

Research Articles

Health-seeking practices of caregivers and determinants in responding to acute respiratory infection episodes in Biliran Island, Philippines

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Background

Despite the substantial programs addressing childhood illnesses, pneumonia still ranks as the leading cause of childhood mortality in the Philippines. Hence, this study was designed to determine the current health seeking behavior and its determinants among caregivers of children under five years old.

Methods

A prospective cohort study of 3,056 children under five years old was undertaken in selected barangays in two municipalities of Biliran Island, Philippines. These children were visited every two weeks from February 2014 to June 2015 to find out if they had any respiratory infections. Mothers documented signs and symptoms of respiratory infections and actions taken in response to the observed signs and symptoms in a disease calendar. Research staff confirmed calendar entries and accuracy of the data and encoded it into a database. The most severe Integrated Management of Childhood Illnesses (IMCI) category was selected to represent an illness period. A new episode was counted when there was >7 days interval of no clinical signs from a previous episode.

Results

Results revealed that mothers may appear to recognize critical signs of illness but are not appropriately responding to them. Of the 191 pneumonia cases, 53.4% sought health care facilities, while 47.6% either took no action or resorted to self-medication. Overall rate of self-medication was highest among pneumonia cases and lowest among the Very Severe Pneumonia group. On average, 38.0% of acute respiratory infection (ARI) episodes self-medicated with antipyretics and antibiotics (33.0%). The number of children under five years old in the household and age of child at the time of the episode were identified as determinants for self-medication.

Conclusions

The findings suggest that there was inappropriateness and delay in seeking care for childhood pneumonia in rural areas.

Pneumonia remains to be one of the major public health concerns that cause childhood morbidity and mortality worldwide. ¹ Globally, 920,000 pneumonia cases led to childhood deaths, of which 80 percent occurred in the first two years of life and majority of these cases occurred in the world's poorest regions with highest incidence in Sub-Saharan Africa and South Asia. ^{2,3} Although substantial progress has been made in reducing under 5-year old child mortality resulting from the launch of UN Millennium Developmental Goals 4 (MDG 4), childhood pneumonia still ranks as the leading cause of childhood mortality, thus remains a challenge in the Philippines. ^{4,5}

It is estimated that close to 4.5 million cases of suspected

pneumonia do not receive care from an appropriate health provider. ⁶ Appropriate health seeking behavior reduces the potential occurrence of severe and life-threatening childhood illnesses, specifically pneumonia. ⁷ Household poverty emerged as the primary determinant in shaping health-seeking behavior. ^{8,9} Previous studies found that those poor families, especially in rural communities, delay or deter consultation to healthcare facilities because of the costs of hospitalization and their poor recognition of signs and symptoms. ⁸

Rural households preferred home treatments during the early stages of an episode of acute respiratory infection (ARI) through the use of conventional and western med-

icines, use of homemade or purchased herbs and use of previous prescriptions.^{10–13} The prevalence of self-medication in managing ARI episodes is very high in both developed and developing countries, and varied significantly with a number of socio-demographic characteristics.¹⁴ Several caregivers were reported to have alarming rates of self-medication with western medicines,^{15,16} with antibiotics used as a panacea for childhood illnesses.^{17,18}

Numerous studies have shown that illness symptoms and perceived severity; children's and mothers' age, caregivers' education, and total family income are strongly associated with care seeking behavior.^{7,19–21} Distance, travel time to the health facility, costs of care, and service availability are also important determinants of seeking care.^{5,22} However, there is a dearth of current information on health seeking behavior and medication use in response to ARI episodes in the Philippines.

This study was designed to describe patterns of health seeking behavior taken by caregivers of children under five years old in response to ARI episodes as well its determinants. The findings of this study may provide better understanding of ARI related health seeking behavior and medication practices to improve current efforts to reduce childhood pneumonia morbidity and mortality and develop supplementary strategies for the delivery of control programs.

MATERIALS AND METHODS

STUDY SITE

This paper is part of a larger study that looked into Acute Respiratory Infections in children.²³ A prospective cohort study was conducted in Biliran, an island province located between the islands of Leyte and Samar in the Eastern Visayas region in the Philippines, with a total population of 161,760.²⁴ It is classified as a fourth-class province, with a predominantly agriculture and fishery economy and is considered as one of the poorest provinces in the country. It was chosen as the study site due to its relatively stable population migration patterns and simple health referral system.²⁵ The map in **Figure 1** shows locations of municipalities of Kawayan and Caibiran, where the study took place. Based on the results of a rapid assessment study,⁵ the expected incidence of childhood pneumonia/year and severe pneumonia/year are 400 and 250, respectively. The study enrolled 2,500 children under five years old who were residents of 15 barangays in Kawayan and 10 barangays in Caibiran.

