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Cross Sectional Survey of Care Seeking For Acute Respiratory Illness in Children Under 5 Years in Rural Kenya

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Abstract: Acute respiratory infection (ARI) is a leading cause of childhood morbidity and mortality in developing countries. In Kenya, diagnosis and treatment of ARI remains predominantly health facility based. This presumes that caretakers can recognize ARI symptoms promptly and make a decision to take the child to an appropriate health facility for treatment. Unfortunately, these presumptions have not been assessed. This study sought to establish determinants of health care seeking among caretakers of children under five years (CU5) of age with ARI. An analytic cross sectional survey was carried out in Githunguri Sub - County of Kiambu County. Households with CU5 who had recently suffered an episode of ARI were enrolled. Structured questionnaires, focused group discussions and key informant guides were used to gather information. Structured questionnaires were administered to caretakers to obtain information on socio-demographics, knowledge and health seeking practices. Bivariate and multivariate analysis was carried out with a p value of < 0.05. From 438 households sampled, 323 (73.7%) had CU5 in their households. Out of these, 240 (74.3%) of the children had an episode of ARI in the preceding 2 weeks. The mean age of the children was 29.2 months, with male to female ratio of 1:1. The mean mothers' age was 29.4 years, 71.2% were married, 54.8% had secondary education and 66.6% were of Christian-protestants faith and (90.0%) were in informal employment. Poor knowledge of pneumonia was documented in 92.5% of caretakers. One hundred and forty nine (62.1%) caretakers had delayed health facility consultation for ARI. The main factors associated with delayed facility consultation were poor knowledge of symptoms (p = 0.007) long distance to the nearest health facility (p = 0.002), means of transport used to access the nearest health facility (p = 0.001) and previous high expenditure at health facility (p = 0.011). On logistic regression, the main factors that independently determined delayed facility consultation were long waiting time (>1hour) before service provision (p = 0.001), use of a motorbike to access the nearest health facility (p = 0.001) and traveling for 4 - 4.9 kilo meters to the nearest health facility (p = 0.002). Travelling for long distance and long waiting time before service provision during the previous facility visit were the main determinants of delayed facility consultations. The study recommends increased sensitization on symptom recognition among caretakers, and intensified efforts to reduce turn-around time during health facility consultations in order to minimize delays in health facility consultation.

Keywords: Acute Respiratory Illness, Children Under Five Years, Health Facility Consultation

1. Background

Worldwide, acute respiratory infections (ARI) are a leading cause of morbidity and mortality. Globally, 5.9 million children under 5 years died in 2016, which translates to 16,000 deaths every day [1]. South East Asia reported the

highest burden, followed by Africa at 0.36 and 0.3 episodes per child-year, compared to 0.06 in Europe [2]. Approximately 60% of pneumonia deaths occur in sub Saharan-Africa and South East Asia [3]. In Kenya the estimated National ARI prevalence was at 65.3%. Pneumonia was among the leading cause of deaths among children under

the age of five years accounting for 17% of these deaths [4]. Disproportionately higher rates of mortality due to pneumonia occur in rural settings, mostly attributed to poverty, poor housing and malnutrition [5]. Among strategies adopted to reduce pneumonia mortality, World Health Organization through Global Alliance of Vaccine and Immunization recommended introduction of pneumococcal vaccine in developing countries. While this had impact on morbidity and mortality, reduction of mortality among CU5 due to pneumonia has been slow (58%) compared to the other diseases like measles (which had an 83% drop) and diarrhea (with a 68% decline) [6]. Moreover, according to the Global Action Plan for Prevention and Control of Pneumonia and Diarrhea progress report on pneumonia intervention coverage, Kenya had achieved a 66% coverage score against the recommended coverage score of 86% [7].

According to WHO and UNICEF joint statement on integrated Community Case Management (iCCM), survival of pneumonia depends on three essential steps. These steps entail timely recognition of signs and symptoms, prompt and appropriate care seeking and timely provision of a full course of antibiotic treatment. Caretakers play an important role, especially in recognition of symptoms and in prompt and appropriate care seeking. Unfortunately, only 1 in every 5 caretakers in developing countries can recognize the 2 symptoms of pneumonia, namely fast breathing, and difficulty in breathing [8]. Appropriate care seeking for childhood pneumonia has been low. Globally, only 58% of those children who had pneumonia/ARI symptoms were taken to a health care provider in 2014. This was much lower in developing countries, where only 47% sought appropriate care [9]. However, in Kenya, approximately 66% of CU5, who had ARI symptoms, were taken to an appropriate health care provider. As such, to avert pneumonia deaths, care seeking must not only be appropriate but also prompt. Timely care seeking from an appropriate provider helps in reducing disease morbidity and the risk of mortality. Health care seeking may be influenced by various factors ranging from individual factors, social factors and service based factors. In addition, survival of community acquired ARI is dependent on complex interaction of numerous mediators; among these are caretaker knowledge, virulence of bacterial pathogens, child vulnerability and prompt action by caretaker. Unfortunately, some of the presumptions have not been assessed locally. This study set out to assess determinants of health facility consultation for children presenting with ARI symptoms in rural Kenya.

