Parents' Knowledge, Attitudes, and Practices towards Antibiotic Use in Children with Upper Respiratory Tract Infections in Cambodia*

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Abstract

Purpose: Antibiotic misuse in children with upper respiratory tract infections is a challenge in public health. The study aimed to examine the relationships among knowledge, attitudes and practices of parents regarding antibiotic use in this group of children in Cambodia; and the prediction of parents' knowledge, attitudes, sex, education, and family income on the parents' practices.

Design: A cross-sectional survey with correlational predictive design.

Methods: A convenience sampling was used to recruit 258 parents who brought their children under 15 years of age to receive health services at eight health centers in Kandal province, Cambodia. Interview and self-administered questionnaires were used. Data were collected from January to March 2020 and analyzed using descriptive statistics, Pearson correlation coefficient, and multiple regression.

Main findings: Significant relationships between knowledge and attitudes ($r = .48$, $p < .001$), and attitudes and practices ($r = .23$, $p < .001$) were found, except that between knowledge and practices ($r = .11$, $p = .086$). While all study factors accounted for 11% of the variance explained in the parents' practice ($R^2 = .11$), only three factors could significantly predict the practices; that is, attitudes ($\beta = .24$, $p < .01$), female parent ($\beta = .14$, $p < .05$), and years of education ($\beta = -.17$, $p < .05$).

Conclusion and recommendations: Parents' attitudes towards antibiotic use was related to their knowledge and practices; attitudes, sex and education were the predictors of parents' practices. Thus, public-directed programs to promote antibiotic awareness is needed. Information about rational drug use should be given in formal education system. Nurses should also pay greater attention on male parents and well-educated parent during giving advice of antibiotic use.

Keywords: antibiotics, attitudes, knowledge, practices, upper respiratory tract infections

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ความรู้ ทัศนคติ และการปฏิบัติของผู้ปกครองเกี่ยวกับการใช้ยาปฏิชีวนะในเด็กที่มีการติดเชื้อทางเดินหายใจส่วนบนในประเทศกัมพูชา*

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บทคัดย่อ

วัตถุประสงค์: การใช้ยาปฏิชีวนะในเด็กที่มีการติดเชื้อทางเดินหายใจส่วนบนเป็นปัญหาสาธารณสุขที่ท้าทาย การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างความรู้ ทัศนคติ และการปฏิบัติของผู้ปกครองเกี่ยวกับการใช้ยาปฏิชีวนะในเด็กกลุ่มนี้ที่ประเทศกัมพูชา และการทำนายของปัจจัยความรู้ ทัศนคติ เพศ การศึกษาของผู้ปกครอง และรายได้ของครอบครัวต่อการปฏิบัติของผู้ปกครอง

รูปแบบการวิจัย: การสำรวจภาคตัดขวางโดยศึกษาความสัมพันธ์เชิงทำนาย

วิธีดำเนินการวิจัย: กลุ่มตัวอย่างที่เลือกโดยวิธีแบบสะดวกเป็นผู้ปกครองจำนวน 258 คน ที่นำบุตรอายุน้อยกว่า 15 ปี มารับบริการตรวจสุขภาพที่ศูนย์สุขภาพ 8 แห่งในจังหวัด Kandal ประเทศกัมพูชา เก็บข้อมูลด้วยวิธีสัมภาษณ์และใช้แบบสอบถาม ระหว่างเดือนมกราคมถึงเดือนมีนาคม พ.ศ. 2563 วิเคราะห์ข้อมูลโดยใช้สถิติพรรณนา สัมประสิทธิ์สหสัมพันธ์ของเพียร์สัน การวิเคราะห์ถดถอยพหุคูณ

ผลการวิจัย: ผลการวิจัยพบ ความสัมพันธ์อย่างมีนัยสำคัญระหว่างความรู้และทัศนคติ ($r = .48$, $p < .001$) ทัศนคติและการปฏิบัติ ($r = .23$, $p < .001$) ยกเว้นความสัมพันธ์ระหว่างความรู้และการปฏิบัติ ($r = .11$, $p = .086$) ปัจจัยที่ศึกษาทุกตัวร่วมกันอธิบายความแปรปรวนของการปฏิบัติของผู้ปกครองในการใช้ยาปฏิชีวนะได้ร้อยละ 11 ($R^2 = .11$) และมีเพียงสามปัจจัยที่สามารถทำนายการปฏิบัติได้อย่างมีนัยสำคัญ คือ ทัศนคติ ($\beta = .24$, $p < .01$) ผู้ปกครองเพศหญิง ($\beta = .14$, $p < .05$) และจำนวนปีการศึกษา ($\beta = -.17$, $p < .05$) ของผู้ปกครอง