STUDY PROCEDURES

Written Informed consent was obtained from parents of children under five years old who agreed to be included in the study. Socio-demographic information was gathered for each household member using questionnaires in the community's native dialect; caregivers were taught to fill out calendars (called "disease calendar". See **Figure S1** in the **Online Supplementary Document**) where they recorded presence/absence of respiratory signs and symptoms they observed in their children on a daily basis and the action they took in response to them. These signs and symptoms included cough, nasal congestion or runny nose, difficulty



Figure 1. Map of Kawayan and Caibiran municipalities, Biliran Province, the Philippines.

of breathing, rapid breathing, chest-in-drawing and general danger signs such as inability to feed or vomiting, lethargy, and convulsion. A nurse visited the households every two weeks and inspected the disease calendar for completeness; if there were no or incomplete entries in the calendar, the nurse guided the caregiver to completely fill it out by recalling information. If there were entries in the disease calendar, the nurse confirmed them. A tablet Personal Computer containing a video of a child with rapid breathing and chest in-drawing was shown to the caregiver to facilitate the validation of those symptoms. Forms and procedures were pilot-tested prior to the actual conduct of the study. Households with newborns in the study sites were asked to participate in the study and children who reached five years old were removed from the cohort. The information from the disease calendar was encoded into a database.

CASE AND OPERATIONAL DEFINITIONS

Clinical signs of ARI recorded in the disease calendar were put together and categorized based on the Integrated Management of Childhood Illnesses (IMCI) guidelines²⁵ with some modifications. Cough or colds without any other signs of respiratory illness was categorized as cough or colds; the presence of difficulty of breathing with cough was categorized as a pneumonia case. Severe pneumonia in the IMCI classification was divided into two: pneumonia cases with chest in-drawing were categorized as chest in-drawing pneumonia (CIP), while very severe pneumonia (VSP) included children with pneumonia and or CIP and with any of the following symptoms: convulsions, inability to eat or drink, inability to wake and/or vomits everything. A new episode is the presentation of ARI signs and symptoms after being symptom free for seven days. The duration of the illness was calculated based on the first appearance of a respiratory symptom and disappearance of all symptoms. When there is a progression of the child's illness based on the

Table 1. The number of ARI episodes by disease category, and health action in Biliran, the Philippines, 2014- 2015

Health action taken during ARI episode	Cough or colds (n=15,605)	Pneumonia (n=148)	CIP (n=32)	VSP (n=11)	All forms of pneumonia (n=191)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
No action	6,893 (44.2)	16 (10.8)	1 (3.1)	0 (0.0)	17 (8.9)
Self-medication	4,245 (27.2)	33 (22.3)	7 (21.9)	0 (0.0)	40 (20.9)
with antibiotics	2,012 (12.9)	28 (18.9)	3 (9.4)	1 (9.1)	32 (16.8)
Health consultation	2,455 (15.7)	71 (48.0)	21 (65.6)	10 (90.9)	102 (53.4)
TOTAL	15,605 (100.0)	148 (100.0)	32 (100.0)	11 (100.0)	191 (100.0)

ARI - acute respiratory infections, CIP - chest in-drawing pneumonia, VSP - very severe pneumonia

signs and symptoms recorded, the more severe IMCI classification was used.

The actions taken by the caregiver in response to an ARI episode were categorized into the following: (a) no action taken, (b) health facility consultation and (c) self-medication. Health facility consultations involved referrals or consultations to any formal health facility, which includes the Biliran Provincial Hospital (BPH), Rural Health Unit (RHU), Barangay Health Station (BHS), and private clinics. The BHS is the first level of primary care in the Philippine Health System while the RHU is the first level referral for BHS. The BHS is usually managed by a midwife and Barangay Health Workers (BHWs) while a doctor, nurse and other medical personnel are stationed at the RHU.²⁶ Self-medication is the use and administration to the child of medicine, without health facility consultation. This included western medicines, antibiotics and traditional medicine. Traditional medicine involves the use of herbal preparations or seeking advice from traditional healers. Western medicines are treatments to medical conditions developed through scientific methods such as antipyretics and bronchodilator (Supplemental Table 1). No action was considered as the least appropriate response followed by self-medication, while health facility consultation was the most appropriate. We used the more appropriate action taken during the illness episode when there were multiple actions.

