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Duru C
Peterside O
Akinbami F

Pattern and outcome of admissions as seen in the paediatric emergency ward of the Niger Delta University Teaching Hospital Bayelsa State, Nigeria

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Duru C (✉)
Peterside O, Akinbami F
Department of Paediatrics and Child Health, Niger Delta University Hospital, Okolobri, Bayelsa State.
Email: chikamerenu@yahoo.com
Tel: +2348034302438

Abstract *Objective:* To describe the pattern and outcome of childhood illnesses seen in a paediatric emergency ward of a tertiary centre in the Niger Delta region of Nigeria.
Methods: Admission records of all children seen in the Children's Emergency Ward (CHEW) between the 1st of January 2008 and 31st of December 2011 were retrospectively reviewed and analysed.
Results: A total of 1756 children were admitted into the emergency ward over a four year period (1st January 2008 to 31st December 2011). The age range was one month to 18 years with a mean of 36.6 months. There was a male preponderance with a male to female ratio of 1.4:1. Majority, 1386 (78.9%) of the patients were below the age of five years. The mean duration of stay was 2.2 days.
The major causes of admission were malaria, 562 (32.0%), diarrhoeal disease 389 (22.2%), respiratory tract infections 162 (9.2%) and anaemic heart failure 112(6.4%). Peak admissions period and mortality were in the months of January, May and December.
There were 799 transfers, 710 discharges, 94 discharges against medical advice and 20 referrals. Over the period, 133 children died giving a mortality rate of 7.6%. Major causes of mortality were anaemic heart failure 32(24.1%), malaria 26 (19.6%), septicaemia 17 (12.8%) and diarrhoeal disease 15 (11.3%).
Conclusions: Infections are the major cause of morbidity and mortality in the study environment with the under-fives being the most vulnerable.

Key words: children, under-fives, emergency room, admissions, morbidity, mortality

Introduction

The attainment of the Millennium Development Goal 4[1] can only be achieved by concerted and focused efforts aimed at reducing childhood morbidity and mortality. Knowledge of the pattern of admissions into the paediatric emergency unit of a tertiary centre would provide valuable information on the progress of the preventive programmes already in place.[2, 3] It would help to provide data which would assist in policy making and health reforms which in turn would further strengthen primary health care.

This is the first report from the Niger Delta University Teaching Hospital (NDUTH) showing the pattern of paediatric emergency admissions with the aim of highlighting the disease pattern among the Paediatric population in Bayelsa State, the Delta region of Nigeria. Information obtained is hoped to add to existing data from other parts of Nigeria in order to highlight areas in the health care systems which need to be strengthened. It will also help in defining priority areas which will help policy makers in planning disease preventive and intervention programmes for the Paediatric population.

Materials and Methods

Study centre

The Niger Delta University Teaching hospital is located in Okolobri, a semi-urban area in Bayelsa State. It was formerly a general hospital but was converted to a teaching hospital in September 2007. The Children's Emergency Ward (CHEW), is a six bedded ward located within the Accident and Emergency complex of the hospital. Children who present to the hospital as emergencies are first managed at the CHEW and either discharged when they are well or transferred to the children's ward when they are stable to continue management.

Sampling

Retrospective records of all children admitted into the CHEW between 1st January 2008 and 31st December 2011 were retrieved, reviewed and analyzed. The data extracted from the records included the age, sex, diagnosis, duration of stay and outcome. The outcome was classified as discharged, died, transferred to the Paediatric wards, referred out to another centre or discharged against medical advice (DAMA). The duration of stay of all the patients was also obtained from the records irrespective of their outcome.

Diagnostic criteria

Diagnosis of malaria was on the basis of a positive blood film for malaria parasite and/or a satisfactory clinical response to antimalarials. A diagnosis of diarrheal disease was made based on a history of diarrhoea with/out vomiting and abdominal pain. Anaemic heart failure was diagnosed on the basis of the presence of the three cardinal clinical features of heart failure (tachycardia, tachypnoea, tender hepatomegaly) with a haematocrit level of less than 5g/dl.
A case of febrile seizures was made in the presence of fever and seizures in the absence of any intracranial infection which was made by performing a lumbar puncture after any contra indication to this had been ruled out. The diagnosis of septicaemia was made on the presence of a positive blood culture and/or clinical findings. Pneumonia and other infectious diseases were diagnosed by the presence of positive clinical and /or laboratory findings. A diagnosis of Paediatric HIV/AIDS was made in the presence of a positive antigen/ antibody test for HIV and/or positive clinical findings. Other disease conditions were identified by their characteristic clinical features.

