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The Prevalence of acute respiratory infections and the associated risk factors: A Study of children under five years of age in Kibera Lindi Village, Nairobi, Kenya

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Abstract: Acute respiratory infection (ARI) in children is a prevalent condition. In Kenya, 19% of all the cases seen in outpatient clinics and hospitals are acute respiratory infection and mostly in the urban communities. The main objective of this study was to determine the prevalence and associated risk-factors of acute respiratory infections in under 5 years of age in Kibera Lindi. Therefore, we investigated the prevalence and whether, housing, overcrowding, smoke emissions and immunization status play a role in the acquisition of acute respiratory infections in Kibera Lindi slum village, which is located in Nairobi, Kenya. Most of the people living in this area are of the low socio-economic status. A retrospective cross-sectional survey was carried out in which the study population consisted of all children under five years of age living in the village. The quota sampling procedure was used, targeting a sample size of 300 children and data was collected using an interview schedule. It was found that ARI was prevalent in the area (69.7%). In addition, among the risk factors of ARI studied were; mud walled houses (RR=1.13), houses without windows (RR=1.14), overcrowing (RR=1.24), cooking fuel (firewood RR=1.42, kerosene RR=1.18), cooking near the bed (R=1.35). The study revelated that acute respiratory infections and prevalent in Kibera Lindi Village and that; smoke emissions, overcrowding, housing played a role in its acquisition. It was not clear whether the children's immunization status had a role in acquisition of acute respiratory infections.

Key words: Acute Respiratory Infections, prevalence, risk factors, Kenya.

Introduction

Acute respiratory infections are a worldwide problem from which millions of children die annually, and literally billions suffer acute and chronic morbidity arising from their effects (Douglas 1984). Studies in various parts of the world show that on average, young children under 5 years of age suffer 4 to 6 episodes of acute respiratory infections per year (Bulla and Hitze 1978, Loda 1972, Mata 1978, Assaad 1981) and that one-third to a half of the outpatient paediatric consultations in developing countries are due to ARI. Later, WHO programme for Control of ARI 1991 acknowledged these reports and that the cases make up a large proportion of patients attended to by health workers in health facilities. Assaad (1981) and AHRTAG, London (1985) reported that it is estimated that 500-900 million ARI episodes per year occur in developing countries. According to the same reports, mortality from ARI in developing countries is 30 to 70 times higher than in developed countries. The same report goes on to say that about 5million children of under 5 year of age die of ARI annually, 90% of which occur in developing countries. The World Health Organization report in 1993 on the control of ARI in Africa further reported that ARI is the major cause of death to children less than 5 years of age in African

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countries. Wafula (1984) reported that ARI is a leading cause if morbidity and mortality in Kenya also, where 19% of all cases seen in outpatient clinics and hospitals are cases of ARI. accounts for 20% of hospital admissions, 87% being children less than 5 years old. Rahman (1997) found that the prevalence of ARI among children aged below 5 years in Bangladesh was 58.7% and among the risk factors; malnutrition, illiteracy, poverty, overcrowding, and parental smoking, were found in significant higher proportions in ARI victims compared to those without ARI. The observations emphasized to need for research aimed at health system of determine the most appropriate approaches to control ARI programmes especially in developing countries. The International Consultation on Control of Acute Respiratory Infections, December 1991, resported that there are links between environmental risk factors (such as; smoke, outdoor air pollution, indoor pollution, passive smoking, overcrowing) and risk factors in the child (that is low birth weight, malnutrition, measles, breastfeeding and vitamin A deficiency) with acute respiratory infections and becoming increasingly clear. The National Council for Population and Development in the Demographic and Health Survey 1998 reported that in Kenya, pneumonia is a leading cause of death for young children. Nairobi District Annual Health data analysis for 1998 recorded ARI as one of the leading cause of morbidity and mortality.

Knowledge of the factors related to the acquisition of ARI will help in its prevention. Also, the results of this study will help in health education to the community on the preventive measures and the government will also be able to set a plan of action on ARI prevention, leading to a healthy community and a healthy nation as a whole.

In this study, acute respiratory infection was a combination of both upper and lower respiratory infections. Children with acute respiratory infection, were to at least have the following signs; cough, runny nose, fast breathing, difficult in breathing and chest indrawing.

The main objective was to determine the prevalence and associated risk factors of acute respiratory infections in under 5 years of age in Kibera Lindi and specifically find out whether smoke emissions, overcrowding, housing, and immunization status play a role in the acquisition of acute respiratory infections.