Socio-economic status was estimated using a 10-item index developed and validated by Schreiner specifically for the Philippines.²⁷ A score is calculated to determine the poverty level of the household in relation to the poverty line. The self-medication rate (SMR) was calculated by dividing the number of ARI and pneumonia episodes which used medicine without prescription for a current illness episode by the total number of ARI and pneumonia episodes.

DATA ANALYSIS

Univariate analysis was done to identify possible determinants for self-medication as well as inaction for a pneumonia episode regardless of severity, with a screening criteria of p-value less than or equal to 0.25. Multivariate multinomial logistic regression was then applied. Explanatory vari-

ables in final model were selected by backward stepwise method with an exit criteria of p-value less than or equal to 0.05. Odds ratios (OR) and 95% confidence intervals (CI) were calculated. Analyses were performed using STATA statistical software (Stata Corp, College Station, TX, USA) and R 3.5.0 (R Development Core Team, Vienna, Austria).

RESULTS

SOCIO-DEMOGRAPHIC PROFILE OF THE CAREGIVERS

A total of 3,056 children under five years old were enrolled in the cohort and visited from February 2014 to June 2015. Majority of the primary caregivers were mothers (84%), while the rest were fathers or other relatives. Less than half (44.9%) of the caregivers were between 21-30 years old (mean: 31.9 years old; SD±10.4); 52% had high school education, or an equivalent of 10-12 years of schooling. Median size of the households was 6 with a range of 2 to 22, with about one fifth of households having an income below the poverty line of US\$ 0.71 or PHP 39.52 per person per day based on the 2003 Family Income and Expenditure Survey (FIES).²⁷ Of the 3,056 children, 97.1% had at least one ARI episode (range of 1 to 21 episodes) and 142 children had at least one pneumonia episode (range of 1 to 7 episodes). There were 15,796 recorded episodes of ARI in the period (Table 1). Nearly all of the ARI were cough or colds (98.8%), whereas there were 191 episodes of pneumonia, CIP and VSP. About half of pneumonia episodes were experienced by children aged ≤2 years old (48.2%) and more males than females had pneumonia (58.1% vs. 41.9%). For illness episodes that progressed to pneumonia, it took an average of 6.59 days (SD±17.2) before the manifestation of difficulty of breathing or chest in-drawing.

PATTERNS OF HEALTH SEEKING BEHAVIOR

A large proportion of caregivers did not take any initial action when the child had cough or colds. Of the 191 pneumonia cases, caregivers brought 53.4% of them to health care facilities. The RHU was most frequently sought source of care regardless of category (Table S1 in the **Online Supplementary Document**). Only few of the cases were brought to the BHS (2.1%), and the private clinics (5.8%). In terms of

Table 2. Self-medication rate (SMR) by age group and the number of medicines given in Biliran, the Philippines, 2014- 2015

	Cough or colds	Pneumonia	CIP	VSP	All forms of pneumonia
SMR per100 episodes	40.1	41.2	31.3	9.1	37.7
by age group					
under 1	41.8	18.2	25.0	33.3	21.2
1	42.6	46.7	27.3	0.0	40.7
2-3	39.0	42.6	14.3	0.0	22.2
4-5	37.9	48.2	66.7	0.0	47.2
Median no. of medicines given (range)	1 (1-6)	2 (1-5)	2 (1-3)	4 (4)	2 (1-5)

SMR - self-medication rate, CIP - chest in-drawing pneumonia, VSP - very severe pneumonia

Table 3. Subsequent actions for pneumonia after self-medication in Biliran, the Philippines, 2014-2015

Subsequent actions after self-medication	Pneumonia (n=101)	CIP (n=22)	VSP (n=7)
	No. (%)	No. (%)	No. (%)
No action	61 (60.4)	10 (45.5)	1 (14.3)
Health consultation	40 (39.6)	12 (54.5)	6 (85.7)

CIP - Chest in-drawing pneumonia, VSP - Very severe pneumonia

the timing of visiting a health facility, 26.7% of pneumonia cases were brought on the same day when a case developed signs. Proportions of cases who were brought to health facilities on the same day were 24.3% and 37.5% in pneumonia and CIP respectively while it was 27.3% in VSP. A quarter of caregivers did not take any action on that day (26.2%). Self-medication was practiced in 47.1% for all pneumonia cases. Overall, 12.6% used antibiotics without prescription from any health care worker. On the average, a pneumonia case was brought to a health facility 1.2 days (SD±4.4) after the appearance of difficulty of breathing or chest in-drawing. It ranged from the day of appearance of symptoms to 37 days after. On the other hand, for cases that were not brought to a health facility on the day the symptoms first appeared, it took an average of 2.8 days (SD±5.4) after the onset before the consultation took place.