Ethical approval

Ethical approval was obtained from the Research and Ethics committee of the Niger Delta University Teaching Hospital.

Data analysis

The data was entered into an Excel spreadsheet and analyzed by calculation of means, percentages and ratios. Test of significance between proportions was assessed using Chi-square and a p value < 0.05 was considered significant at a 95% confidence interval.

Results

General characteristics of the patients

A total of 1805 children were admitted over a four year period (1st January 2008 to 31st December 2011) but the data for 1756 (97.3%) were analyzed as the remaining 49 children had incomplete data in the medical records. Of the 1756 children, there were 1028 males (58.5%) and 728 females (41.5%) with a male: female ratio of 1.4:1. The ages of the children ranged from one month to 18 years with a mean age of 36.6 months. Out of all the children admitted, 1386 (78.9%) were under-fives with 785 (56.6% of them) being between the ages of 12 to 59 months (see table 1 and 2). The total duration of stay ranged from 1 to 10 days with a mean of 2.2 days.

Table 1: Age and sex distribution among the 1756 children admitted into CHEW

Age(months)	No of patients	Male	Female	% of total
1-<12	601	337	264	34.2
12-<60	785	471	314	44.7
≥60	370	220	150	21.1
Total	1756	1028	728	100.0

Table 2: Age distribution according to disease condition

Disease condition	Age (years)				Total (%)
	<1	1- 2	3-4	>5	
Malaria	101	230	101	130	562 (32.0)
Diarrhoeal disease	243	117	12	17	389 (22.2)
Respiratory Tract Infections	93	48	12	9	162 (9.2)
Anaemic heart failure	33	46	20	13	112 (6.4)
Febrile seizures	17	40	21	1	79 (4.5)
Protein Energy Malnutrition	18	12	0	1	31(1.8)
Infections (Septicaemia, Meningitis, Measles, HIV/AIDS, Tetanus)	63	33	12	40	148(8.4)
Others(Sickle cell disease, Asthma, Trauma, Surgical conditions, Burns Accidental poisonings)	20	32	26	110	188 (10.7)
Miscellaneous	13	18	5	49	85(4.8)
	601	576	209	370	1756
	(34.2)	(32.8)	(11.9)	(21.1)	(100.0)

HIV/AIDS- Human immunodeficiency Virus/Acquired Immunodeficiency Syndrome,

Discharges against medical advice

Of the 94 children discharged against medical advice, 55 were male while 39 were female with a male/ female ratio of 1.4:1. Severe malaria 29 (30.9%), diarrheal disease 25 (26.6%) and respiratory tract infections 9 (9.6%) were the major disease conditions they presented with. Seventy-five (80%) of the children discharged against medical advice were less than 5 years old.

The proportion of males that were discharged against medical advice was equal to the proportion of females (5.4%) (Table 4).

Table 3: Causes of admission and patient outcome

Disease condition	Total (%)	Outcome				
		Discharges	Deaths	Transfers	DAMA	Referred
Malaria	562(32.0)	269(47.9)	26(4.6)	237(42.2)	29(5.2)	1(0.2)
Diarrheal disease	389(22.2)	175(45.0)	15(3.9)	174(44.7)	25(6.4)	0(0.0)
Respiratory tract infection	162(9.2)	54(33.3)	10(6.2)	87(53.7)	9(5.6)	2(1.2)
Anaemic heart failure	112(6.4)	37(33.0)	32(28.6)	41(36.7)	2(1.8)	0(0.0)
Febrile seizures	79(4.5)	44(55.7)	5(6.3)	26(32.9)	4(5.1)	0(0.0)
Protein Energy Malnutrition	31(1.8)	2(6.5)	7(22.6)	21(67.7)	1(3.2)	0(0.0)
Infections(Septicaemia, Meningitis, Measles, HIV/AIDS, Tetanus)	148(8.4)	31(20.9)	26(17.6)	81(54.7)	6(4.1)	4(2.7)
Others (Sickle cell disease Asthma, Trauma, Surgical conditions, Burns, Accidental poisonings)	188(10.7)	65(34.6)	6(3.2)	98(52.1)	14(7.4)	5(2.7)
Miscellaneous	85(4.8)	33(38.8)	6(7.1)	34(40.0)	4(4.7)	8(9.4)
Total %	1756(100.0)	710(40.4)	133(7.6)	799(45.5)	94(5.4)	20(1.1)