2. Materials and Methods

2.1. Study Setting and Design

Data in the present study was collected among community members of Githunguri Sub - County, Kiambu County,

Kenya. It is a rural area and 1 of the 12 Sub – Counties in Kiambu County. This Sub-County covers approximately 173.50 km². In 2014, this Sub – County had a total population of 160,315 persons while the total number of CU5 was approximately 20,200 [10]. An analytical cross sectional study design was used to collect data on determinants of timely health facility consultation for ARI among CU5. Data was collected in the 3 divisions of Githunguri Sub - County namely; Githunguri, Ikinu and Komothai. These divisions had 4, 5 and 2 functional community units (CUs) respectively at the time of the study. The names are, Githunguri 1, Githunguri 2, Kimathi, Nyaga, Githiga, Matuguta, Gathangari, Kiababu, Ikinu, Kibicho and Mbari -ya – Igi. In each of these community units, a list of all the households was generated by the community health workers (CHWs) per unit. Simple random sampling was used to sample households with CU5. Proportionate sampling was done per community unit, based on the total population of the households with CU5 generated.

2.2. Study Population

This included children under the age of five and the respondents being caretakers of these children.

2.3. Enrollment of Study Participants

Participant enrollment started from November 2014 to December 2014. A total of 438 households were sampled. Four hundred and two (402) had CU5 in their households, but only 353 were eligible and consented to participate in this study. Out of the 353, thirty had chronic conditions and were excluded from participating in this study. Hence, 323 households with CU5 in their households fully met the inclusion criteria. The flow chart of enrollment of study participants is presented in Figure 1.

Health care workers (nurses, doctors and clinical officers) were also enrolled to participate as key informants in order to gather more information on health service delivery factors influencing health care seeking behaviors among caretakers of CU5. Twelve health officials were purposively sampled as the key informants. Each was a representative of a community health unit. A key informant interview guide was used to collect information on health facility factors such as availability of trained staff, availability of equipment and medications, incurred costs at the facility and timing of health consultation by caretakers. Three focused group discussions (FGDs) were carried out among caretakers who had not participated earlier in the study. Each FGD had 15 members with at least 3 representatives from each community unit in the 3 divisions. Purposive sampling was carried out in selection of the caretaker's representative.

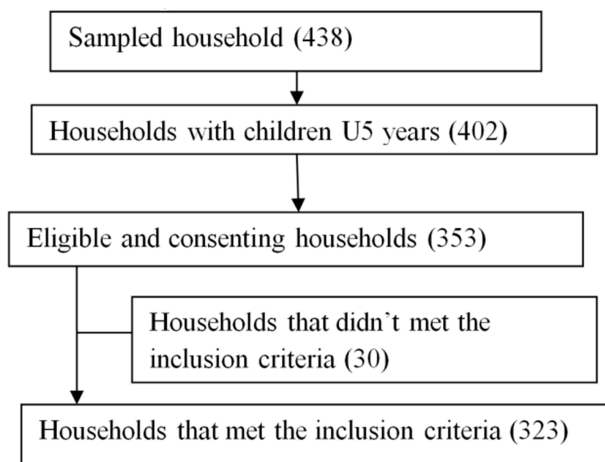


Figure 1. Study participants enrollment.

2.4. Selection Criteria

2.4.1. Inclusion Criteria

All consenting caretakers of CU5 who resided in Githunguri Sub-County and whose children had symptoms of ARI two weeks prior the study period were included in this study.

2.4.2. Exclusion Criteria

Caretakers whose CU5 had a pre-existing diagnosed chronic condition were excluded. To identify this, caretakers were asked if the child was being treated for another medical condition that required them to attend clinic days. If they answered yes, this called for exclusion to the study.

2.5. Outcome Measurement

The outcome variable for this study was timing of health facility consultation for ARI. Caretakers were asked to state how long they took after recognition of ARI symptoms to seek care at the health facility. This was to determine if timing of care was delayed or prompt. Prompt health facility consultation was identified when a sick child received appropriate health care within 24 hours of symptom recognition while delayed health facility consultation meant health facility consultation after more than 24 hours of signs and symptom recognition. ARI was defined as an illness characterized with symptoms of cough, accompanied by fast and/or difficulty in breathing. Caretakers were asked for occurrence of ARI in their children. Those with pre-existing chronic conditions were excluded. For those households reporting ARI episodes, a structured questionnaire was administered to the caretaker. This sought information on the socio-demographics and health seeking practices during the child's illness. This was based on the health belief model for behavior change. An appropriate health facility was attendance to a registered health center, clinic, or hospital. A hospital was defined as any health facility from the level of a District that is level 4, level 5 and level 6 hospital where admission services for the general and special conditions is available.