Self-medication rate (SMR) for all forms of pneumonia was 38.0%, highest among the pneumonia cases and lowest in VSP (Table 2). The rate was almost stable between age groups whilst increasing along with age among pneumonia

and CIP cases. Rates of antibiotic use was slightly higher in all forms of pneumonia than the cough or cold cases (Table S2 in the **Online Supplementary Material**). On the average, caregivers used two types of medicine for pneumonia while one type of medicine for cough and colds episodes. **Table 3** shows the number of subsequent actions taken after administering self-medication among any pneumonia forms. Subsequent actions of caregivers of pneumonia cases showed that a large proportion eventually went to a health facility during the course of the illness episode.

DETERMINANTS OF HEALTH SEEKING BEHAVIOR

There were no determinants associated with self-medication of medicines other than antibiotics for pneumonia episodes (Table 5). The odds of antibiotic self-medication in households with 2 or more children were higher than in households with only 1 child. Also the age of the child at the time of the ARI episode was associated with not taking action during a pneumonia episode.

Table 4. Comparison of household determinants between health consultation and other actions in response to ARI episode in Biliran, the Philippines, 2014-2015.

	Health consultation No. (%)	No action taken /Observed No. (%)	Odds ratio	<i>P</i> -value	Self- medication (including traditional medicine) No. (%)	Odds ratio	<i>P</i> -value	With Antibiotics No. (%)	Odds ratio	<i>P</i> -value
Relationship of caregiver to child:										
Not mother	6 (5.9)	3 (17.7)			4 (10.8)			1 (3.1)		
Mother	96 (94.1)	14 (82.4)	0.29	0.106*	33 (89.2)	0.56	0.394	31 (96.9)	1.94	0.547
Age of caregiver:										
<30 years old	53 (52.0)	10 (58.8)			19 (51.2)			22 (68.8)		
31-40 years old	28 (27.5)	3 (17.7)	0.57	0.418	9 (24.3)	0.90	0.817	6 (18.8)	0.52	0.201*
41 years and above	21 (20.6)	4 (23.5)	1.01	0.988	9 (24.3)	1.08	0.869	4 (12.5)	0.46	0.195
Educational attainment of caregiver:										
Elementary or lower	18 (17.7)	6 (35.3)			14 (37.8)			6 (18.8)		
High school to vocational	61 (59.8)	9 (52.9)	0.44	0.168*	15 (40.5)	0.38	0.030*	13 (40.6)	0.64	0.426
College	23 (25.6)	2 (11.8)	0.26	0.125*	8 (21.6)	0.45	0.139*	13 (40.6)	1.70	0.367
HH economic status:										
Less than 25 percentile (0-19 SES score)	35 (34.3)	3 (15.8)			14 (37.8)			11 (34.4)		
25 percentile (20-27 SES score)	26 (25.5)	7 (36.8)	3.14	0.120*	8 (21.6)	0.90	0.823	5 (15.6)	0.61	0.412
50 percentile (28-39.4 SES score)	21 (20.6)	4 (21.1)	2.22	0.326	10 (27.0)	1.11	0.831	12 (37.5)	1.82	0.232*
75 percentile (SES score above 39.5)	20 (19.6)	5 (26.3)	1.75	0.517	5 (13.5)	0.58	0.359	4 (12.5)	0.64	0.485
Household size:										
1-5	31 (30.1)	7 (41.2)			12 (32.4)			8 (25.0)		
6 or more	72 (69.9)	10 (58.8)	0.57	0.294	25 (67.6)	0.83	0.633	24 (75.0)	1.19	0.705
Number of children under five years in HH:										
1	52 (51.0)	11 (64.7)			17 (42.5)			5 (15.6)		
2 or more	50 (49.0)	6 (35.3)	0.57	0.298	23 (57.5)	1.41	0.364	27 (84.4)	5.62	0.001*
Age of child at time of episode:										
less than 1.5 years old	44 (43.1)	2 (11.8)	0.18	0.026*	11 (27.5)	0.50	0.088*	9 (28.1)	0.52	0.133*
1.5 years and older	58 (56.9)	15 (88.2)			29 (72.5)			23 (71.9)		
Number of adults in the household:										
1-2	58 (56.9)	9 (52.9)			28 (70.0)			17 (53.1)		
3 or more	44 (43.1)	8 (47.1)	1.18	0.763	12 (30.0)	0.56	0.156*	15 (46.9)	1.16	0.710

HH – household, SES – socio-economic status

*Statistically significant at $\alpha=0.05$ and subjected to multinomial multivariate logistic regression.