สรุปและข้อเสนอแนะ: ทัศนคติของผู้ปกครองต่อการใช้ยาปฏิชีวนะในเด็กติดเชื้อทางเดินหายใจส่วนบนมีความสัมพันธ์กับความรู้และการปฏิบัติ และทัศนคติ เพศ การศึกษา สามารถทำนายการปฏิบัติของผู้ปกครองได้ ดังนั้นโปรแกรมที่จัดให้กับประชาชนเพื่อส่งเสริมความตระหนักในการใช้ยาปฏิชีวนะจึงเป็นเรื่องจำเป็น รวมถึงการสอนหัวข้อการใช้ยาปฏิชีวนะอย่างสมเหตุผลในระบบโรงเรียน และพยาบาลควรให้ความใส่ใจเป็นพิเศษในการให้คำแนะนำการใช้ยาปฏิชีวนะแก่ผู้ปกครองเพศชายด้วย

คำสำคัญ: ยาปฏิชีวนะ ทัศนคติ ความรู้ การปฏิบัติ การติดเชื้อทางเดินหายใจส่วนบน

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Background and Significance

Upper respiratory tract infections (URTIs) occur commonly in children. In Cambodia, children under 5 years of age exposed 741,763 acute URTIs in 2018 were evaluated at outpatient settings[1]. URTIs can range from mild and self-limiting to life threatening illnesses. Generally, URTIs in children are virus origin, and self-limited; the symptoms can cause fever that make children feel irritable, sluggish, and uncomfortable. In case of uncomplicated URTIs, symptomatic treatment are suggested and antibiotics are not found to provide clinical benefit in the management of such infections[2-3]. However, URTIs are frequently associated with high number of antibiotic misuse in healthcare settings and communities[4]. It is estimated that 80% of antibiotics are consumed in the community and the use is increasing among low-middle income countries (LMICs); and half of community use is probably inappropriate for treating cough and cold[4]. Another study conducted in an outpatient department of one pediatric hospital in Cambodia revealed that 69% of 775 children were given certain medicines by their caregivers 48 hours before presenting at hospital. This study also found 31.7% (246/775) had positive antibiotics in their urine samples, and children with urinary antibiotic activity were more likely to have had a history of fever and cough[5]. Such findings did confirm the misuse of antibiotics in Cambodian community. The misuse of antibiotics is evidently a contributing factor to the development of antibiotic resistance which is not only individual problem but also one of the global concerns in public health. Antibiotic resistance results in huge consequences such as increasing health care cost, rising long hospitalized stay, and increasing morbidity and mortality[6].

Parents' misuse of antibiotics when their children suffers from URTIs includes self-medication with antibiotics, reusing leftover antibiotics, sharing antibiotics, having incomplete full course, obtaining antibiotics from physician through the phone, unfollowing the physician's instruction, expecting and requesting antibiotics from physician[7-11]. For Cambodian parents, especially those living in rural area, they often seek private healthcare providers for the first choice of their health service consumption and purchase the medications (including antibiotics) from nearby private drug stores or drug outlets when their family member or children get fever or mild sickness[12-13]. Such parents' practices imply that parents may have insufficient knowledge and wrong beliefs about antibiotic use. Two qualitative studies revealed that Cambodian people in rural community wrongly understood that antibiotics could cure all internal inflammations, fever, runny nose and cold[13]; and Cambodian physicians also reported that parents from wealthy family preferred expensive and broad spectrum antibiotics for their children due to their belief that expensive antibiotics would be better than the cheaper one and broad spectrum antibiotics would help faster recovery from the illness[14].

Empirical studies revealed that there were associations between knowledge, attitudes, and practices on antibiotic use among parents of children with URTIs[15-18]. Furthermore, demographic factors (for example; sex, education, income) are also reported as factors associated with parent's knowledge, attitudes and practices on antibiotic use in children with URTIs[7,10,19-20]. However, these findings may not be appropriately generalized to knowledge, attitudes and practices of Cambodian parents due to different contexts of healthcare systems, regulations, cultures, custom, living styles, and childrearing practices. Due to none of the studies found in Cambodia examining parents' knowledge, attitudes and practices on antibiotic use in children with URTIs and their associations, it is essential to conduct this study to fill the gap of unknown knowledge in this matter. Therefore, the objectives of this study were to examine (a) the relationship among knowledge, attitudes, and practices of Cambodian parents; and (b) and prediction of knowledge, attitudes and demographic characteristics on practices of Cambodian parents regarding antibiotic use in children with URTIs. The conceptual framework of the study, as seen in Figure 1, was based on the Knowledge (K), Attitudes (A), and Practices (P) survey model[21] and related literature regarding human behavior, knowledge, attitudes, and practices[22] as well as the influential demographic factors on antibiotic use including sex, education and family income[15-16]. The findings of the study would be very useful to inform health policy makers in determining a strategy or an intervention to promote appropriate antibiotic use in children with URTIs. Moreover, the findings of the study will provide key message for nurses who are working at primary health centers to know which characteristics of the parents need to pay attention for providing sufficient and precise information related to antibiotic use.