2.6. Data Collection and Analysis

Data used for analysis in this study emanate from the interviews conducted with the 323 caretakers for their CU5 and also from key informants and FGDs discussants. Collected data was coded, entered and analyzed using Statistical software; SPSS version 21. Baseline contacts and source characteristics were presented as frequencies, percentages, means and ratios. For each child, proportions were calculated regarding whether the child had an ARI symptom or not (Yes or No) in the last two weeks. Information on whether treatment was sought was also inquired and recorded as a (Yes or No) response. Enquiry on place of care (Health facility, Chemist or Shop), decision maker for care seeking (Respondent/Mother, Father/partner, Respondent mother, other (Mother - in - law, Friends), and timing of consultation (Same day, Next day, Two days, Three or more days) was done.

Socio-demographics, level of pneumonia knowledge and facility factors were also assessed as determinants of health facility consultation. Proportions were calculated for these factors and bivariate chi-square test ($p < 0.05$) calculated to assess association of these variables with timing of the health facility consultation. Variables that showed statistical significant association during chi-square test were included in multivariate logistic regression to assess the strongest independent predictor of timing of health facility consultation. The findings were presented as Odds Ratio with confidential interval levels and statistical significance calculated at P value < 0.05 .

On socio-demographics, enquiry was done in regards to age in months and gender of the child (male or female). Data on caretaker's age in years, marital status (Married, Single, Separated/Divorced or widowed), religious status (Protestant, Roman Catholic or Others; Wakurino, Muslims), source of income (Salaried or Non-salaried; casual laborers, crop farming and animal husbandry) and education level (No formal, Primary, Secondary, College/university) was also assessed. Regarding caretaker level of pneumonia knowledge, enquiry on causation, risk factors, signs and symptoms and prevention was done. A "knowledge index" was used to judge caretaker's level of knowledge on pneumonia. Each question on knowledge was weighted based on number of responses. For a question with only one correct answer, a score of 1 was awarded for a correct answer, and 0 for a wrong answer. For those questions with > 2 possible responses, participant that got more than half the responses correct, was termed as having good knowledge, while the opposite implied poor knowledge. Health service delivery factors were also assessed. Enquiry on the nearest health facility characteristics like ownership (Government or Private), type of the health facility (Clinic, Dispensary, Health center, Hospital), distance to the nearest health facility in kilometers (< 1 , 1-1.9, 2-2.9, 3-3.9, 4-4.9, ≥ 5), Means of transport used to reach the nearest health facility (by Foot, Public; (Matatu, motor bike, taxi) or Private) was carried out. In addition, past experiences at the health facility to include

costs incurred in previously at the health facility (buying children card, doctors consultation, buying medications), total cost in US Dollar (≤ 2 or >2), and turn – around time at the health facility in hours (≤ 1 or >1) were also assessed

Qualitative data gathered during FGDs and key informant interview was analyzed through content analysis of key thematic areas and was presented in verbatim form.

2.7. Ethical Considerations

Ethical approval to carry out the research was granted by the Kenyatta University Ethical Research Committee (Reference number: KU/R/COMM/51/362). A research permit was obtained from the National Council for Science, Technology and Innovation (Reference number: NACOSTI/P/14/4674/3923). Further, research approval was obtained from Kiambu County Commissioner (Reference number: ED.12/1/VOL II/53) and County Director of Health Research (Reference number: KBU/COUNTY/RESEARCHAUTHO/VOL1/6).

Participation in this study was voluntary and participants who agreed to participate were asked to sign or thumb-print the informed consent form before commencing the study. Group consent was obtained for FGDs. Confidentiality and privacy was maintained during data collection and handling. Interviews were undertaken with individual study

participants in their homes or household. All data collected was stored, analyzed and reported in formats that did not allow identification of the individual participant.

3. Results

3.1. Study Participants Characteristics

Data analysis included 323 caretakers of CU5s all of which were the biological mothers. From the sampled household only one child who was less than five years was selected for inclusion. Eighty (24.8%) had their children aged between 13 to 24 months, but mean age was 29.2 months. Male children were (170, 52.6%), while (153, 47.4%) were females. Most of the study participants 160 (49.5%) were aged between 20 to 29 years, with a mean age of 29.4 years. Majority, (230, 71.2%) were married. Up to 177 (54.8%) had achieved secondary level of education, 92 (28.5%) had attained primary education 33 (10.2%) had no formal education and only 21 (6.5%) had achieved their college/tertiary level of education. Most, 215 (66.6%) were of Christian-protestant faith. Regarding their source of income, 291, (90%) engaged in informal employment as casual laborers, crop farming and animal husbandry, while only (32, 10%) had salaried employment. This is presented in Table 1.

Table 1. Participant's Characteristics.

