Original Article

Socio-Economic Factors Associated with Anaemia Management among Children under Five in Kisumu County Hospital, Kenya

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ABSTRACT

Background: High burden of anaemia due to high prevalence and its impacts in children's health especially in growth and development especially, makes anaemia an important public health concern. The difficulty in implementing effective measures for controlling anaemia remains a concern, World Health Organization (WHO) is implementing new strategies for the integrated management of the sick child in the primary care set ups, these includes algorithms based on clinical signs observed by health care workers. We aimed to assess the healthcare-seeking behaviour, economic, and social factors affecting anaemia management among caregivers of sick children who had severe anaemia and are five years and below in Western Kenya. **Methods**: Descriptive cross-sectional study design was used. Systematic random sampling was used in selection of study subjects. Data on factors associated with anaemia management in Kisumu County hospitals was collected using a structured questionnaire and clinician desk review charts. Association of factors measured using a Chi-Square test of association and odds ratio used for likelihood tests. **Results**: Results revealed that Anaemia factors, Number of children <5 years of age, and type of food were major determinants for anaemia management. Children fed on non-rich iron foods were less likely to practice good anaemia management as compared to those who eat iron-rich food and prone to increase likelihood of developing anaemia. **Conclusions**: Anaemia management in Kisumu County Hospital is satisfactory. However, there is a need to address finding gaps and as well conduct further studies on home and hospital management outcomes to inform policy.

INTRODUCTION

Anaemia in children is considered when the haemoglobin or haematocrit level are lower than the age-adjusted reference range for healthy children. Anaemia is a condition in which reduced haematocrit or haemoglobin levels lead to diminished oxygen-carrying capacity that does not optimally meet the metabolic demands of the body. Anaemia is one of the most severe public health problems affecting people in both developing and industrialized countries. In developing countries, it is reported that an estimated 3.5 billion people are anaemic. Anaemia prevalence in Africa was 64.6%, almost 50 percentage points higher than the majority in Europe (16.4%), and over 60 percentage points higher than in North America (3.4%) (WHO, 2008). Anaemia in children is of particular interest since it impairs their mental, physical, and social development; it causes adverse behavioural and cognitive effects resulting in poor school performance and work capacity in later years. The high prevalence of Anaemia and its consequences for children's health and especially for their growth and development have made Anaemia a signify essential public health problem, given the difficulty in implementing effective measures for controlling it. Its aetiology involves many factors, such as socioeconomic, nutritional, biological, environmental, and cultural characteristics, and the interventions required encompass pertinent and relevant matters within the context of public health. The study's objective was to determine factors associated with anaemia among children under-fives in Kisumu County Hospital.

Ghana has children anaemia prevalence of 78.4% (GDHS, 2016) and prevalence reduces with age. Anaemia is defined as a low level of haemoglobin in the blood, as evidenced by a reduced quality or quantity of red blood cells (Cavasini et al., 2000). The basic physiology of anaemia is the lack of sufficient circulating haemoglobin to deliver oxygen to tissues. Community-based estimates of anaemia prevalence (blood haemoglobin concentration (Hb) <11 g/dl) in children under five in settings where malaria is endemic range between 49% and 76% (Cavasini et al., 2000). It has serious negative consequences, including increased mortality in children, decreased capacity to learn, impaired physical development, and decreased productivity in all individuals. It is devastating effects on health, physical and mental productivity, affect quality of life and translate into significant economic losses for individuals and nations with high anaemia prevalence. Anaemia is one of the world's most widespread health problems. The most up to date global estimate of childhood anaemia indicate that, 293.1 million children age less than five years are anaemic worldwide, and 28.5% of those are located in Sub Saharan Africa (WHO, 2006). Childhood anaemia is considered a severe public health problem in Sub Saharan Africa, reaching 67% prevalence, or 83.5 million children in the region (WHO, 2006). Anaemia in Children is of particular interest since it impairs their mental, physical and social development; it causes negative behavioural and cognitive effects resulting in poor school performance and reduced work capacity in later years (Villalpando et al., 2003).

