 (23.8)	48 (23.5)
	Never	1 (8)	2 (2.5)	3 (1.5)
D. Cough	Always	15 (12.1)	11 (13.8)	26 (12.7)
	Most of the time	22 (17.7)	12 (15)	34 (16.7)
	Often	36 (29)	16 (20.1)	52 (25.5)
	Sometimes	28 (22.6)	20 (25)	48 (23.5)
	<b>Never</b>	23 (18.5)	21 (26.3)	44 (21.6)
E. Vomiting	Always	16 (12.9)	11 (13.8)	27 (13.2)
	Most of the time	16 (12.9)	8 (10)	24 (11.8)
	Often	26 (20.9)	22 (27.6)	48 (23.5)
	Sometimes	28 (22.6)	15 (18.8)	43 (21.1)
	<b>Never</b>	38 (30.6)	24 (30)	62 (30.4)
F. Fever	Always	49 (39.5)	24 (30)	73 (35.8)
	Most of the time	24 (19.3)	21 (26.3)	45 (22.1)
	Often	21 (16.9)	7 (8.8)	28 (13.7)
	Sometimes	20 (16.1)	18 (22.5)	38 (18.6)
	<b>Never</b>	10 (8.1)	10 (12.5)	20 (9.8)
G. Ear pain	Always	39 (31.5)	20 (25)	59 (28.9)
	<b>Most of the time</b>	32 (25.8)	24 (30)	56 (27.5)
	Often	32 (25.8)	13 (16.3)	45 (22.1)
	Sometimes	19 (15.3)	17 (21.3)	36 (17.7)
	Never	2 (1.6)	6 (7.5)	8 (3.9)
Q2. How often would you give your child antibiotics without the pediatricians' advice, for the following reasons?	-	-	-	-
A. Because you did not have enough spare time to visit a pediatrician, or because you did not have enough money to pay for the visit.	Always	9 (7.3)	3 (3.8)	12 (5.9)
	Most of the time	14 (11.3)	11 (13.8)	25 (12.3)
	Often	29 (23.4)	17 (21.3)	46 (22.5)
	Sometimes	36 (29.1)	34 (42.5)	70 (34.3)
	<b>Never</b>	36 (29)	15 (18.8)	51 (25)
B. Because you thought that your child's condition was not serious enough.	Always	8 (6.5)	4 (5)	12 (5.9)
	Most of the time	17 (13.7)	14 (17.5)	31 (15.2)
	Often	42 (33.9)	37 (46.3)	79 (38.7)
	Sometimes	33 (26.6)	18 (22.5)	51 (25)
	<b>Never</b>	24 (19.4)	7 (8.8)	31 (15.2)

(Table 3) contd....

Question in the Questionnaire	Response	Jordanian n (%)	Syrian n (%)	Total n (%)
Q3. Would you change your pediatrician because of not prescribing as many antibiotics as you think he/she should?	Strongly disagree	38 (30.6)	9 (11.3)	47 (23)
	Disagree	67 (54)	48 (60)	115 (56.4)
	Neither/nor	7 (5.6)	12 (15)	19 (9.3)
	Agree	8 (6.5)	10 (12.5)	18 (8.8)
	<b>Strongly agree</b>	4 (3.2)	1 (1.3)	5 (2.5)
Q4. Would you change your pediatrician because whenever you visit him/her, he/she keeps prescribing antibiotics?	Strongly disagree	2 (1.6)	9 (11.3)	11 (5.4)
	Disagree	33 (26.6)	19 (23.8)	52 (25.5)
	Neither/nor	13 (10.5)	12 (15.1)	25 (12.3)
	Agree	58 (46.8)	34 (42.5)	92 (45.1)
	<b>Strongly agree</b>	18 (14.5)	6 (7.5)	24 (11.8)
Q5. Would you reuse any leftover antibiotics whenever your child presents with similar symptoms of upper respiratory tract infections?	Strongly disagree	47 (37.9)	22 (27.5)	69 (33.8)
	Disagree	50 (40.3)	31 (38.8)	81 (39.7)
	Neither/nor	15 (12.1)	7 (8.8)	22 (10.8)
	Agree	11 (8.9)	19 (23.8)	30 (14.7)
	<b>Strongly agree</b>	1 (8)	1 (1.3)	2 (1.0)
Q6. Do you think that most of the upper respiratory tract infections resolve without antibiotic administration because they are self-limited?	Strongly disagree	12 (9.7)	7 (8.8)	19 (9.3)
	Disagree	43 (34.7)	22 (27.5)	65 (31.9)
	Neither/nor	27 (21.8)	27 (33.8)	54 (26.5)
	Agree	33 (26.6)	23 (28.7)	56 (27.5)
	<b>Strongly agree</b>	9 (7.3)	1 (1.3)	10 (4.9)
Q7. Would you request an antibiotic prescription if your child suffers from frequent upper respiratory tract infections?	Strongly disagree	10 (8.1)	3 (3.8)	13 (6.4)
	Disagree	34 (27.4)	17 (21.3)	51 (25)
	Neither/nor	26 (21)	21 (26.3)	47 (23.1)
	Agree	44 (35.5)	35 (43.8)	79 (38.7)
	<b>Strongly agree</b>	10 (8.1)	4 (5)	14 (6.9)