Characteristic	Categories	Frequency n (323)	Percentage %
Child's age (in completed months)	0-12	64	19.8
	13-24	80	24.8
	25-36	79	24.5
	37-48	50	15.5
	49-59	50	15.5
Child's sex	Male	175	54.2
	Female	148	45.8
Mother's age (in completed years)	<19	9	2.8
	20-29	160	49.5
	30-39	118	36.5
	>40	36	11.1
Marital status	Single/never married	78	24.1
	Married	230	71.2
	Divorced/separated	11	3.4
	Widowed	4	1.2
Education level	No formal education	33	10.2
	Primary	92	28.5
	Secondary	177	54.8
	College/University	21	6.5
Religion	Protestant	215	66.6
	Roman Catholic	79	24.5
	Others	29	9.0
Source of income	No salaried	291	90.0
	Salaried employment	32	10.0

3.2. ARI Prevalence and Care Seeking

Two hundred and forty (74.3%) children had a cough and fast breathing 2 weeks prior the study. the rest (83, 25.7%) had symptoms of nasal congestion, chest congestion and a running nose. All children who had ARI symptoms were taken to a health facility for check up. On timing of health consultation, 149 (62.1%) delayed visiting a health facility while only (91,

37.9%) visited a health facility promptly. Among those that delayed visiting a health facility, 80(53.7%) took 1 day, 47 (31.5%) took 2 days and 22(14.8%) took at least 3days. Regarding the facility sought, majority (170, 70.8%) sought care in a health center, 39(16.2%) in a dispensary while 31 (12.9%) sought care in a hospital. Biological mothers were the key decision makers (151, 62.9%) in regards to care seeking. However, child's father (30, 12.5%) and Mother in law and

friends (59, 24.6%) also had some little influence on choice of care for the sick child in some cases. Timing of health facility consultation was measured among those children who had ARI. Of the 240 children with ARI, (149, 62.1%) delayed visiting a health facility, while (91, 37.9%) visited a health facility promptly. Among those who had delayed visiting a health facility, (80, 53.7%) took 1 day, (47, 31.5%) took 2 days and (22, 14.8%) took ≥ 3 days to seek appropriate care. This is presented in Table 2.

Majority delayed seeking appropriate care for their children. During FGDs with the caretakers, most reiterated that they made the decision to seek care but they had to wait for their husbands to provide. "I am always with (child name) so I am able to see when he gets sick. But, I have to inform his father before I seek care for financial provision" a focus group discussant. Another focused group discussant reported as follows, "After noticing (child name) was sick I waited for three days before going to a health facility, because, I depend on his father for finances". More insight on timing of health

care consultation was revealed during Key Informant Interviews (KIIs) with Health Care Workers (HCWs). One of the HCW reported, "Mothers know that they should come to the health facility immediately when they recognize their child is not feeling well. However, most of them seek health facility care after three or four days of symptoms recognition". Moreover, during in-depth interview with the HCWs, it was noted that most mothers use alternative treatments before seeking care at the health facility. One of the HCW reported the following, "Mothers always delay seeking care for their children even if they know that health facility care is the best. Most of them use home remedies and only come to us when the illness complicates". Another key informant reported as follows, "Mothers know that children should be brought to the health care facility immediately when sick. Most of them however, opt to buy cold cap and piriton at the shop for cough and only come to us (health facility) when the condition worsens".

Table 2. ARI prevalence and care seeking.

Characteristic	Categories	Frequency (n)	Percentage %
Sick with ARI symptoms*	Yes	240	74.3
	No	83	25.7
Place care was sought**	Hospital	31	12.9
	Health center	170	70.8
	Dispensary	39	16.2
Key decision maker for care seeking	Mother	151	62.9
	Father	30	12.5
	Mother in law/relatives	59	24.6
Timing of health facility consultation**	Delayed	149	62.1
	Prompt	91	37.9
Level of delay (in days)***	1	80	53.7
	2	47	31.5
	≥ 3	22	14.8

* n equals to 323 participants, ** n equals to 240 participants, *** = n equals to 149 participants

3.3. Caretakers Level of Pneumonia Knowledge

Enquiry on causation, risk factors, signs and symptoms and prevention of pneumonia was done to determine caretaker's level of knowledge. When asked what causes pneumonia, (142, 59.2%) reported it was due to cold temperature, (90, 37.5%) said it was due to changes in climate, while only (38, 15%) said it was caused by a virus or bacteria. When asked to list the risk factors of pneumonia, (152, 63.3%) reported cold to be one of the risk factors, (54, 22.5%) listed malnutrition and (45, 18.8%) listed lack of vaccination. On their knowledge of pneumonia symptoms, (115, 47.9%) reported cough as a common symptom, and (104, 43.3%) reported difficulty/fast breathing. This data was then scored to determine the level of pneumonia knowledge. Regarding causation of pneumonia, which had only one correct response (209, 87.1%) had poor knowledge. On knowledge of risk factors, which had 7 possible responses, majority, (237, 98.8%) knew less than 50% of the correct responses while only (3, 1.2%) knew more than 50% correct responses. Out of 5 correct possible responses regarding symptoms of pneumonia, majority (179, 74.6%) could not