Causes of anaemia is multi-factorial. Its direct causes can be broadly categorized as poor, insufficient, or abnormal red blood cell production; excessive red blood cell destruction; and excessive red blood cell loss. Contributing causes include poor nutrition related to dietary intake leading to deficiency in iron plus deficiencies in folate, vitamins B, and B12, and certain trace elements involved with red blood cell production, dietary quality, sanitation, and health behaviours; adverse environmental conditions; lack of access to health services; and poverty. The relative importance of these causes vary by region with the highest prevalence in Africa and Asia (Stoltzfus, 2001), For instance 80 % of children in Benin were noted to be anaemic as captured in results of a study conducted by McLean et al., (2009), which makes anaemia a threat to development in our time. Iron deficiency causes 50 percent of all anaemia worldwide and in turn, is largely due to an inadequate dietary intake of bio-available iron, increased iron requirements during rapid growth periods (such as pregnancy and infancy), and increased blood loss due to hookworm or schistosome infestation. Supplementing dietary iron with iron tablets, syrups, drops, or elixirs, and fortifying processed foods and condiments with iron are the best defence against this cause of anaemia. Where fortification has been evaluated in specific populations, it has improved iron status and reduced anaemia prevalence. In most developing countries, however, food industries are not well developed. Where they are developed, most people cannot afford to buy fortified foods. Supplementing dietary iron can meet the iron needs of vulnerable groups who do not consume fortified foods (WHO/UNICEF/MI, 1999). Certainly, children admitted to hospital with severe anaemia (Hb<8 g/dl) are more likely to die than children admitted without anaemia. Anaemia is one of the largest killers of children admitted to hospital in sub-Saharan Africa (Haque, 2013). Prevalence of anaemia among children under-fives in Kenya was 46.30 (WHO, 2011). Its highest value over the past 21 years was 78.00 in 1990, while its lowest value was 46.30 in 2011. Prevalence of anaemia among children under age 5, is the percentage of children under age 5 whose haemoglobin level is less than 110 grams per litre at sea level.

The World Health Organization (WHO) is implementing new strategies for the integrated management of sick children in the primary care setting, which includes algorithms based on clinical signs detected by trained professional health care workers. As part of this algorithm Palmer pallor is used to evaluate the presence of severe anaemia in absence of routine haemoglobin (Hb) measurements (Specht et al., 1997). The initial focus of the WHO has been on the use of the algorithm by health care workers in health facilities. However, early recognition of moderate to severe anaemia by the primary caregiver is essential to ensure that these children are brought to the formal health care system. Early diagnosis and appropriate treatment are essential to reduce morbidity and mortality related to malaria in children (Armstrong et al., 2002). The choice of treatment has been found to be influenced by accessibility, disease type and severity, patient's gender, and parents' educational level (Masud Ahmed, 2001; Miguel et al., 1998; Müller et al., 2003). Attitude towards providers is also an important factor (McCombie, 1996). Patients are more likely to start with self-treatment at home as this allows them to minimize expenditure (Aly Théra et al., 2000; Nyamongo, 2002). Naturally, caregivers play a pivotal role in the provision and care for childhood diseases. Since most children cannot fend for themselves, time of intervention and quality of care received, depend on the actions of the caregiver, and ultimately determines the outcome of a disease. The use of health care options has a direct influence on the outcome of Severe Malarial Anaemia (SMA). Older children do rarely get Severe Malarial Anaemia, but with the possibility of shifting ages of severe malaria attack, older children may begin to present with this disease As such, it will be critical to have an early recognition of moderate to severe anaemia by the primary caregiver to ensure that these children are brought to the formal health care system. As such, the current study assessed the health care seeking behaviour among caregivers of sick children who had severe anaemia and are 10 years and below in western Kenya.