DAMA- Discharges against Medical Advice, , HIV/AIDS- Human

Table 4: Age and sex distribution among the 94 children discharged against medical advice

Age (months)	No of patients	Male	Female	% of Total
1 –< 12	32	18	14	34.0
12-<60	43	25	18	45.8
≥60	19	12	7	20.2
Total	94	55	39	100.0

Mortality pattern

One hundred and thirty three children died over the period giving an overall mortality rate of 7.6%. There were 69 males and 64 females with a male: female ratio of 1.1:1. Proportional mortality rate for males was 69 (6.7%) and for females 64(8.8%) with no significant sex difference (χ^2 = 2.63, p = 0.10). One hundred and thirteen (85%) patients who died were aged less than 5years with 57 (50% of them) being less than one year.
Though anaemic heart failure constituted 6.4% (112) of all admissions, it was the cause of death in the majority; 32 (24.1%). This was followed by malaria and its other complications 26 (19.6%), septicaemia 17 (12.8%), diarrhoeal diseases 15 (11.3%) and respiratory tract infections 10 (7.5%). Causes of mortality in the miscellaneous group included acute renal failure, Guillien barre syndrome, enterocutaneous fistula and congenital biliary atresia (table 5).

Seasonal pattern of admissions

As shown in fig 1, there were more admissions in the month of December, followed by May and January which corresponded to the peak periods of mortality. Children presenting with diagnosis of malaria, anaemic heart failure and febrile seizures were noticed to present mainly between the months of May to July which corresponded to the peak of the wet, rainy season. Diarrhoeal diseases occurred predominantly in the dry season in the months of December and January. Respiratory tract infections showed three peaks of occurrence in March, July and October (Fig 2). Other disease conditions showed no significant monthly variation in occurrence or mortality.

Table 5: Major causes of mortality in the 1756 admitted patients

Disease condition	No of cases	No that died	CFR (%)	%Total Mortality n =133	% of Total Admissions n = 1756
Anaemic heart failure	112	32	28.6	24.1	1.8
Malaria	562	26	4.6	19.6	1.5
Septicaemia	56	17	30.4	12.8	1.0
Diarrheal disease	389	15	3.9	11.3	0.9
Respiratory Tract	162	10	6.2	7.5	0.6
Infection	31	7		5.3	0.4
Protein Energy	79	5	22.6	3.8	0.3
Malnutrition	30	4		3.0	0.2
Febrile seizures			6.3		
Meningitis			13.3		
Paediatric HIV/	22	3	13.6	2.3	0.2
AIDS	26	3		2.3	0.4
Burns	26	2	19.2	1.5	0.1
Measles	51	2	7.7	1.5	0.1
Trauma	42	1	3.9	0.8	0.6
Surgical conditions			23.8		
Miscellaneous	85	6	7.1	4.5	0.3

CFR- Case Fatality Rate, HIV/AIDS- Human immunodeficiency Virus/Acquired Immunodeficiency Syndrome

Fig 1: Monthly variation in number of admissions and Mortalities

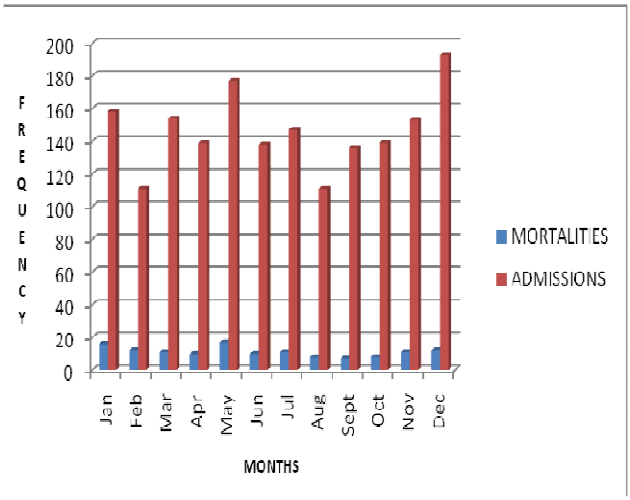
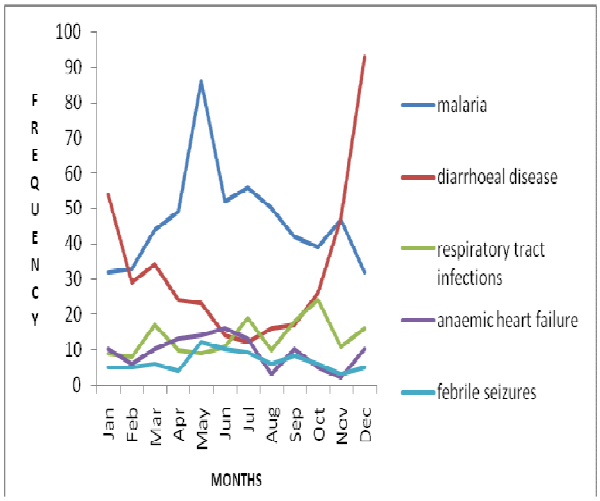