Materials and Methods

The study was carried out in Kibera. Kibera is located in the capital city of Kenya, south west of Nairobi. Kibera is a slum in Nairobi, located about 6km away from the city centre. This region was originally an military reserve administered by the Kenya rifles who had rendered at least 12 years of services as early as 1933. Cartel land commission recommended gradual eviction with compensation because the tenants were liable to the crown on whose land they had settled. This recommendation was not effected by the 1952 emergency declaration and many people especially from western Kenya moved to work in Nairobi to replace Kikuyus who had been sent to detention camps. In 1963, the city boundary was extended to include Kibera and subsequently plans for its development were drawn up, the plan being the property of the state. Kibera has 9 villages namely: Lindi, Makina, Siranga, Gatwikira, Laini Saba, Mashimoni, Kambi Muru, Kianda and Kisumu Ndogo. The 1970's and 1980's saw a large influx of people from the rural areas in search of employment. Existing population figures combine data from the slum section of Kibera and that of the surrounding areas. However the population is estimated to be 620,000 (AMREF-1999 populatiion projection). The rent of houses in the area per room ranges from Ksh. 500 to Ksh. 3000. Kibera is served by public transport in terms of Matatus and the Kenya Bus Services. Use of the bicycles mode of is also common, though accessibility of the roads to the interior is quite poor. The Nairobi-Kisumu railway line passes through Kibera. The Nairobi City Commission has supplied communal water taps to the residents of Kibera. A few of these people have private water tanks. Those households that house the taps charge a fee of Ksh 5.00 to 10.00 per 20 litre container. Kibera is served by one government outreach clinic (Kibera Nutrition Centre), a few Non-Governmental Organizations clinics, many private clinics and traditional medicine men. There are mosques and several churches with a range of various denominations. There are 5 formal schools currently run by individual or non-government organizations. Administratively, 1 chief and 1 assistant chief serve Kibera Locadtion. It is boardered by Ngummo estate, Langata estate, Ngong forest and Kilimani. There is a Resident Magistrate's Court at Makina village. The study was centred in Lindi village of Kibera slums which has an estimated population of 15,000. The community consists of various religious sects of Christianity and Muslims. Majority of the people who live in Kibera Lindi are casual laborers in the city's industrial area, while others earn a living from carpentry, tailoring and small shops and food vendoring. There are also quite a number who are unemployed. The study was carried out in Kibera Lindi slum village, which is located in Nairobi the capital city of Kenya. Most of the people living in this

area are of the low socio-economic status. A retrospective cross-sectional survey was carried out in which the study population consisted of all children under five years of age living in Kibera Lindi village at that time. The quota sampling procedure was used starting from the center of the village, targeting a sample size of 300 children aged under five years. Every household was checked for children less than 5 years of age from whom the prevalence was assessed by asking the mothers or guardians if the children had been ill with cough accompanied by short, rapid breathing among other signs of ARI in the last 2 weeks. Data was also collected on the specific risk factors, that is, immunization status, smoke emissions, housing and overcrowing. This was done using an interview schedule. Summary analyses were presented in tables, pie chart, and photographs.

Results

Most of the respondents in the study were mothers of primary level of educatin. After analysis we found that most of the children we interviewed about were aged 0-4 years. The percentage of children aged 49-60 months was only 8.7%. Also, we managed to get almost an equal number of both male and female children. Majority of these children had cough, runny nose, and fever. Chest indrawing and difficulty in breathing were not common among the children. Apart from acute respiratory infections, the children also had illnesses such as diarrhoea, vomiting, refusing to eat, and skin infections. 26.3% of those children who were sick were taken to goverment health facilities, 11.7% were taken to private hospitals, 11% bought drugs from shops and 25% were not given any treatment. During the data collection period 42% of the children were still stick and 39% had recovered.

Majority of the children our study sample (94.7%), lived in one roomed semi-permanent houses which have only one window. The other 3.3% of the children live in permanent houses, while only 2.0% live in temporary houses. Most of these houses are made of iron sheet roofs, and the walls and floor are either earth mud or cement. Most of the study populatioin lived 4-6 persons in one room thus, overcrowded.

The main mode of light are the lantern and the tin lamps (also called koroboi), while kerosene is the mostly use source of fuel. In most of the households, the cooking is done next to the bed where the children sleep and the stoves are lit and put off inside the houses. In most of the households of our study, there were few smokers, who used filtered cigarettes.

Table 1 Prevalence

ARI PRESENT	NO. OF SUBJECTS	PERCENTAGE
YES	209	69.7%
NO	91	30.3%
TOTAL	300	100%

69.7% of the children had ARI, while 30.3% did not have ARI. This indicated that ARI is prevalent in the area.