Table 5. Determinants of selected health seeking behavior (Multivariate analysis) in response to ARI episode in rural communities of Biliran province, the Philippines, 2014-2015.

	No action/observed patient		Self-medication (including traditional medicine)		With antibiotics	
	Odds ratio	P-value	Odds ratio	P-value	Odds ratio	P-value
Number of children under five years in HH:						
1						
2 or more	0.64	0.427	1.50	0.285	6.04	0.001*
Age of child at time of episode:						
less than 1.5 years old	0.18	0.030*	0.48	0.074	0.45	0.078
1.5 years and older						

HH - household

*Statistically significant at $\alpha=0.05$ and included in final model (model cut-off=0.05).

DISCUSSION

Our findings revealed that children in rural areas have fewer episodes of pneumonia regardless of disease severity compared to previously reported estimates. The data showed that the percentage of children having pneumonia to VSP is only 1.2%, lower than the 10.6% recalculated from a cross-sectional study in the same locale⁵ and prospective population-based surveys of Hortal, et al²⁸ in Uruguay, Thörn et al., in Brazil²⁹ and le Roux et al., in South Africa.³⁰ Our findings were rather similar to the estimates in the 2013 Philippine National Demographic Health Survey (PNDHS) where rates of prevalence for ARI among children under five years of age in the past two weeks was 6%.³¹ The conflicting findings with the previous study⁵ can partly be attributed to the difference in methodological designs. The study derived ARI prevalence from a single question with a recall period of 1 year. We used self-diary in the cohort to record ARI episodes with which pneumonia was classified from signs and symptoms that has been checked every two weeks. Our calculation could give more accurate pneumonia prevalence estimate since recall bias could have been minimized.

Appropriate health seeking behavior is critical to the reduction of childhood deaths. In fact, several studies reported that the delay could lead to complications resulting to less effective medical care.^{21,32} The community patterns in response to pneumonia episode in this study implicates that caregivers may appear to recognize signs of illness early in the episode but inappropriately responded to them. Our results also showed that half of the pneumonia cases were brought to health facilities, and 47% either took no action or resorted to self-medication. This is somewhat comparable with the PNDHS report that more than half of the (64%) of children with ARI were taken to a health facility or a health provider and half of children with ARI received antibiotics.³¹ The survey results were slightly higher partially due to accounting actions for ARI in addition to pneumonia. We also highlighted a certain number of self-med-

ication with western medicines in response to ARI episodes as described in some studies.^{10,13} Moreover, the actions taken were highly dependent on the presenting symptoms. Hardon noted that initially if children did have cough and colds without accompanying fever, they opted to resort first to herbal preparations instead, such as *Kalamansi* (lime) juice in urban slum areas in the Philippines.³³ Fever was a notable indicator that the condition is severe and needs medical attention.³³ This is incongruent with the study performed in Bohol, Philippines where it was reported that the low utilization of health facilities resulted from complex assumptions and indigenous explanatory model on ARI illness that the parents hold. The consultation pathways were triggered by the perceived cause of cough (if cough is due to wind, due to change in weather, or due to a sprain) and caregivers' perception of the severity of the cough. Specific actions or necessary treatments of caregivers were highly dependent on continuous reassessment of cause and symptom, in turn resulting to delays in health facility utilization.¹⁰ Further, the timing of the decision to seek care to health facility was broadly dependent on mothers' and family's understanding of the severity of the child's condition.^{6,18-20,33}

Our study also found out that having 2 or more children under five years old in the household was associated with antibiotics self-medication and that the caregiver of a child less than 1.5 years of age was less likely to do no action during a pneumonia episode. The finding concurs with a study conducted in the communities of Nigeria, Ethiopia and Democratic Republic of Congo.³⁴ Although there was no reported significant association to other socio-demographic characteristics such as child's gender, location, and number of symptoms dissimilar from other reports,^{5,28,32,35,36} this informs the need to strengthen efforts on educating caregivers on the signs and symptoms, the severity of the ARI episodes, and on when and where to immediately take the child to the health facility. The reason for this disparity is not clear but suggests that it was probably due to the variances in methodologies (different approach in data collec-

tion, study population, cultural differences and locale of the study).