Note : n=number, %=percentages The highest score response highlighted in Bold ( B ) Q1 include seven sub questions (A-G), Q2 include two sub questions (A-B)

Table 4. Responses to questions used to measure knowledge score toward antibiotics use with acute respiratory infection among parents (frequencies and percentages of jordanian and syrian parents' responses) (N= 204).

Question in the Questionnaire	Response	Jordanian n (%)	Syrian n (%)	Total n (%)
Q1. How often do you ask your pediatrician whether or not the prescription of antibiotics is necessary?	Always	51 (41.1)	25 (31.3)	76 (37.3)
	Most of the time	30 (24.2)	23 (28.7)	53 (26)
	Often	27 (21.8)	15 (18.8)	42 (20.6)
	Sometimes	14 (11.3)	15 (18.8)	29 (14.2)
	<b>Never</b>	2 (1.6)	2 (2.5)	4 (2)
Q2. How often do you directly ask your pediatrician to prescribe antibiotics?	Always	3 (2.4)	5 (6.3)	8 (3.9)
	Most of the time	12 (9.7)	17 (21.3)	29 (14.2)
	Often	24 (19.4)	16 (20)	40 (19.6)
	Sometimes	50 (40.3)	23 (28.7)	73 (35.8)
	<b>Never</b>	35 (28.2)	19 (23.8)	54 (26.5)
Q3. How often do you completely follow all the pediatrician's instructions and advice?	<b>Always</b>	70 (56.5)	41 (51.2)	111 (54.4)
	Most of the time	31 (25.0)	12 (15.0)	43 (21.1)
	Often	14 (11.3)	20 (25.0)	34 (16.7)
	Sometimes	4 (3.2)	5 (6.3)	9 (4.4)
	Never	5(4.0)	2(2.5)	7(3.4)
Q4. How often do you insist on your pediatrician prescribing antibiotics as a precaution even if there is no confirmed diagnosis?	Always	4 (3.2)	6 (7.5)	10 (4.9)
	Most of the time	8 (6.5)	9 (11.3)	17 (8.3)
	Often	11 (8.9)	12 (15.0)	23 (11.3)
	Sometimes	36 (29.0)	22 (27.5)	58 (28.4)
	<b>Never</b>	65 (52.4)	31 (38.8)	96 (47.1)
Q5. How often does your pediatrician inform you about your child's disease and notify you whether it is necessary or not to receive antibiotics?	<b>Always</b>	28 (22.6)	22 (27.5)	50 (24.5)
	Most of the time	37 (29.8)	11 (13.8)	48 (23.5)
	Often	39 (31.5)	19 (23.8)	58 (28.4)
	Sometimes	15 (12.1)	23 (28.7)	38 (18.6)
	Never	5 (4.0)	5 (6.3)	10 (4.9)

Note : n=number, %=percentages The highest score response highlighted in Bold ( B )