Fig 2: Monthly variation of occurrence of some of the major causes of morbidity



Discussion

This study shows that infectious diseases are the major cause of childhood admissions in this environment. This is despite the various preventive programmes such as the Roll Back Malaria, Baby Friendly Initiative and Control of Diarrheal diseases put in place to curb the scourge.[2] These findings are similar to those from studies in other parts of Nigeria [4-10] and Africa.[11]

The male predominance in terms of childhood admissions in the present series is similar to findings by Abhulimhen-Iyoha and Okolo[4] in Benin and Ibeziako and Ibekwe[5] in Enugu of 1.3:1 and 1.4:1 respectively. Though the reason proposed for this has not been established, [10] it may be related to the increased biological vulnerability of males to infection.[12]

The finding of majority (78.9%) of admissions in the under five age group in this study is similar to reports from Abhulimhen and Okolo[4] in Benin (70.2%), Okechukwu and Nwalozie [7] in Abuja (80.1%) and Bamgboye and Familusi [6]in Ibadan(86.4%). This highlights the vulnerability of this age group and emphasizes the need to step up preventive and curative programmes in the treatment of childhood illnesses.

The peak periods of childhood admissions were in the months of January, May and December which corresponded to the peaks of the dry and rainy season in this environment. These findings are similar to reports from Singhi *et al*[13] in India with busiest months in May and December and Ibeziako and Ibekwe [5] in Enugu who observed highest admissions in January and September. This is however in contrast to findings from Roy *et al* [12] in India who reported highest admissions in the months of August to November. In the present series, mortality was also noted to peak in the months of January and May which was similar to reports from Bamgboye *et al* [6] in Ibadan.

Malaria, anaemic heart failure, diarrhoeal disease and respiratory tract infections accounted for the major causes of mortality among the paediatric emergency patients in the present series. This is similar to findings from other Nigerian studies.[4-6] All the above mentioned diseases are largely preventable with simple and cost effective measures.[14] Malaria can be prevented by use of insecticide treated bed nets and malaria chemoprophylaxis but it has been reported that only 8% of under-fives in Sub-Saharan Africa sleep under bed nets while only one in 3 children are treated with malaria chemoprophylaxis.[15] In a paper reviewing the evidence for beneficial effects of malaria chemoprophylaxis, it was reported that chemoprophylaxis has the potential to reduce childhood clinical malaria attacks, with significant reduction in hospital admissions and mortality.[16] Diarrhoeal diseases can be prevented by simple hygienic practices[15] while the incidence of respiratory infections can be significantly reduced by administration of childhood vaccines against causative organisms like Haemophilus influenza type B and Streptococcus pneumonia in addition to the vaccines currently included in the Nigerian National Programme for Immunization schedule.[10]

The cases of malaria, anaemic heart failure and febrile seizures were noted to peak during the rainy season in the months of May to July which suggests the role of malaria as an important cause of anaemia and febrile seizures in this environment. The leading role of malaria as a cause of childhood morbidity and mortality in this series has also been documented by other authors from Nigeria[4, 5, 8] and other African countries.[11]

The prevalence of diarrhoeal diseases during the months of January and December which corresponds to the dry season was similarly observed in other Nigerian studies. [7, 17, 18] The NDUTH where the present study was carried out serves patients from the host community which is a rural community as well as other surrounding rural communities. The increased prevalence of diarrhoeal diseases during the dry season may be explained by the fact that residents in these communities get their drinking water from rain during the rainy season and from surface water which is likely to be contaminated by faecal waste

during the dry season. It has been shown that unsafe drinking water and poor environmental sanitation contribute significantly to childhood diarrhoea.[19]