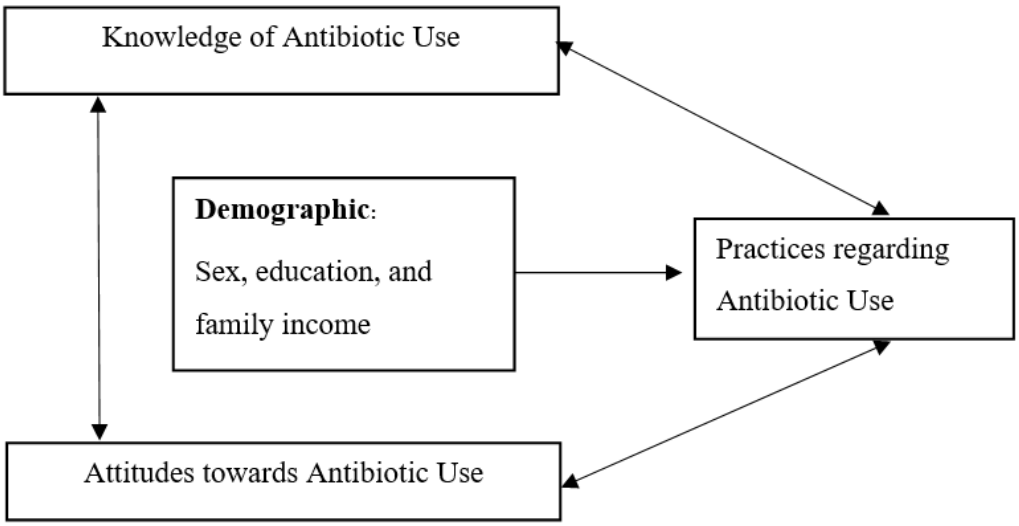

Figure 1 The study conceptual framework

Methodology

Study Design and Setting

This cross-sectional survey with correlational predictive design conducted in eight health centers under supervision of Takhmao Operational Health Office, Kandal province, Cambodia, from January to March 2020. A Health Center (HC) is a lowest level of healthcare delivery in Cambodia that mainly focuses on providing the primary healthcare services including quality mother-child and reproductive health service, vaccination, health education, health promotion and outreach activities[23]. In Kandal province, the purchase of over-the-counter drugs from pharmacy stores and illegal drug outlets was common.

Population and Sampling

A convenience sampling method was used to recruit parents who brought their children under 15 years of age to receive health services in outpatient and vaccination units of the health centers. Eligible parents were those who were a primary caregiver of the child; aged 18 years old or above; and able to read and write Khmer language. Parents with hearing and visual problems were excluded from the study. The children accompanied with the parents to the health centers had to report if having URTIs during the past 12 months.

The sample of this study was calculated by using G*Power software version 3.1.9.7. Effect size was calculated from a previous study conducted in Egypt[16]. In this previous study, the correlation among KAP (r) ranged from .22 to .35. In order to obtained large sample size, the lowest r = .22 was selected. To use multiple regression analysis in the current study, the correlation was conversed to be f^2 by the software. With f^2 = .051, power .80, alpha .05, and five predictors, the required sample size would be 258.

Research Instruments

1. General Information Questionnaire - The questionnaire consists of 10 items asking participants about their demographic characteristics, experience of having URTIs and self-medication of antibiotics during the past 3 months.

2. KAP on Antibiotic Use Questionnaire - This self-administered questionnaire was developed by the researchers based on the existing related instruments and relevant literatures about the KAP on antibiotic use[9,24-25] as well as theoretical definition of knowledge, attitudes and practices[22,26]. The questionnaires were composed of three parts sequentially arranged as follows:

Part I - Practice. This part was designed to ask parent's action or behavior on antibiotic use when their children suffer from URTIs. The questionnaire consists of 10 items with 5-point rating scale ranging from 5 (never) to 1 (always). The questions are composed both negative and positive statements. Total scores range from 10 to 50. The higher the scores, the better practices toward antibiotic use in URTIs.

Part II - Attitudes. This part was designed to ask the parent's feelings or any preconceived ideas towards the use of antibiotics in URTIs. The questionnaire consists of three components of theoretical definition of attitudes (cognitive, affective and conative responses).

Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) is used for the response scale. The questions are composed of both negative and positive statements. Total scores range from 10 to 50. The higher the scores, the more positive attitudes on antibiotic use in URTIs.