list half of these responses even when read out loud for them. On pneumonia prevention, most (208, 86.7%) had poor knowledge. Overall, there was poor knowledge of pneumonia reported in 222(92.5%) of caretakers. On specific pneumonia knowledge, there was poor knowledge on causation 209(87.1%), risk factors 237(98.8%), prevention 208(86.7%) and symptoms and signs 179 (74.6%) of pneumonia (Table 3). Generally mothers had poor knowledge of pneumonia. Similarly, during FGDs it was noted that mothers lacked the correct information of pneumonia causation and symptoms. "Cold was the main reason (name of the child) developed a cough. I was not worried about the cough at first, but after two days, the cough was not over and the child was unable to breathe well. So I went to the health facility for him to be seen" a focused group discussant report. Another focused group discussant reported as follows, "When (child name) developed a cough and fever, I thought it was "homa" (common cold). It was at night so I bought piriton and gave him. In the morning he was still unwell. His breathing was noisy. I then decided to take him to the health center."

Table 3. Caretakers knowledge on pneumonia.

Caretakers pneumonia knowledge			
Variable		Frequency (n=240)	Percentage (%)
Causes	Poor	209	87.1
	Good	31	12.9
Risk factors	Poor	237	98.8
	Good	3	1.2
Signs	Poor	179	74.6
	Good	61	25.4
Prevention	Poor	208	86.5
	Good	32	13.5
Overall knowledge	Poor	222	92.5
	Good	18	7.5

3.4. Health Service Delivery Factors

The nearest health facility for majority of the caretakers was owned by the government (223, 93.3%). Health center was the most common (185, 77.1%) type of health facility near the study participants place of residence, followed by a dispensary (38, 15.8%) and finally a District hospital (17, 7.1%). Majority (185, 77.1) resided less than 4 kilometers from the nearest health facility while the rest (55, 22.9%) more than 4 kilometers. Most of the caretakers used public means of transport to access the nearest health facility; eighty one (33.8%) said that they used matatu/buses, 58 (24.2%) motorbikes, 41(17.1%) taxi while 39 (16.2%) walked and 21

(8.8%) used personal means. To determine caretaker experiences at their nearest health facility, we asked them about costs incurred previously and computed the total cost. In addition, caretakers were asked to indicate how long it took for them to be assisted and also to state the general status of service provision during their previous visit at the facility. Majority (194, 80.8%) had used. ≥ 2 USD to cater for cost of care for their child at the health facility in the previous visit. Caretakers were said to have incurred high cost of care if they used > 2 USD, while the opposite implied low cost. This was based on the average daily income. Most caretakers had no salaried income in this study. Their average daily income therefore was between 1.5 to 2.5 USD (which is equivalent to 150 to 250 Kenya Shillings). Three quarters, (184, 76.7%) had waited for ≤ 1 hr, while (56, 23.3%) waited for > 1 hr before being assisted at the health facility in the previous visit. Caretakers were said to have had experienced delayed assistance/facility delays if they had waited for > 1 hr at the health facility. The opposite implied prompt assistance. With regards to previous status of care at the health facility, majority (219, 91.2%) reported that they lacked medication for their child. The rest (21, 8.8%) said they experienced delays at the health facility and attributed this to long queues and few staffs. This is presented in Table 4.

Table 4. Health service delivery characteristics.

Characteristic	Categories	Frequency (n=240)	Percentage %
Nearest health facility characteristics			
Ownership	Private	16	6.7
	Government	223	93.3
Type	District hospital	17	7.1
	Health Centre	185	77.1
	Dispensary	38	15.8
	< 1	28	11.7
	1 - 1.9	56	23.3
Distance (in kilometers)	2 - 2.9	66	27.5
	3 - 3.9	35	14.6
	4 - 4.9	19	7.9
	> 5	36	15.0
	By foot	39	16.2
Means of transport	Bus/ Matatu	81	33.8
	Personal means	21	8.8
	Taxi	41	17.1
	Motorbike	58	24.2
Past experience at the health facility			
Costs incurred	None	31	12.9
	Buying children cards	65	27.1
	Doctor's consultation	17	7.1
	Buying medicines	127	52.9
Total cost (in US Dollar)	< 2	46	19.2
	≥ 2	194	80.8
Waiting time before being assisted (in hours)	< 1	184	76.7
	≥ 1	56	23.3
	No available medication	219	91.2
Status of care	few staff to attend us	10	4.2
	Long queues/delays	11	4.6

3.5. Determinants of Health Facility Consultation

On bivariate analysis using chi-square test, among socio-demographic factors, child's gender ($P = 0.036$) and key

decision maker for care seeking ($P = 0.014$) were statistically associated with health facility consultation. The rest, child's age ($p = 0.276$), mother's age ($p = 0.614$), marital status ($p = 0.747$), occupation ($P = 0.125$) and level of education ($p =$

0.476) were not associated with timing of health facility consultation. A few 19 (7.9%) belonged to non-conventional religious group, some of which barred their members from

seeking health facility care. However, religion was not associated with delayed consultation ($p = 0.926$). This is presented in Table 5.