METHODOLOGY

Study Area and Data Sources

The study was carried out in Kisumu County Hospital. It is malaria endemic zone with high anaemia prevalence. The main economic activity is

varied as it is located at the town Centre with cosmopolitan population but with diverse economic activities from the rural neighbouring populations.

Study Design

This was descriptive cross-sectional study design. This study design was used since this study is non-experimental and it enables collection of accurate information within a short time at a minimal cost.

Study Variables

Dependent variables - Anaemia management among children under five in Kisumu County Hospital. Independent variables - Socio-demography factors, economic status

Study Population and Sample

The targeted population for the study were caregivers of anaemic children under five years old, while the accessible population was derived from caregivers with children under five years old at Kisumu County hospital paediatric ward. Children with caregivers' not meeting inclusion criteria i.e., not mentally stable were excluded from the study.

Inclusion and Exclusion Criteria

Inclusion criteria; Care givers of children under five residing in Kisumu County diagnosed with anaemia.

Exclusion criteria; Care givers of children under five residing out of Kisumu County and those care givers with anaemic children under five meeting criteria but belonging to none consenting caregivers.

Sampling Criteria

The study employed systematic random sampling to identify and interview the caregivers of anaemic children under five years who are resident of Kisumu County. Systematic sampling method was used in selecting caregivers of anaemic children under five years at Kisumu County Hospitals Paediatrics ward whereby, the care giver of every third anaemic child was selected until the required sample size of target of 362 participants was achieved.

The researcher collected data on factors associated with anaemia management in Kisumu County hospitals by use of a structured questionnaire. Information on anaemia management was collected by reviewing the clinician desk review charts to ascertain the management levels. The study used questionnaire since it is a reliable instrument for data collection because it can be distributed to many people within a very short period at minimal costs.

Data Analysis Plan

Data collected by use of questionnaires were checked for accuracy and completeness before they are entered into a computer. Analysis of this data was done by use of Statistical Package for Social Sciences Version 20. Missing and invalid responses were excluded from final data analysis. Descriptive statistics i.e., mean and frequencies were used to analyse the sample and the variables of the study. Associations were done by use of Chi-Square. Data analysed were presented by use of tables, graphs as well as discussion of findings.

RESULTS

Characteristics of the Study Participants

Children between 0-12 months accounted for the highest percentage (30.9%) followed by children between 13-24 months (28.4%), and the least were children between 49-60 months (9.2%) of the total number of children. Male children were the highest participants (51.8%) in comparison to the female (48.2%). Most of the caregivers were between 25-29 years (39.2%) followed by 20-24 years (31.5%), and the least number of caregivers were aged between 45-49 years (1.1%). Close to half of the caregivers had primary education (47.0%) followed by secondary education (35.7%) and the least percentage of caregivers attained a tertiary level of education (17.3%).

In terms of occupation, the highest number of caregivers had personal businesses (55.2%), (10.6%) were farmers and those with other occupations were (18. 6%). Majority of caregivers were Christians (95.5%) whereas (2.8%) of the caregivers followed the African traditional culture, the least number of caregivers practiced Islam (1.7%). 88.3% of the participants were not affected

by maternal health status while (11.7%) were affected by maternal health status. The highest number of children suffered moderate anaemia (42.9%) while mild anaemia least affected the children (24.5%). Majority of the children did not suffer from malnutrition (20.9%)

A high number of children were fed with Iron rich food (57.1%) while those fed with non-iron rich food were (37.3%), and the least number of children were fed with other types of food (5.6%). Iron deficiency was found to be the highest cause of anaemia (42.9%) followed by malaria (32.6%) and sickle cell disease was at (17.8%) and the least cause was others (3.1%). Most children were between 2-5 years (53.5%) while (46.5%) were 1 and below years. The highest number of children were dewormed on a 3-month frequency (32.3%) followed closely by 6-month frequency (30.9%) the least frequency of deworming was yearly (9.5%) whereas others accounted for (27.3%). (Table 2).