Part III - Knowledge. This part asks parent's understanding on antibiotic use for URTIs in children in terms of indications of antibiotics use, side effects of antibiotics, complications of antibiotics misuse, the nature causes of URTIs and treatment of URTIs. This part contains 10 items with dichotomous response of 'True' and 'False'. The correct answer is given one point while the incorrect one no point. Total scores range from 0 to 10. The higher the scores, the higher level of parent's knowledge of antibiotic use. Content validity of the instruments was checked by 5 validators in the fields of nursing, pharmacy, and medicine. The I-CVI of knowledge, attitudes and practices raged between .80 to 1.00 and S-CVI/Ave were .96, .94 and .88, respectively. To ensure the reliability of the questionnaire, the try-out testing was conducted with 15 participants whose eligibilities were similar to the study sample. Cronbach's alpha coefficients were .77 for knowledge, .74 for attitudes and .74 for practices.

Ethical Considerations

This study was approved by Institutional Review Board of Faculty of Nursing, Mahidol University, Thailand (COA No.IRB-NS2019/529.17.12) and National Ethic Committee for Health Research (NECHR), Ministry of Health, Cambodia (No.010 NECHR). The participants were informed about the study objectives and the rights to refuse to participate in the study. Written consent forms were obtained from the participants who voluntarily agreed to participate in the study. Names of participants were anonymous and only identification was used instead.

Data Collection

Data were collected by the first researcher and two research assistants who were nurses from another health centers. A nurse or midwife at each health center introduced the study to the eligible parents. If they showed their interest in participating in the study, they would be introduced to either the first researcher or the research assistants for further details of the study. When the eligible parents agreed to participate in the study, signed consent forms were obtained. The study subjects were interviewed about their demographics and history of antibiotic use for 5-10 minutes. After that, the parents completed the KAP questionnaire about 20-30 minutes.

Data Analysis

Data obtained were analyzed using SPSS version 18.0. Descriptive statistics were used to describe demographic data and the study variables. Pearson's product moment correlation coefficients were analyzed to examine the relationships among the study variables. Multiple regression was applied to determine the predictability of knowledge, attitudes, sex (1 = male, 2 = female), education, and family income (1 = sufficient, 2 = not sufficient) on antibiotic use. The significance level was set at .05. Assumptions for statistical use were checked before performing the main analysis.

Findings

1. Demographic Characteristics

As seen in Table 1, out of 258 participants, 72.1% were females and 27.9% were males. Average age of the participants was 32.49 (SD = 7.97) years ranging from 19 to 65 years. Average years of education were 8.75 years (SD = 3.28); slightly over one-third of them (38.0%) obtained secondary school level and only 8.5% graduated at university level. Most participants (72.9%) had sufficient income. Most of the participants were mothers (67.4%), followed by fathers (27.1%).

2. History of URTIs and Self-medication of Antibiotics

During the past three months, 89.7% of the parents reported that their children had URT and 58.8% of the children exposed URTIs more than one episode. Almost forty percent (38.1%) of the parents ever purchased antibiotics without prescription during the past three months. The top three reasons why the parents purchased antibiotics without prescription included that their children did not have severe symptoms (59.4%); they did not have available time to see a physician (43.8%); and use of services at nearby pharmacy stores was fast and convenient (18.8%), as shown in Table 2.

Table 1 Demographics of the participants (N = 258)

Variables	Group (s)	$\bar{X} \pm SD$	n	%
Sex	Female	-	186	72.1
	Male	-	72	27.9
Age (years)	≤ 25	32.49 ± 7.97	47	18.2
	26-30		67	26.0
	31-35		66	25.6
	36-40		50	19.4
	41-45		13	5.0
	≥ 46		15	5.8
Education (years)	Primary school	8.75 ± 3.28	69	26.7
	Secondary school		98	38.0
	High school		69	26.7
	University		22	8.5
Income status	Sufficient	-	188	72.9
	Insufficient	-	70	27.1
Relationship with the child	Mother	-	174	67.4
	Father	-	70	27.1
	Grandparent	-	10	3.9
	Relatives	-	4	1.6

Table 2 History of URTIs and self-medication of antibiotics during the past 3 months (N = 252)*

During the past 3 months		n	%
Having URTIs	No	26	10.3
	Yes	226	89.7
Frequency of exposure to URTIs (n = 226)	One	93	41.2
	Two	79	34.9
	More than two	54	23.9
Purchasing antibiotics without prescription	No	156	61.9
	Yes	96	38.1
Reasons for self-medication of antibiotics (n = 96)	Child's symptoms not serious to see physician	57	59.4
	No available time to see physician	42	43.8
	No enough money	11	11.5
	Recommendation from family, friends or relatives	10	10.4
	Fast service and convenience from nearby pharmacy stores	18	18.8

* Missing data, n = 6

3. Relationship among KAP of Cambodian Parents

As seen in Table 3, the correlation analysis revealed that there were significantly and positively relationships between knowledge and attitudes ($r = .48$, $p < .001$), and attitudes and practices ($r = .23$, $p < .001$). However, there was no relationship between knowledge and practices ($r = .11$, $p = .081$).