72.3% of the children were fulley immunized. Out of the fully immunized children 71.4% had ARI. 19.7% were still eligible for immunization, of which 67.8% had ARI. Out of the 8% of the children who were partially immunized, 58.3% had ARI. In this case, there was no relation between immunization and acquisition of ARI. 94.7% of the houses are semi permanent, 70% of those children living in these houses had ARI. All of the houses were roofed with iron sheets. 56% of houses had mud walls, while 44% were cemented. 73.4% of the children living in mud houses had ARI and only 64.9% of those living in cemented houses had ARI. The Relative Risk of ARI cases to children living in mud houses was 1.13. Therefore, there is some association between acquisition of ARI and type of wall. Most of the houses (63.0%) had cemented floor. 69.3% of children living in these houses had ARI. 36.7% of the houses had mud floors, of which 70% of the children living in these houses had ARI. The RR of ARI in children living in mud-floored houses was 1.01. Therefore, there is no association between acquisition of ARI and type of floor. 95.3% of the houses had windows, of which 69.2% of the children living in these houses had ARI. Although the number of houses without windows was small (14 out of 300), 78.6% of these had ARI with a Relative Risk of 1.14. Hence a slight relationship between ARI acquisition and the number of windows.

61 out of 300 children lived in houses that had 1 to 3 occupanta of which 65.6% of children living in these houses had ARI. 205 out of 300 (68.3%) children lived in houses that had 4 to 6 occupants. Of children living in these houses, 68.8% had ARI. 32 out of 300 children lived in houses that had 7 to 10 occupants. 81.3% of children living in these had ARI. 2 of the 300 children lived in houses, which had more than 10 occupants and all the children (100%) in these houses had ARI. The Relative Risk of ARI cases in children living 4 to 6 persons in a house was 1.05 and those living 7 or more persons was 1.24. Therefore, there is a relationship between overcrowing and acquisition of ARI. 242 out to 300 (80.7%) children slept on the bed with their mothers. Of

Table 2 Possible associated factors of ARI

	ARI					
	NO	%	YES	%	TOTAL	Relative Risk
Immunization						
Fully immunized	62	28.6%	155	71.4%	217	1
Partially immunized	10	41.7%	14	58.3%	24	0.82
Still eligible	19	32.2%	40	67.8%	59	0.95
House						
Permanent	3	30.0%	7	70.0%	10	1
Semi permanent	85	29.9%	199	70.1%	284	1.00
Temporary	3	50.0%	3	50.0%	6	0.71
Roof Type						
Iron Sheet	91	30.3%	209	69.7%	300	—
Wall Type						
Cemented	46	35.1%	85	64.9%	131	1
Mud	45	26.6%	124	73.4%	169	1.13
Floor Type						
Cemented	58	30.7%	131	69.3%	189	1
Mud/Earth	33	30.0%	77	70.0%	110	1.01
Cow Dung	0	0.0%	1	100%	1	infinite
Windows						
No Windows	3	21.4%	11	78.6%	14	1.14
Have Windows	88	30.8%	198	69.2%	286	1
Occupants						
1 To 3	21	34.4%	40	65.6%	61	1
4 To 6	64	31.2%	141	68.8%	205	1.05
7 To 10	6	18.8%	26	81.3%	32	1.24
10 And Above	0	0.0%	2	100%	2	infinite
Sleeping Place						
Bed	76	31.4%	166	68.6%	242	1
Floor	12	26.7%	33	73.3%	45	1.07
Seat	3	23.1%	10	76.9%	13	1.12
Lighting						
Candles	1	50.0%	1	50.0%	2	0.72
Koroboi	38	29.5%	91	70.5%	129	1.01
Lantern	45	30.4%	103	69.6%	148	1
Pressure Lamp	3	23.1%	10	76.9%	13	1.10
Electricity	3	50.0%	3	50.0%	6	0.72
Others	1	50.0%	1	50.0%	2	0.72
Fuel						
Firewood	1	14.3%	6	85.7%	7	1.42
Charcoal	21	39.6%	32	60.4%	53	1
Kerosene	69	28.8%	171	71.2%	240	1.18
Cooking Place						
Kitchen	5	45.5%	6	54.5%	11	1
Outside	1	50.0%	1	50.0%	2	0.92
In Bedroom	52	26.3%	146	73.7%	198	1.35
At The Door	14	29.2%	34	70.8%	48	1.30
Others	19	46.3%	22	53.7%	41	0.99
Smoking						
No Smoking	67	31.0%	149	69.0%	216	1
Smoking	24	28.6%	60	71.4%	84	1.03