Self-medication was observed to be more frequently taken as a first action. We also noted that while 68% of pneumonia cases self-medicate as their first action, 53% eventually seek health facility consultation. In a study of Myanmar mothers, inappropriate practice of self-medication with western medicines was found to be frequently utilized followed by indigenous and traditional medicines.¹⁵ Our findings also highlight the alarming rate of self-medication with antibiotics and unnecessary polypharmacy in response to ARI episodes across disease severity as described in a couple of studies done in rural communities of Vietnam, where mothers used antibiotics as if such drugs were panacea.^{18,36} Antibiotics are the most widely used category of drugs because they are readily available and because bacterial and viral infections have common manifestations.³⁷ Overuse and misuse of antibiotics was particularly high (50% to almost 100%) in upper respiratory infections, most of which are generally viral and self-limited. A study conducted in the Philippines underscored that 86% of mothers in rural communities of northern Mindanao responded to ARI episodes by giving home medications, such as purchase of antipyretics at *sari-sari* (local grocery shops) stores, the use of prescriptions from past illness episodes, and the use of herbs.¹² Lansang et al. also reported that the use of antibiotics was recognized as “vitamins” or as “first aid” prior to medical advice, and more than half of which were purchased without prescription.¹⁷ Kim et al. also confirmed that children with ARI symptoms in an urban community in the Philippines were self-treated with Amoxicillin or its derivatives, Cotrimoxazole and Cephalosporins.³⁸ Further, Planta emphasized that the irrational use of antibiotics without proper diagnosis of the disease leads to emergence of multiple resistant strains of the causative organisms, which in turn, are difficult and costly to treat, especially for immune-compromised individuals.³⁹ In this regard, our results suggest that improved rational drug use should be made as a strategy to reduce inappropriate antibiotics use for ARI episodes in the Philippines.

Identifying pneumonia cases and instituting appropriate antibiotic therapy is still the primary strategy in reducing pneumonia morbidity and mortality in the Philippines. The strategy is under the Care for the Respiratory Infections (CARI) program of the Department of Health where IMCI strategy is being utilized.⁴⁰ It is a simple strategy that is intended to guide decisions on referral, antibiotics therapy, need for oxygen and intensity of monitoring, thus offering a system of prioritizing and rationalizing resource use.⁴¹ However, Bhutta (2006) raised the concern that the existing diagnostic criteria can lead to significant overtreatment of children with respiratory infections.⁴² And once the treatment went to the hands of the community health workers, there is actually a large-scale threat on drug misuse and over use and risk of the development of drug resistance.^{1,43} On that note, the WHO released the revised classification and treatment for childhood pneumonia at first level health facility and outpatient department, which simplifies the management and treatment options, and to reduce the number of referrals for hospitalization,⁴⁴ and this update is currently being discussed and reviewed for local adapta-

tion in the Philippines. The current state of IMCI program of DOH should be reviewed to find out if this strategy is working in the country.

Greater focus on local health staff empowerment and capacity building is imperative to ensure that proper diagnosis and management of cases is being delivered in the communities. There is a need to strengthen the delivery of health education focusing on promotion of responsible use of antibiotics and identification of danger signs of ARI to improve appropriate health seeking behavior of the caregivers. Finally, different techniques of the delivery of information should be explored to amplify its reach and acceptability in the local settings.

LIMITATIONS AND FUTURE RESEARCH

One limitation of the study is that it was largely based on the self-reported behavioral practices using a two-week recall period. Although nurses confirmed the information, these could have been subject to recall bias and underreporting of cases. However, the biases were reduced through nurses' frequent visits to the household. The nurses validated the recordings, and if there were inconsistencies, caregivers were requested to record it in the presence of the nurses so that they will record it correctly. By virtue, caregivers were encouraged to be more compliant and made them realize the importance of the proper recording. Additional research is needed to more closely examine the determinants in health seeking behavior.

CONCLUSION

Overall, these findings suggest that there was inappropriateness and delay in seeking care to childhood pneumonia in rural areas. Our determinants are number of children under 5 years old and age at the time of episode. All of these factors should be taken into consideration when designing health policy and intervention programs to reduce morbidity and mortality cases of childhood pneumonia.

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(available on request from the corresponding author) and declare no conflicts of interest.

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