Anaemia Prevalence by Age group and Sex in children Under 5

According to the study findings, 111(30.9%) of the caregiver's kids were between age category 0-12 months and of these 24(21.6%) of the kids suffered mild anaemia, 62(55.9%) of the kids suffered of moderate anaemia and 25(22.5%) of the kids suffered of severe anaemia. However, 102(28.4%) of the kids were in age category between 13-24 months and of these 25(24.5%) of the kids suffered of mild anaemia, 40(39.2%) of the kids suffered of moderate anaemia and 37(36.3) of the kid suffered of severe anaemia as provided below.

On sex, 186(51.8%) of the children were male and of these 47(35.3%) of the kids suffered of mild anaemia, 75(40.3%) of the kids suffered of moderate anaemia and 64(34.4%) suffered of severe anaemia. Female children were 173(48.2%) of and of these 41(23.7%) of the kids suffered of moderate anaemia and 53(30.6%) of the kids severed of severe anaemia. The *Figure 1* below reveals that 29% of the participants practice good anaemia management while 71% of the participants practice poor anaemia management.

Figure 1: Prevalence of anaemia management in Kisumu County Hospital, Kenya
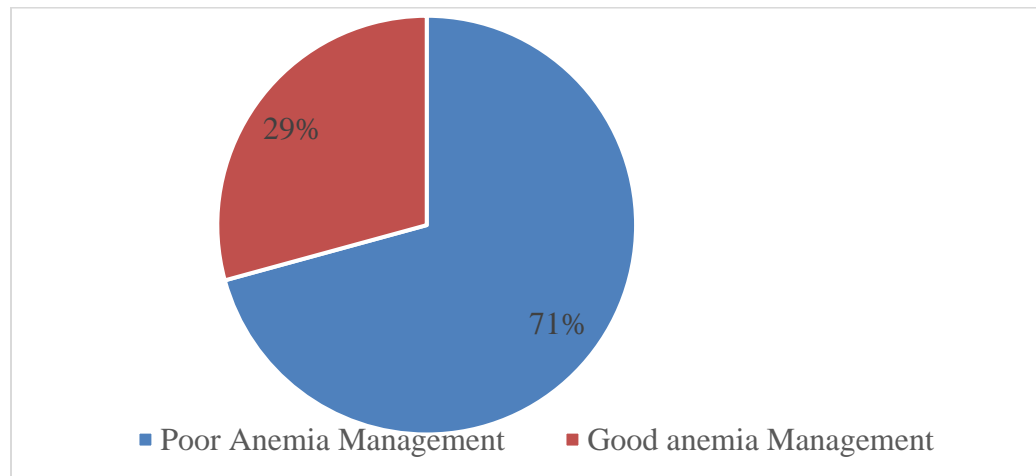
Socio-Demographic Factors Influencing Anaemia Management in Kisumu County Hospital

According to the study findings, children who eat non-rich iron foods and practice good anaemia management were 23.1% compared to 35.1% children who eat iron rich food and practice good anaemia management. (cPR = 0.7; 95%CI, 0.46-0.95; p-value=0.023).

The study further illustrates that children who had other anaemia factors and practice good anaemia management were 54.6% compared to 28.6% children suffering from iron deficiency and practicing good anaemia management. (CPR = 1.9; 95%CI; 1.05-3.46; p-value=0.033). In addition, those who suffered from sickle cell disease and had good anaemia management was 9.4% compared to 28.6% children suffering from iron deficiency. (cPR = 0.3;95%CI,0.15-0.73; p-value=0.007). \

Table 1: Socio-Demographic Factors Influencing Anaemia Management in Kisumu County Hospital