these 166 (68.6%) had ARI. 45 out of 300 (15%) children slept on the floor of whom 33 (73.3%) had ARI. The remaining 13 slept on the seat of which 10 (76.9%) had ARI. Therefore, there is a relationship between ARI acquisition and where the child sleeps, since there are more children with ARI who slept on the seat and floor than those who slept on the bed. 49.3% use lantern as source of light 69.6% of the children in these houses had ARI. 43% use tin lamp and 70.5% of these children houses had ARI. It was found that fuel used was mostly kerosene, followed by charcoal and firewood. 85.7% of firewood users had ARI. 71.2% of kerosene users had ARI while 60.4% of those who use charcoal had ARI. The relative risk of ARI cases in homes where firewood and kerosene was used as source of fuel was 1.42 and 1.18 respecrively. Therefore there is a significant association between the type of fuel used and acquisition ARI.

66% of the people cook in the bedroom, of which, 73.7% of the children in these houses had ARI. 16% of the people cook at the door of which 70.8% of the children living in those houses had ARI. 3.7% of the people cook in the kitchen and 54.5% of their children had ARI. 13.7% of the people cook anywhere else other than the above areas had 53.7% of the children with ARI. The relative risk in homes where cooking was done in the bedroom is 1.35. Therefore, there is a close relationship between ARI acquisition and the cooking site. 72% of the people in the household where data was collected were non-smokers. The remaining 28% were smokers. For those who smoke 71.4% of their children had ARI. While those who do not smoke had 69% of their children suffering from ARI. The relative risk to ARI in homes where parents were smokers is 1.03. Therefore smoking has no effect no acquisition of acute respiratory infection.

Discussion

From the results, it was revealed that 69.7% of the subjects under study had ARI, while 30.3% did not have ARI. This was in agreement with the study conducted by Bulla and Hitze in 1978. The high prevalence of ARI in the area could be attributed to the type of walls, floor, windows and overcrowding.

73% of the children living in mud walled houses had ARI (RR=1.13), while 65% of the children living in cemented walls had ARI. This implies that the type of wall had an impact on the ARI prevalence. The houses without windows had 78.6% ARI cases (RR=1.14), and those with windows had 69.2% ARI cases.

As indicated above, housing contributed to the prevalence of ARI. This has supported Berman (1983) on ventilation as a risk factor to ARI incidence. However the exact type of house; that is whether permanent, semi-permanent or temporary did not feature well since most of the houses in the study area were semi-permanent.

In addition, overcrowding was cited as a risk factor to ARI. It was found that houses with occupants more than three had 70.7% of ARI cases, unlike houses with occupants less than four who had 65.6% of ARI cases. These results tallied with the findings of Berman of 1983 and Rahman of 1997.

It was also found that cooking fuel used mostly firewood, kerosene and charcoal. 85.7% of the children living in houses using firewood had ARI (RR=1.42) while 71% of children living in houses using kerosene had ARI (RR=1.18) and only 60% of those children living in houses using charcoal had ARI. The cooking places included kitchen, outside the house, next to the bed, and at the door in the house. 73.7% of children living in houses where cooking was done next to the bed (RR=1.35) had ARI, while 70.8% of children living in houses where cooking was done at the door in the house (RR=1.30) had ARI and 54.5% of children who lived in houses where cooking was done in the kitchen had ARI. 71.4% of children living in houses where the parents are smokers had ARI (RR=1.03) as compared to 69% of children living in houses where their parents were not smokers. This showed that the indoor air pollution especially smoke emissions contributed to ARI prevalence. This finding agrees with Berman (1983), Wafula (1990) and Rahman (1997) (parental smoking).

The international consultation on control of ARI (December 1991) reported that there are links between environmental risk factors and risk factors in the child with ARI in developing countries and recommended on more research on these factors. However, our study found out that apart from indoor pollution (smoke emissions), overcrowding and housing. However immunization status role was not clear in ARI acquisition. This may be due to high immunization coverage in the area as from our study with only one child not immunized; therefore, the findings were not enough for comparison on this factor.

The study revealed that ARI is prevalent in Kibera Lindi Village and that; smoke emissions, overcrowding housing (type of walls, number of windows) played a role in acquisition of ARI. It was not clear whether the children's immunization status had a role in acquisition of ARI.

The community should therefore be given health education on the preventive measure of ARI such as living in well-ventilated houses with good-size windows

and the need to open them, the need to avoid overcrowding (number of occupants per room), and the effects of indoor air pollution (smoke emissions). Also the local government should ensure that standard and afforable houses with good ventilation and bigger sized rooms are build and the Ministry of Health expand to community health outreach services to the slum areas. More research needs to be carried out on the risk factors associated with acquisition of ARI, especially immunization status and type of housing.

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