**Table 5. Correlation Between the socio-demographic variable and knowledge, attitudes, and practices toward antibiotics use with acute respiratory infection (N= 204).**

KAP Variables	Socio-Demographic Variable	Correlation r	P-value
Knowledge toward the use of antibiotics	Total number of children	0.034	0.631
	Family income	0.055	0.43
	Father's education	0.03	0.667
	Mother's education	.01	0.886
Attitudes toward the use of antibiotics	Total number of children	-0.018	0.795
	Family income	0.061	0.39
	Father's education	0.174	0.013*
	Mother's education	0.199	0.004*
Practices toward the use of antibiotics	Total number of children	-0.109	0.12
	Family income	0.043	0.539
	Father's education	0.093	0.185
	Mother's education	0.175	0.012*

Abbreviations: KAP; Knowledge, attitude, practices \*: Level of significant (P value ≤ .05)

**3.5. The Relationship between Demographic Variables and Knowledge, Attitudes, and Practices Scores toward Antibiotics use**

The Spearman's correlation was used to test the correlation between knowledge, attitude, and practice scores toward antibiotic use with acute respiratory infection (parent's gender, father's education level, and mother's education level). The parent's gender was positively and significantly correlated only with attitudes toward the use of antibiotics ( $r=0.166, p=0.018$ ). Mothers had a significantly higher mean score 47.16 ( $SD=8.16$ ) compared to fathers' mean score which stands at 43.7 ( $SD=9.32$ ). The results revealed a positive significant correlation between father's education and attitude toward antibiotic use ( $r= 0.174, p= 0.013$ ). Besides, the results showed a positive significant correlation between mother's education level and attitude ( $r= 0.199, p= 0.004$ ) and practices towards the use of antibiotics ( $r= 0.175, p= 0.012$ ), as shown in Table 5.

**3.6. Differences between Jordanian and Syrian Parents' Knowledge, Attitudes, and Practices toward Antibiotics use**

An independent sample t-test was used to test the difference between Jordanian and Syrian parents' knowledge, attitudes, and practices towards the use of antibiotics to treat acute respiratory infection. The results showed no significant differences between the Jordanian parents ( $mean= 2.94, SD= 1.37$ ) and the Syrian parents ( $mean=2.73, SD= 1.51$ ) in terms of their knowledge toward the use of antibiotics to treat ARI [ $t(202)= 1.028, p= 0.3$ ]. Similarly, there were no significant differences between Jordanian parents ( $mean= 46.6, SD=8.42$ ) and Syrian parents ( $mean= 45.5, SD= 8.99$ ) in terms of their attitudes toward the use of antibiotics to treat ARI [ $t(202)= 0.904, p=0.37$ ]. Conversely, the results showed a significant difference between the Jordanian parents ( $mean= 17.93, SD= 2.44$ ) and the Syrian parents ( $mean= 16.88, SD= 2.697$ ) in terms of their practices toward the use of antibiotics to treat ARI. Jordanians had a significantly higher mean score compared to Syrians [ $t(202)= 2.88, p= 0.004$ ].

**4. DISCUSSION**

This study was conducted to assess the KAP toward antibiotic use. Close to half of the parents believe that once a child has a fever, antibiotics must not be given. This finding is in contrast with the study that was conducted in Saudi Arabia

which revealed that the majority of parents had good knowledge about the use of antibiotics with the febrile child. The finding of this study indicated that less than half of parents reported adequate knowledge regarding the administration of antibiotics for a viral infection such as cold, flu, or sore throat as the illness is self-limited. The same study in Saudi Arabia by Alwahhabi *et al.* [12] showed that less than half of parents had a good knowledge about ARI causes, such as the virus. It is noteworthy that a small percentage of parents are well aware that antibiotics do not help children to recover quickly in cases where they are suffering from flu-like symptoms. This finding is slightly lower in percentage than a Palestinian study by Zyoud *et al.* which showed that almost 25% of the sample disagreed with giving antibiotics to children to help them recover faster from flu-like conditions [14]. These results resembled the findings of a study conducted in United Arab Emirates by Salama *et al.* which showed that approximately 50% of participants agreed that antibiotic resistance develops because of antibiotics misuse [8].