Table 5. Socio-demographic factors as determinants of health facility consultation.

Variable	Timing of health consultation (n = 240)				Chi-square test	
	Delayed		Prompt			
	N	%	N	%		
Age of the child (in completed months)	0-12	26	63.4	15	36.6	$\chi^2 = 5.115$, df = 4 P = 0.276
	13-24	43	71.7	17	28.3	
	25-36	36	59.0	25	41.0	
	37-48	24	63.2	14	36.8	
	49-60	20	50.0	20	50.0	
Child's gender	Male	66	55.5	53	44.5	$\chi^2 = 4.396$, df = 1 P = 0.036*
	Female	83	68.6	38	31.4	
	<19	4	66.7	2	33.3	
Mother's age (in completed years)	20-29	71	59.2	49	40.8	$\chi^2 = 1.805$, df = 3 P = 0.614
	30-39	53	62.4	32	37.6	
	>40	21	72.4	8	27.6	
Marital status	Single/never married	34	58.6	24	41.4	$\chi^2 = 1.226$, df = 3 P = 0.747
	Married	108	63.5	62	36.5	
	Divorced/separated	4	50.0	4	50.0	
	Widowed	3	75.0	1	25.0	
Education level	No formal education/ Primary completed	16	66.7	8	33.3	$\chi^2 = 2.496$, df = 3 P = 0.476
	Secondary complete	45	66.2	23	33.8	
	College/University	77	57.9	56	42.1	
	Protestant	11	73.3	4	26.7	
Religion	Roman Catholic	95	62.5	57	37.5	$\chi^2 = 0.154$, df = 2 P = 0.926
	Others	43	62.3	26	37.7	
	Others	11	57.9	8	42.1	
Source of income (Occupation)	Non salaried	137	63.7	78	36.3	$\chi^2 = 2.351$, df = 1 P = 0.125
	Salaried	12	48.0	13	52.0	
Key decision maker for care	Mother	85	56.3	66	43.7	$\chi^2 = 8.530$, df = 2 P = 0.014
	Father	18	60.0	12	40.0	
	Mother in law/ Relatives	46	78.0	13	22.0	

*Significant at $p < 0.05$

During FGDs, most caretakers considered pneumonia as a serious childhood illness. They knew that the commonest symptoms of pneumonia were a cough and difficulty in breathing. None the less, most associated it with exposure to cold and therefore they mostly intervened by keeping the child warm or administering warm drinks. This is what some Caretakers reiterated, "Cold was the main reason (name of the child) developed a cough. I was not worried about the cough at first, but after two days, the cough was not over and the child was unable to breathe well. So I went to the health facility for him to be seen" a focused group discussant.

Another focused group discussant reported as follows, "When (child name) developed a cough and fever, I thought it was "homa" (common cold). It was at night so I bought piriton and gave him. In the morning he was still unwell. His breathing was noisy. I then decided to take him to the health center." On bivariate analysis of knowledge level and timing of hospital consultation, the knowledge of symptoms of pneumonia was significantly associated prompt facility visit ($p = 0.007$). Knowledge of causation of pneumonia ($p = 0.059$), prevention strategies for pneumonia ($p = 0.130$) were all not significant (Table 6).

Table 6. Knowledge of pneumonia as a determinant of health facility consultation.

Variable	Timing of health consultation (n = 240)				Chi-square test	
	Delayed		Prompt			
	N	%	N	%		
Causation	Poor	125	59.8	84	40.2	$\chi^2 = 3.557$, df = 1 p = 0.059
	Good	24	77.4	7	22.6	
Signs	Poor	120	67.0	59	33.0	$\chi^2 = 7.348$, df = 1 p = 0.007*
	Good	29	47.5	32	52.5	
Prevention	Poor	133	63.9	75	36.1	$\chi^2 = 2.290$, df = 1 P = 0.130
	Good	16	50.0	16	50.0	
Overall total score	Poor	139	62.6	83	37.4	$\chi^2 = 0.352$, df = 1 P = 0.553
	Fair	10	55.6	8	44.4	

*Significant at $p < 0.05$

During KIIs, enquiry into the overall turn-around time at the facility was about 2 hrs. Large work-loads and staff shortages were the main reasons. Drug shortages at the facilities were a common scenario in these facilities, and patients were given prescriptions to buy the medicines elsewhere. One of the key informants reported the following in regards to delayed assistance at the health facility. “Some time we delay seeing the sick children because of the work load and their high number. Of course this discourages the mothers from seeking care but what can we do bearing in mind we are very few”. Another key informant reported as follows, “We are four staffs at this health facility, but only

two of us report to work in a day. At times, one works as a laboratory technician, nurse and clinician. This is too much for one person to handle. Therefore, as much as we would want to assist the mothers with no delay, we can’t”. On bivariate analysis of health facility factors, those statistically significantly associated with delayed facility visit were long distance to the nearest health facility (p = 0.002), means of transport used to access the nearest health facility (p = 0.001), previous high expenditure at health facility (p = 0.011), and long waiting time before being served during the previous visit (P = 0.023) (Table 7).