Respiratory tract infections showed peak occurrences in the months of March, July and October which corresponds to the peak of the rainy season. Akanbi [20] in Benin similarly reported more episodes of respiratory tract infections in the rainy season which was in contrast to Singhi *et al*[13] who noted more cases in December/ January. Along with malaria and acute diarrheal disease, it is one of the major causes of under-five mortality alone or in combination. [3, 20, 21]

The outcome of admissions show a good transfer rate out of the Emergency ward as well as a good discharge rate which was similar to findings in other studies in Nigeria.[4, 5] The rate of discharges against medical advice in the present series (5.4%) was notably lower than reports from Okechukwu [21] in Abuja (7.4%) and Onyiriuka [22] in Benin(6.3%). Possible explanations for the lower rates of DAMA in our series could be the fact that neonates were not included in our study unlike the others. Though in this study, no reasons were given for the desire of the parents to DAMA, poverty and ignorance as contributing factors have been reported.[5, 21, 22]

This study revealed an overall mortality rate of 7.6%, which is lower than the 8.4% reported by Adeboye *et al* [9] though neonatal mortality was inclusive in their study. Abhulimhen-Iyoha and Okolo [4] in Benin reported a rate of 4.4% while Ibeziako and Ibekwe[5] reported 5.1% from Enugu. The reason for the comparably higher mortality rate in the present series is not immediately clear but may be due to environmental factors as the hospitals in the Benin and Enugu series were both located in urban centres as opposed to the present series where the hospital is located in a rural area. According to Mesike and Mojekwu, [23] environmental risk factors account for one-fifth of the total disease burden in low income countries. Singhi *et al* [13] in India compared the outcome of Paediatric emergency patients in an urban versus a rural hospital. They found that mortality was higher in the rural area.

Peak mortality was noted in the ages of 12 to 59 months which was in contrast to findings from Enugu[5] and Calabar[24] where peak mortality was noted in the 7 to 12 month age groups. We were unable to determine the causes of this high mortality from our study; however Antia-obong [24] in Calabar has suggested late presentation in the hospital as one of the major contributing factors to high childhood mortality in our environment. This is certainly a possibility as our hospital is the only tertiary centre in the community and subserves other primary and secondary health centres. Also accessibility from most of the neighbouring communities is a challenge as the only source of transport from most of these communities is by sea due to lack of roads. According to Olusegun *et al* [15] in Nigeria and Mondal *et al* [25] in Bangladesh, contributors to child mortality includes accessibility to health care services and the risk of child mortality decreases with wider access to safe treatment places.

Conclusions

Infectious diseases are the major causes of childhood admissions in our environment. Achievement of the Millennium Development Goal 4[1] of reducing child mortality by two-thirds from the 1990 rate will depend on renewed efforts to prevent and control malaria, acute respiratory infections and diarrhoea in the African region. Health intervention programmes such as the Integrated Management of Childhood Illnesses (IMCI), [26] and Primary health care[27] which have been shown to significantly reduce childhood morbidity need to be intensified.

Author's contributions
Chika D collected the data, analyzed it and wrote the manuscript. Oliemen Peterside conceived the study and revised the manuscript. Felix Akinbami revised the manuscript and supervised the conduct of the study.
Conflict of interest: None
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References

1. WHO/MDG4 Reduce Child Mortality http:/ www. who .int /topics/ millennium_ development_ goals/ child mortality/en/ accessed 30th December 2012.
2. Child Survival in Nigeria: Situation, Response and Prospects. POLICY project NIGERIA. October 2002.
3. National child health policy. Ministry of Health Nigeria, April 2006.
4. Abhulimhen-Iyoha BI, Okolo AA. Morbidity and mortality of childhood illnesses at the emergency paediatric unit of the University of Benin Teaching Hospital, Benin City. *Nig J Paediatr 2012; 39(2):71-4.*
5. Ibeziako SN, Ibekwe RC. Pattern and outcome of admissions in the children's Emergency Room of the University of Nigeria Teaching Hospital, Enugu. *Nig J Paediatr 2002; 29(4):103-7.*
7. Bamgboye EA, Familusi JB. Mortality pattern at a Children's Emergency ward, University College Hospital, Ibadan, Nigeria. *Afr J Med Med Sci 1990; 9(2): 127-32.*
8. Okechukwu AA, Nwalozie C. Morbidity and mortality pattern of admissions into the Emergency Paediatric Unit of the University of Abuja Teaching Hospital, Gwagwalada .*Niger J Med 2011;20 (1):109-13.*