4. Prediction of knowledge, attitudes and demographics on practices of Cambodian parents

As seen in Table 4, the multiple regression analysis showed that all independent variables could jointly explain 11% of the variance in the parents' practices regarding antibiotic use for URTIs in children. Out of five study variables, three of them could significantly predict the parents' practices; that is, attitudes ($\beta = .24$, $p = .001$), sex ($\beta = .14$, $p = .032$), and education ($\beta = -.17$, $p = .010$), respectively. That is, female parents, parents with better attitudes, and parents with lower education had better practices on antibiotic use. Knowledge and family income could not predict the parents' practices.

Table 3 Descriptive statistics and correlation coefficient (r) among KAP (N = 258)

Variable	Range		$\bar{X}$ (SD)	Knowledge	Attitudes	Practices
	Possible	Actual				
Knowledge	0-10	1-10	5.67 (1.86)	1.00		
Attitudes	10-50	18-46	30.48 (4.20)	.48*	1.00	
Practices	10-50	23-50	38.48 (5.20)	.11	.23*	1.00

*p < .001

Table 4 Regression analysis summary for factors predicting the practices of antibiotic use (N = 258)

Model	b	SE	β	t	p-value	95%CI for b
Constant	30.17	2.62		11.51	< .001	25.00, 35.33
Knowledge	.03	.19	.01	.18	.859	- .03, .41
Attitudes	.30	.09	.24	3.52	.001	.13, .47
Sex	1.57	.72	.14	2.18	.030	.15, 2.99
Education	- .26	.10	- .17	- 2.61	.010	- .46, - .07
Family income	-1.16	.70	- .10	-1.65	.100	-2.55, .23

R = .332, R^2 = .110, Adjusted R^2 = .093, * Significance level is .05

Discussion

1. Knowledge and Attitudes

According to the theoretical definition of attitudes and its components, cognitive is one of the components and is to do with intelligence in terms of knowledge and awareness[26]. Cognitive responses could be expressions of beliefs that link the antibiotic use with certain characteristics. Beliefs to the effects as found in this study (that the leftover antibiotics from previous use can be reused for current similar symptoms, that good doctor would prescribe antibiotics to a child having either common cold or fever, or that URTIs would take longer times to recover if antibiotics are not given) might be taken as evidence of unfavorable attitudes toward the antibiotic use. By way of contrast, favorable attitudes would be implied by expressions of beliefs suggesting that a common cold can be resolved without the use of antibiotics, or that antibiotics are currently used too much and unnecessary, and the like. Such beliefs partly come from the parents' understanding or knowledge of antibiotic use that accumulates from education and experience. This means that when parents have the better knowledge, the more positive attitudes towards antibiotic use will be formed. The magnitude of correlation found between knowledge and attitudes in the current study (r = .48, p < .001) was moderately high supporting the logical explanation of the KAP

model[21-22]. The finding was also consistent with previous studies conducted in Irag[15] and Egypt[16] that parents with sufficient knowledge on antibiotic use for their children with URTIs were more likely to have positive attitudes ($r = .54$, $p = .001$; and $r = .22$, $p < .05$, respectively).

2. Knowledge and Practices

Knowledge is logically assumed to be an influential factor of practice; that is, parents with correct knowledge about antibiotic use should carry out the appropriate practice in this regard, and vice versa. Note that parents in the present study did not have good knowledge; their average knowledge scores were only 5.67 points out of ten. The study found that majority of the parents misunderstood that antibiotics are used to cure viral infections like cold and flu, and children who develop a fever must be given antibiotics, for example. In addition to the modest knowledge found, its association and influence on the parents' practices regarding antibiotic use did not exist too. Interestingly, the finding was not consistent with the KAP survey model and a previous study in Iraq[15]. Generally, people are taught on how to do certain things, and then later go on to practice them; that is, knowledge provides the foundation for practices. However, the obtainment of knowledge is more academic and abstract but the practice of information and understanding is more concrete. This may be a reason why the influence of knowledge on the parents' practices toward antibiotic use was not seen.