Table 7. Health service delivery factors as determinants of health facility consultation.

Variable	Timing of health consultation (n = 240)				Chi-square test	
	Delayed		Prompt			
	N	%	N	%		
Nearest health facility characteristics						
Ownership	Private	13	81.2	3	18.8	$\chi^2= 2.675, df= 1$ p = 0.102
	Government	136	60.7	88	39.3	
Type	District hospital	20	64.5	11	35.5	$\chi^2= 0.090, df= 2$ p = 0.956
	Health Centre	105	61.8	65	38.2	
	Dispensary	24	61.5	15	38.5	
	<1	12	42.9	16	57.1	
Distance (in kilometers)	1 - 1.9	34	60.7	22	39.3	$\chi^2= 18.713, df= 5$ p = 0.002*
	2 - 2.9	49	74.2	17	25.8	
	3 - 3.9	14	40.0	21	60.0	
	4 - 4.9	13	68.4	6	31.6	
	> 5	27	75.0	9	25.0	
Means of transport	By foot	26	66.7	13	33.3	$\chi^2= 19.530, df= 4$ p = 0.001*
	Bus/ Matatu	55	67.9	26	32.1	
	Personal means	15	71.4	6	28.6	
	Taxi	13	31.7	28	68.3	
Past experience at the health facility	Motorbike	40	69.0	18	31.0	
	None	21	67.7	10	32.3	
Costs incurred	Buying children cards	45	69.2	20	30.8	$\chi^2= 3.221, df= 3$ p = 0.359
	Doctor’s consultation	9	52.9	8	47.1	
	Buying medicines	74	58.3	53	41.7	
Total cost (in USD)	≤2	128	66.0	66	34.0	$\chi^2= 6.527, df= 1$ p = 0.011*
	> 2	21	45.7	25	54.3	
Waiting time before assistance (in hours)	<1	107	58.2	77	41.8	$\chi^2= 5.177, df= 1$ P = 0.023*
	≥1	42	75.0	14	25.0	
Status of care	No available medication	134	61.2	85	38.8	$\chi^2= 0.854, df= 1$ P = 0.355
	others (few staff/ long queues)	15	71.4	6	28.6	

*Significant at p < 0.05

Variables that were significantly associated with delayed health facility consultation on bivariate analysis were included in multivariate analysis model, to identify which one was the independently significant. The strongest independent determinant of “health facility consultation for ARI” was long waiting time (>1hour) before service provision (OR = 5.249; C.I (1.997 - 13.796); p = 0.001), use

of a motorbike to access the nearest health facility (OR = 52.057; C.I (4.597 – 589.551); p = 0.001) and traveling for 4 -4.9 kilo meters to the nearest health facility (OR = 6.354; C.I (1.950 - 20.704); p = 0.002). Details of independent predictors of delayed health facility visit for ARI are presented in Table 5.

Table 8. Independent determinants of health facility consultation.

Independent variables	P value	Odds Ratio (OR)	Confidential interval for OR at 95%	
			Lower	Higher
Sex of child	Male (Ref)			
	Female	0.046	1.896	1.013 - 3.550
Key decision maker for care seeking	Mother (Ref)	0.103		
	Father	0.067	2.127	0.948 - 4.770
	Others	0.054	2.845	0.982 - 8.241

Independent variables		P value	Odds Ratio (OR)	Confidential interval for OR at 95%	
				Lower	Higher
Knowledge on signs of pneumonia	Poor (Ref)				
	Good	0.061	0.482	0.224	1.035
	<1 (Ref)	0.018			
	1 - 1.9	0.014	6.056	1.431	25.623
	2 - 2.9	0.030	3.824	1.141	12.812
Distance (in kilometers)	3 - 3.9	0.261	1.917	0.616	5.969
	4 - 4.9	0.002	6.354	1.950	20.704
	> 5	0.250	2.385	0.542	10.491
	By foot (Ref)	0.030			
	Bus/ Matatu	0.985	0.990	0.358	2.742
Means of transport	Personal means	0.502	1.377	0.541	3.501
	Taxi	0.931	0.946	0.267	3.345
	Motorbike	0.001	52.057	4.597	589.551
	Total cost (in USD)				
	≤2 (Ref)				
	> 2	0.104	6.062	0.691	53.174
Waiting time before assistance (in hours)	<1 (Ref)				
	≥1	0.001	5.249	1.997	13.796

*Significant at $p < 0.05$

4. Discussion

Prevalence of ARI in this area was 74.3%, slightly higher than the national prevalence of 65.9% [4], this could be attributed to maternal occupation as laborers in agricultural farms, to where they carried children along. Rural preponderance was also reported in a Ugandan study which reported rural and urban rates of ARI at 50% and 37% respectively [11]. Another study in Ethiopia found ARI prevalence at 91% among rural dwellers [12]. On the contrary, an Indian study reported higher urban than rural rates at 63.7% and 53.7% respectively [13].