9. Fajolu IB, Egri-Okwaji MTC. Childhood mortality in children emergency centre of the Lagos University Teaching hospital. *Nig J Paediatr* 2011; 38(3):131-5.
10. Adeboye MAN, Ojuawo A, Ernest SK, Fadeyi A, Salisu OT. Mortality pattern within the first 24 hours of Emergency Paediatric admissions in a Resource poor Health facility. *West Afr J Med* 2010; 29 (4):250-252.
11. Obi JO. Morbidity and mortality of children under 5 years old in a Nigerian hospital. *J Nat Med Ass* 1979; 71(3):245-47.
12. Petit PL, van Ginneken JK. Analysis of hospital records in four African countries 1978-1990, with emphasis on Infectious diseases. *J Trop Med Hyg* 1995; 98(4):217-27.
13. Roy RN, Nandy S, Shrivastava P, Chakraborty A, Dasgupta M, Kundu TK. Mortality pattern of hospitalized children in a tertiary care hospital of Kolkata. *Ind J Comm Med* 2008; 33(3):187-9.
14. Singhi S, Gupta G, Jain V. Comparison of Paediatric Emergency patients in a Tertiary care hospital vs. a community hospital. *Indian Paediatrics* 2004; 41:67-72.
15. The Nigerian academy of science. 2009. Reducing maternal and infant mortality in Nigeria (workshop summary). Nwosu J, Odubanjo MO, Osinusi BO (Eds). West African book Publishers, Lagos, Nigeria. ISBN: 978-978-153-437-9.
16. Olusegun OL, Thomas IR, Michael IM. Curbing maternal and child mortality: The Nigerian experience. *Int J Nurs Midwif* 2012; 4(3): 33 – 39.
17. Paul D, Geerligs P, Brabin BJ, Eggelte TA. Analysis of the effect of malaria chemoprophylaxis in children on haematological responses, morbidity and mortality. *Bull World Hlth Org* 2003; 81: 205 – 216.
18. Omer MI, Karrar ZA. Pattern of Paediatric Emergency admissions in one unit in Khartoum. *Sudan J Paediatr* 1977; 1:19-30.
19. Diakparome MA, Obi JO. The Pattern of Paediatric Emergencies in the University of Benin Teaching Hospital. *Nig J Paediatr* 1980; 18(7):43-5.
20. Bryce J, Boschi-Pinto C, Shibuya K, Black RE. WHO estimates of causes of death in children. *Lancet* 2005; 365: 1147 – 1152.
21. Akanbi MO. The burden of respiratory disease in Nigeria. *Afr J Resp Med 2009; 4(2):10-17.*
22. Okechukwu AA. Discharges against medical advice in children at the university of Abuja teaching hospital, Gwagwalada, Abuja. *J Med Med Sci 2011; 2(7):949-954.*
23. Onyiriuka AN. Paediatric discharges against medical advice: experience from a Nigerian secondary health care institution. *Med J Islamic Republic of Iran 2011; 4:194-199.*
24. Mesike CG, Mojekwu JN. Environmental determinants of child mortality in Nigeria. *J Sust Dev 2012; 5(1): 65 – 75.*
25. Antia- Obong OE. Paediatric Emergencies in Calabar. *Nig Med Pract 1992; 23:51-5.*
26. Mondal NI, Hossain K, Ali K. Factor's influencing infant and child mortality: A case study of Rajshahi District, Bangladesh. *J Hum Ecol 2009; 26(1): 31 – 39.*
27. Lulseged S. Integrated management of childhood illnesses: a review of the Ethiopian experience and prospects for child health. *Etiop Med J 2002; 40: 187 – 201.*
28. Afari EA, Nkrumah EK, Nakana T, Sakatoku H, Hori H, Binka F. Impact of primary health care on child morbidity and mortality in rural Ghana: the Gomoa experience. *Cent Afri J Med 1995; 41: 148 – 153.*