3. Attitudes and Practices

Attitudes and practices had positively significantly correlation, ($r = .23$, $p < .001$). The finding was consistent with similar studies in Thialand[27], Egypt[16], and Irag[15]. It means that the more positive attitudes, the better practices on antibiotic use in children with URTIs. Attitudes is a degree to which a person expresses his/her favorable or unfavorable evaluation of the behavior in question[28]. A person with positive attitudes might express intention to carry out the behavior, and vice versa. If a person values a behavior to be beneficial and important, then, he/she is more likely to perform such behavior and may direct to do so. Practice is an action or behavior of people expressed by demonstrating the acquisition of knowledge and attitudes[22]. It is usually assumed that a person is more likely to act in accordance with his/her attitudes. Thus, it was not surprising when the current study also reported that attitudes could predict practices regarding antibiotic use. The finding was in line with a study in Jordan[17]. indicating that mothers who had positive attitudes were 6.3 times more likely to have good practices on antibiotic use than those who had negative attitudes ($OR = 6.3$, $p < .001$).

4. Demographic factors and practices

Sex is one of the factors potentially affecting the practices related to health specific subjects; and the finding in this study did confirm this postulation. Sex is biological attributes of individuals, which is categorized as males or females referring to mothers and fathers or individuals who were primary caregivers of children in the current study. The presence of both male and female figures, particularly father and mother, with different roles and responsibility in a family is very important for a child's optimal development[29]. In Cambodia, father

is traditionally responsible for earning the money; and mother stays at home for taking care of children[30]. This could be concluded that Cambodian mothers or female caregivers were more likely to frequently meet and obtain medical advices from health care providers than fathers or male caregivers. Therefore, mother might have more experiences related to antibiotic use for their children than fathers. The finding was consistent with other studies conducted in Asian and Muslim worlds, like Thailand[27], and Saudi Arabia[31], for example.

Formal education of a person is the collection of knowledge, skills, and capacities that is considered as a contributing cause of health[32]. To illustrate, compared to individuals with limited education, those with higher education tend to have higher paying jobs with better benefits (such as insurance coverage), be better able to afford healthcare cost, have better understanding health-related information, and have more resources for making health choices. In the present study, the parents' education was not significantly correlated with the practices of antibiotic use in children with URTIs; however, when controlling for the other study variables, the education could predict the practices. Compared to a previous study reporting that the higher educated the parents, the better practices on antibiotic use[33], it is very interesting that the direction of the prediction was inverse in the present study. Intuitively, it may be expected that parents with higher education should have better practices on antibiotic use. However, the unexpected finding was found in the present study. A review of 102 studies on the factors affecting the patients' compliance to therapeutic regimen revealed that highly educated patients might not believe in the benefits of being compliant to the medication regimen while those with lower education might have more trust in healthcare providers' advice and showed more therapeutic compliance[34]. The finding of this review is probably an explanation of why the parents with lower education had higher practice scores on antibiotic use in children with URTIs. According to Hahn and Truman[32], not all learning is acquired in a formal education; many opportunities for informal education occur outside the school setting. Thus, a measurement of education using years in school may not cover certain experiential learning related to the use of antibiotics in children with URTIs.

Income can influence people's life in many aspects including their health. Previous evidence indicates that high-income individuals tend to be in better health than low-income persons[35]. This may be because increased income allows people to acquire more health inputs that can enhance their health. Regarding the antibiotic use in children with URTIs, parents with high income were more likely to have better practices[16,19]. However, the previous findings could not be generalized to the Cambodian parents as the controversy was found in the current study. Possible explanation why income did not predict the practices could be the measurement used for family income. In the present study, the actual amount of family income was hardly informed by Cambodian people; thus, the sufficiency of family income (sufficient vs insufficient) was obtained,

instead. One disadvantage of using dichotomous data rather than continuous ones is to have compromised statistical power because the categories of interest do not have enough difference to achieve a statistically significant result[36]. The limitation of using self-administered questionnaire together with sensitive question asked about income (even in terms of sufficiency) would prevent the researcher to know if the respondents gave the accurate information; that is truly sufficient or truly insufficient. Thus, the interpretation of this finding should be in caution.

Conclusion and Recommendations

This cross-sectional study revealed that the Cambodian parents' attitudes, sex, and education could predict their practice towards antibiotic use in children with URTIs. The findings suggest that nurses and other healthcare providers should pay more attention on male parents when educating them about the antibiotic use. Integration of rational drug use into related subjects of formal education should be earnestly initiated. It is also essential to develop a public-directed intervention to increase public awareness on antibiotic use. In addition, enforcement of law and the regulation on antibiotic prescription should be acted seriously to decline direct sale of antibiotics in Cambodian community. To extend the body of knowledge in this issue, other factors that may influence the ATB use (for example, accessibility of ATB purchasing, rational drug use policy in Cambodia, healthcare coverage) should be further examined too.