The analysis indicated that Jordanian and Syrian parents scored 46 out of 70 for attitude. The level of attitude in this study is lower than in a study in Greece by Lakshmi *et al.* where most mothers (92%) reported a moderately good overall attitude [15]. This may be because the study was conducted in a Western country, where the population enjoys a higher quality of life than that of most people in Jordan. Additionally, the Jordanian population needs a comprehensive national campaign to educate parents about the use of antibiotics. Furthermore, in the current study, Syrian parents were found to have a lower attitude score than Jordanian parents. This can be explained based on the demographic data of this study, including the lack of health insurance for Syrian children and the low level of income, which promotes self-medication without doctor consultation. According to a study conducted in United Arab Emirates by Salama *et al.* [8], parents without health insurance and with low incomes have a strong tendency to administer medicine at home or buy an antibiotic from the pharmacy to save money.

In the current study, one third of participants reported that among the reasons for administering the antibiotic without a doctor's consultation is that sometimes there was not enough time to visit the doctor or no money to pay the fee, particularly among Syrian parents. This may be attributed to the unavailability of health insurance for their children in

comparison to Jordanian children who have health insurance from the Jordanian MOH until the age of six years. Furthermore, more than half of parents thought that sometimes or often they considered their child's condition not serious enough to warrant a visit to the doctor, so they administered an antibiotic on their own responsibility. In concordance, a study in Palestine Zyoud *et al.* showed that 24.7% of parents used antibiotics as self-medication due to financial difficulties or insufficient time. In addition, 50.6% would give antibiotics to their children because they believed symptoms were not as harmful as they thought [14]. The data suggested that most parents strongly disagreed and disagreed with changing pediatricians because they didn't prescribe as many antibiotics as they thought they should. This finding is somewhat relevant to a result of a study in Oman by Al Hashmi *et al.* [16] which showed that 66% of responders disagreed about changing physicians for this reason. Additionally, the results showed that more than half of parents (57%) agreed and strongly agreed that they would change their pediatrician since he/she keeps prescribing antibiotics. The results of the current study are more promising than the results of a study in Oman Al Hashmi *et al.* which showed only 22.9% agreed with switching doctors if they consistently prescribed antibiotics. In this study, most parents (73.5%) strongly disagreed and disagreed that they would reuse any leftover antibiotics whenever the child exhibits ARI symptoms. The result reflects the findings of a study conducted in Oman by Al Hashmi *et al.* which showed that 75.8% of participants disagreed with utilizing the remaining antibiotics [16]. The result of this study revealed that both Jordanian and Syrian parents reported a practice score of 17.5 out of 25 toward the use of antibiotics to treat ARI. In comparison, an Egyptian study by Mansour *et al.* found that more than half of parents (53.3%) reported inappropriate practices toward antibiotic use with ARI [17]. However, the Jordanian parents reported better practices than the Syrian parents. The reason may be attributed to the fact that the Jordanian sample in this study had a higher education level. For example, the majority of Jordanian mothers (83.9%) had a college or higher level of education, while less than 25% of Syrian mothers had a college or higher level of education. Likewise, the percentage of highly educated fathers in the Jordanian sample is higher than in the Syrian one. To support this, a study in Puerto Rico by Hernández-Díaz *et al.* showed that the correct behavior toward antibiotic uses correlates with the higher education level of parents [18]. Hence, inappropriate practice might be due to many factors, such as not allocating enough time from the attending physician to educate parents and the lack of health education specialists in health institutions.