At least 62.1% of ARI cases had delayed hospital consultations. Use of home remedies and over-the-counter medications was the main reason for these delays. Similar findings were reported in studies done in Uganda and Ethiopia [14, 15] as well as studies in Pakistan and Albania [16, 17]. Gender disparities still play a role in health seeking behaviours. Our findings revealed that caretakers were 1.8 times more likely to delay consulting a health facility if their child was a female than male. Similar findings were reported in studies done in Pakistan, India and Africa [16, 18, 19]. Surprisingly, age of child was not found to influence health facility consultation in this study. On the contrary, studies carried out in Sub-Saharan Africa, Pakistan and Indonesia all found age of the child to be associated with prompt care seeking for ARI/presumed pneumonia, [16, 19, 20]. In Kenya, according to KDHS, mothers level of education did not influence care seeking for childhood illness [4]. Likewise, caretaker's level of education was not found significant in this study. On the contrary, a study done in Nandi County, Kenya found low education level to be associated with care seeking delays [21]. In addition, other studies carried out in Pakistan, Yemen and Ethiopia did find level of education as a significant determinant to timing of health seeking for ARI [16, 22, 23, 24]. Religious affiliations have been found to influence health facility consultations. In this study, a few religious cults barred their children from seeking health

facility care. In a study carried out in rural Ethiopia, prompt care seeking was reported in Christian based than Muslim headed households [24]. Despite the fact that mothers were the key decision makers on health care seeking, they depended on the child's father for financial provision, which led to delays in care seeking. Similar findings were reported in studies done at Yemen and Niger where mothers were the key decision makers on care seeking, but relied on the child's father for financial provision. This caused further delays in seeking appropriate care for ARI [23, 25].

Overall, only (18, 7.5%) had good knowledge of pneumonia, and caretakers with poor knowledge were more likely to have delayed consultations. This concurs with findings from an earlier study done in rural Nandi, Kenya that showed that mothers sought prompt care if they were able to recognize difficulty in breathing and fast breathing in child, than a mere cough [26]. Similar findings were also reported in a study done in Ethiopia [15]. Majority (87.1%) had poor knowledge of pneumonia causation, and (59.2%) reported that it was due to cold temperature and therefore keeping the child warm could help relief the symptoms. Similar findings were reported in a study done in Nigeria that cold caused pneumonia and reducing its exposure and wearing warm clothes would prevent it [27].

Health facility factors strongly influenced facility consultation. Long waiting time before service provision at the health facility strongly determined timing of next consultation ($p = 0.001$). This was supported by KIIs reports that large workloads and few health personnel were among the main causes of delayed services. Similar findings were reported in a study carried out at Homa bay County, Kenya, where long queues or delays at the health facility were found to contribute to delays in seeking care at the hospitals [28]. Other studies done in South Africa, Australia and Central America also reported similar findings, [29, 30, 31, 32].

Health care cost has been cited as one of the barriers to health care seeking. Although the policy position that treatment of CU5s is free in all government health facilities, caretakers often have to purchase drugs elsewhere as often

stock run out. Caretakers therefore, opt to buy over the counter medications before seeking care at these facilities, hence delays in consultation. Other studies done in Kenya reported similar findings [33, 34]. This has also been described in other studies from South Africa, Southeast Asia and Philistines [30, 35, 36].

Though, majority (185, 77.1) resided less than 4 kilometers from the nearest health facility, distance to these facilities was associated with delayed facility consultation. This could have been due to the poor terrain and roads forcing caretakers to use motorbikes to access the nearest health facility. Similarly, studies carried out in Kenya reported that poor access and long distances to be associated with delays in seeking appropriate care [34, 28]. Similar findings were reported in Southeast Asia, Australia and Philippine which found that mothers who traveled long distance to the facility, delayed or failed to seek health facility care for their child [31, 35, 37].

Large number of non-consenting households in this study may have influenced findings. In addition, this study was carried out over a limited period of time and therefore did not look at seasonal variations to ARI prevalence and determinants to health facility consultations.

5. Conclusions

The prevalence of ARI in Githunguri Sub-County among CU5s was high at 74.3%, and most 149, (62.1%) had delayed health facility consultation. Overall, respondents had poor knowledge of pneumonia, and poor symptoms recognition was associated with delayed health facility consultation. Long distances to the nearest health facility and more so poor access to the nearest health facility were health facility characteristics that lead to delayed health facility consultation for ARI. Past experiences at the health facility, like high expenditure at health facility (due to lack of medication at the facility and caretakers had to buy) and long waiting time before being served by HCWs were strongly associated with current delay of care seeking. This study recommend increased sensitization on symptom recognition among caretakers, and intensified efforts to reduce turn-around time during health facility consultations in order to minimize delays in health facility consultation.

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