References

1. Ministry of Health. Annually progress report 2018. Phnom Penh, Cambodia: Ministry of Health; 2018. 204 p. (in Khmer).
2. DeMuri GP, Gern JE, Moyer SC, Lindstrom MJ, Lynch SV, Wald ER. Clinical features, virus identification, and sinusitis as a complication of upper respiratory tract illness in children ages 4-7 years. J Pediatr. 2016;171:133-9.e1. doi: 10.1016/j.jpeds.2015.12.034.
3. Vandepitte WP, Ponthong R, Srisarang S. Treatment outcomes of the uncomplicated upper respiratory tract infection and acute diarrhea in preschool children comparing those with and without antibiotic prescription. J Med Assoc Thai. 2015;98(10):974-84.
4. Gelband H, Miller-Petrie M, Pant S, Gandra S, Levinson J, Barter D, White A, et al. The state of the world's antibiotics 2015. Washington, D.C.: Center for Disease Dynamics, Economics & Policy; 2015. 14 p.
5. Emary KRW, Carter MJ, Pol S, Sona S, Kumar V, Day NPJ, et al. Urinary antibiotic activity in paediatric patients attending an outpatient department in north-western Cambodia. Trop Med Int Health. 2015;20(1):24-8. doi: 10.1111/tmi.12398.
6. World Health Organization. Antibiotic resistance [Internet]. Geneva, Switzerland: WHO; 2020 [cited on 2020 Aug 31]. Available from: https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance.
7. Al-Shawi MM, Darwish MA, Wahab MMA, Al-Shamlan NA. Misconceptions of parents about antibiotic use in upper respiratory tract infections: a survey in primary schools of the eastern province, KSA. J Family Community Med. 2018;25(1):5-12. doi: 10.4103/jfcm.JFCM_46_17.

8. Elbur A, Albarraq AA, Abdallah MA. Saudi parents' knowledge, attitudes and practices on antibiotic use for upper respiratory tract infections in children: a population–based survey, Taif, Kingdom of Saudi Arabia. J Med Res. 2016;2(4):99-103.
9. Salama RA, Bader KN, Rahmen AS, Hashmi F. Parents Knowledge, attitudes and practice of antibiotic use for upper respiratory tract infections in children: a cross-sectional study in Ras Al khaimah, United Arab Emirates. Epidemiol Biostat Public Health. 2018;15(4):e12969. doi: 10.2427/12969.
10. Teck KC, Ghazi HF, Bin Ahmad MI, Binti Abdul Samad N, Ee Yu KL, Binti Ismail NF, Aizat Bin Esa M. Knowledge, attitude, and practice of parents regarding antibiotic usage in treating children's upper respiratory tract infection at primary health clinic in Kuala Lumpur, Malaysia: pilot study. Health Serv Res Manag Epidemiol. 2016;3:2333392816643720. doi: 10.1177/2333392816643720.
11. Torres NF, Chibi B, Middleton LE, Solomon VP, Mashamba-Thompson TP. Evidence of factors influencing self-medication with antibiotics in low and middle-icome countriess: a systematic scoping review. Public Health. 2019;168:92-101. doi: 10.1016/j.puhe.2018.11.018.
12. Kumran E, Doum D, Keo V, Sokha L, Sam B, Vibol C, et al. Dengue knowledge, attitudes and practices and their impact on community-based vector control in rural Cambodia. PLoS Negl Trop Dis. 2018;12(2):e0006268. doi: 10.1371/journal.pntd.0006268.
13. Om C, Daily F, Vlieghe E, McLaughlin JC, McLaws M-L. Pervasive antibiotic misuse in the Cambodian community: antibiotic-seeking behaviour with unrestricted access. Antimicrob Resist Infect Control. 2017;6:30. doi: 10.1186/s13756-017-0187-y.
14. Om C, Daily F, Vlieghe E, McLaughlin JC, McLaws M-L. "If it's a broad spectrum, it can shoot better": inappropriate antibiotic prescribing in Cambodia. Antimicrob Resist Infect Control. 2016;5:58. doi: 10.1186/s13756-016-0159-7.
15. Hassan WZ, Baiee HA, Altufaily Y. Audit on the knowledge, attitudes and practice about themisuse of antibiotics in upper respiratory tract infections in children among parents in Al-Najaf province. Kufa Journal for Nursing Sciences. 2015;5(2):246-52.
16. Mohamed SMM. Study of maternal knowledge, attitude and practice on antibiotic use for acute upper respiratory tract infection in children. IOSR Journal of Nursing and Health Science. 2015;4(4):17-23. doi: 10.9790/1959-04461723.
17. Alkhaldi SM, Al-Mahmoud MF, Kanaan H. Mothers' knowledge, attitudes, and practices of antibiotic use for children in Jordan. Jordan Med J. 2015;49(4):215-26. doi: 10.12816/0028174.
18. El Khoury G, Ramia E, Salameh P. Misconceptions and malpractices toward antibiotic use in childhood upper respiratory tract infections among a cohort of Lebanese parents. Eval Health Prof. 2018; 41(4):493-511. doi: 10.1177/0163278716686809.
19. Al-Saleh S, Hammour KA, Hammour WA. Influencing factors of knowledge, attitude, and practice regarding antibiotic use in children with upper respiratory tract infections in Dubai. J Eval Clin Pract. 2020;26(1):197-202. doi: 10.1111/jep.13188.
20. Shah NM, Rahim MA. Parental knowledge, attitudes and practices (KAP) on the use of antibiotics in children for upper respiratory tract infections (URTIs). Int J Pharm Pharml Sci. 2017;9(3):105-10. doi: 10.22159/ijpps.2017v9i3.15674.