In terms of knowledge, the results revealed no significant relationship between knowledge of antibiotics and any demographic data (parents' education level, family income, number of children, or gender), which is compatible with the finding of a study in Jordan by Abu Hammour *et al.* that discovered no significant differences in parent's knowledge scores depending on gender or educational level [19]. However, this result is contrary to the result of a study conducted in Greece by Panagakou *et al.* which found there was a positive relationship between knowledge of antibiotics and parents' level of education level, family income, and the number of children [20]. For attitude, the findings showed that there was a significant relationship between attitude toward

antibiotics and parent's gender. Mothers were found to have a better attitude than fathers, which is confirmed by a study in Greece by Panagakou *et al.* [20]. There was a significant positive relationship between attitudes toward the use of antibiotics and the father's/mother's level of education, which agrees with the study in Greece by Panagakou *et al.* which confirmed that low level of education may lead to negative attitudes about antibiotics use [20].

For practices, the findings showed that there was a significant positive relationship between practice toward antibiotics and mother's level of education. This finding was confirmed by the study in Greece by Panagakou *et al.* [20]. However, there was no significant relationship between practice and father's education which disagrees with the findings of a study in Malaysia by Teck *et al.* [9]. Although both parents are caregivers of the children, the mother is the person who is most attached to the child and the one who spends the most time with them. Therefore, the best level of her education prepares her for reading and searching for answers regarding the health of her child. This may be an explanation for the relationship of a mother's high education level with her positive attitudes and practices. Furthermore, this explanation is supported by a study in Jordan by Al-Azzam *et al.* [21], which showed that low-income people and people with lower levels of education had higher intentions to use antibiotics.

Obviously, limitation of this study is that the results do not represent the Jordanian community as whole, due to the setting of the study which confines to Irbid city in the northern part of Jordan. Likewise it does not represent the Syrian community comprehensively because there is a big portion of them living in the refugee camps or inside other Jordanian cities, therefore, their socio-economic conditions may differ from those in Irbid city.

There is a shortage of research conducted to assess KAP among parents regarding antibiotic use in Jordan, whether among Jordanian nationals or Syrian refugees. Currently, Syrian refugees constitute a good proportion of Jordanian society; there are approximately 660,000 registered Syrian refugees in Jordan [22]. Hence, the objectives of this study were to (1) assess knowledge, attitudes, and practices towards antibiotic use to treat acute respiratory infections among Jordanian and Syrian refugee parents who have children under five years old; (2) examine the relationship between KAP toward antibiotic use and parental socio-demographic variables, and to find the differences between Jordanian and Syrian refugee parents in terms of their KAP toward antibiotic use.

## CONCLUSION

Overall, the knowledge and attitudes of parents about ARI and the use of antibiotics by both Jordanian and Syrian parents in the city of Irbid are limited. Parental education and income levels were mainly correlated with KAP. Jordanian parents recorded higher attitude and practice scores than Syrian parents. Thus, there is a clear need to improve the awareness of parents through health education and to improve health insurance policies. Health education should target parents with low socio-economic status in general and Syrian refugee parents in particular.

Currently, there is a strong and urgent need to impose a



law prohibiting the dispensation of antibiotics without a prescription from pharmacies because of their possible side effects, the most important of which is bacterial resistance. In line with the recommendations of the World Health Organization to reduce bacterial resistance, infection prevention and control policies, programs, and implementation should be improved [23]. Decision-makers should create a national health policy that regulates the purchase of antibiotics from the pharmacy without a medical prescription. This policy should also regulate medical prescriptions in public and private hospitals and in healthcare centers. Furthermore, serious attention should be paid to developing a children's health insurance policy for Jordanians and Syrians. It is also important to provide a highly qualified specialist physician to diagnosis infectious diseases correctly before antibiotic prescription.

**ABBREVIATION**

**KAP** = Knowledge, Attitudes, and Practices

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Ethical approval for conducting this study was obtained from the Institutional Research Committee (IRB) at Jordan University of Science and Technology.

**HUMAN AND ANIMAL RIGHTS**

No animals were used in this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committees and with the 1975 Declaration of Helsinki, as revised in 2013.

**CONSENT FOR PUBLICATION**

Informed consent was obtained from all participants.

**STANDARDS OF REPORTING**

STROBE guidelines were followed.

**AVAILABILITY OF DATA AND MATERIAL:**

Not applicable.

**FUNDING**

None.

**CONFLICT OF INTEREST**

The authors declare no conflict of interest, financial or otherwise.

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