21. World Health Organization. Advocacy, communication and social mobilization for TB control: a guide to developing knowledge, attitude and practice surveys. Geneva: WHO; 2008. 69 p.
22. Rav-Marathe K, Wan TTH, Marathe S. A systematic review on the KAP-O framework for diabetes education and research. Med Res Arch. 2016;4(1):1-21.
23. Docterate of General for Health Sevice. Operational guideline on minimum package of activities (MPA). 3th ed. Phnom Penh, Cambodia: Ministry of Health; 2018. 156 p. (in Khmer).
24. Hernández-Díaz I, Ayala-Meléndez A, González-González E, Rosario-Calderón I, Figueroa-Ríos D, Melin K, et al. Knowledge and beliefs, behaviors, and adherence among Latino parents or legal guardians related to antibiotic use for upper respiratory tract infections in children under 6 years of age. J Am Pharm Assoc. 2019;59(4): 506-13. doi: 10.1016/j.japh.2019.03.004.
25. Panagakou SG, Spyridis N, Papaevangelou V, Theodoridou KM, Goutziana GP, Theodoridou MN, Syrogiannopoulos GA, Hadjichristodoulou CS. Antibiotic use for upper respiratory tract infections in children: a cross-sectional survey of knowledge, attitudes, and practices (KAP) of parents in Greece. BMC Pediatr. 2011;11:60. doi: 10.1186/1471-2431-11-60.
26. Ajzen I. Attitude structure and behavior. In: Pratkanis AR, Breckler SJ, Greewald AG, editors. Attitude structure and function. Hillsdale, NJ: Lawrence Erlbaum Associates; 1989. p.241-74.
27. Sirijoti K, Hongsranagon P, Havanond P, Pannoi W. Assessment of knowledge attitudes and practices regarding antibiotic use in Trang province, Thailand. J Health Res. 2014;28(5):299-307.
28. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process. 1991;50(2):179-211. doi: 10.1016/0749-5978(91)90020-T.
29. Gežová KC. Father's and mother's roles and their particularities in raising children. Acta Technologica Dubnicae. 2015;5(1):45-50. doi: 10.1515/atd-2015-0032.
30. Investing in Children and their Societies, Royal University of Phnom Penh. Seminar report: parenting in Cambodia [Internet]. Phnom Penh, Cambodia: Investing in Children and their Societies; 2014 [cited 2020 Jul 6]. Available from: https://www.ics.nl/public/media-upload/Files/Report%20Parenting%20Seminar_March%2021%20Phnom%20Penh_ICS%20RUPP.pdf.
31. Alsuhaibani MA, AlKheder RS, Alwanin JO, Alharbi MM, Alrasheedi MS, Almousa RF. Parents awareness toward antibiotics use in upper respiratory tract infection in children in Al-Qassim region, Saudi Arabia. J Family Med Prim Care. 2019;8(2):583-9. doi: 10.4103/jfmpc.jfmpc_368_18.
32. Hahn RA, Truman BI. Education improves public health and promotes health equity. Int J Health Serv. 2015;45(4):657-78. doi: 10.1177/0020731415585986.
33. Alrafiaah AS, Alqarny MH, Alkubedan HY, AlQueflie S, Omair A. Are the Saudi parents aware of antibiotic role in upper respiratory tract infections in children? J Infect Public Health. 2017;10(5):579-85. doi: 10.1016/j.jiph.2017.01.023.
34. Jin J, Sklar GE, Min Sen Oh V, Chuen Li S. Factors affecting therapeutic complican: a review from the patient's perspective. Ther Clin Risk Manag. 2008;41(1):269-86. doi: 10.2147/tcrm.s1458.
35. Woolf SH, Aron L, Dubay L, Simon SM, Zimmerman E, Luk KX. How are income and wealth linked to health and longevity? [Internet]. Washington, D.C.: Urban Institute; 2015 [cited 2020 Jul 16]. Available from: https://www.urban.org/sites/default/files/publication/49116/2000178-How-are-Income-and-Wealth-Linked-to-Health-and-Longevity.pdf.
36. Altman DG, Royston P. The cost of dichotomising continuous variables. BMJ. 2006;332(7549):1080. doi: 10.1136/bmj.332.7549.1080.