Variable		Overall N (%)	Poor Anaemia Management n (%)	Proper Anaemia Management n (%)	cPR (95%CI)	P-value
Age of Caregiver	Mean±SD (27.04±5.09)					
	15-19	11(3.1)	10(90.9)	1(9.1)	ref	
	20-24	113(31.5)	83(73.4)	30(26.6)	2.9 (0.44-19.46)	0.268
	25-29	141(39.3)	87(61.7)	54(38.3)	4.2 (0.64-27.69)	0.134
	30-34	69(19.1)	56(81.2)	13(18.8)	2.1(0.29-14.34)	0.460
	35-39	16(4.5)	12(75.0)	4(25.0)	2.8 (0.35-21.48)	0.335
	40-44	5(1.4)	3(60.0)	2(40.0)	4.4 (0.51-38.08)	0.178
	45-49	4(1.1)	3(75.0)	1(25.0)	2.8(0.21-34.46)	0.433
Occupation	Formal employment	56(15.6)	40(71.4)	16(28.6)	ref	
	Farming	38(10.6)	27(71.1)	11(28.9)	1.0 (0.53-1.94)	0.968
	Personal Business	198(55.2)	135(68.2)	63(31.8)	1.1 (0.70-1.77)	0.648
	Other	67(18.6)	52(77.6)	15(22.4)	0.8 (0.43-1.44)	0.433
Education Level	Primary	169(47.0)	123(72.8)	46(27.2)	ref	
	Secondary	128(35.7)	89(69.5)	39(30.5)	0.3(0.65-1.34)	0.543
	Tertiary	62(17.3)	42(67.7)	20(32.3)	0.1(0.69-1.69)	0.457
Religion	African traditional	10(2.8)	6(60.0)	4(40.0)	ref	
	Christianity	343(95.5)	244(71.1)	99(28.9)	0.7(0.33-1.57)	0.411
	Islam	6(1.7)	4(66.7)	2(33.3)	0.8(0.21-3.26)	0.793
Malnutrition Status	Yes	75(20.9)	54(72.0)	21(28.0)	0.9(0.63-1.41)	0.791
	No	284(79.1)	200(70.4)	84(29.6)	ref	
Anaemia Factors	Iron deficiency	154(42.9)	110(71.4)	44(28.6)	ref	
	Sickle cell disease	64(17.8)	58(90.6)	6(9.4)	0.3(0.15-0.73)	0.007
	Parasitic infections	13(3.6)	10(76.9)	3(23.8)	0.8(0.29-2.25)	0.683
	Malaria	117(32.6)	71(60.7)	46(39.3)	1.4(0.98-1.92)	0.063
	Others	11(3.1)	5(45.4)	6(54.6)	1.9(1.05-3.46)	0.033
No. of children <5 yrs)	<1	167(46.5)	134(80.2)	33(19.8)	ref	
	2-5	192(53.5)	120(62.5)	72(37.5)	1.9(1.33-2.71)	<0.0001
Type of food	Iron rich	205(57.1)	133(64.9)	72(35.1)	ref	
	Non-Iron rich	134(37.3)	103(76.9)	31(23.1)	0.7(0.46-0.95)	0.023
	Other	20(5.6)	18(90.0)	2(10.0)	0.3(0.08-1.08)	0.064

Statistically significant if p-value <0.05, cPR; Crude Prevalence rates, ref; Reference category

Socio-Economic factors influencing Anaemia Management in Kisumu County Hospital

Comparing to 24.3% participants who relied on farming and practiced good anaemia management, those who had good anaemia management and relied on donations as source of income were 0% (cPR = 0.1, 95% CI; 0.0--; p-value<0.0001).

Participants who earn 11000-30000,31000-50000 and 51000-100000 per month and practiced good anaemia management were 24.8%, .0% and 0.0% respectively compared to 42.1% earning <1000 and practicing good anaemia management. (cPR = 0.6;95% CI,0.41-0.83; p-value=0.003), (cPR = 0.6; 95% CI,0.37-0.95; p-value=0.028) and (cPR = 0.0;95% CI,0.0--; p-value<0.0001).

Participants who valued food as a key expenditure and had good anaemia management were 35.4% compared to 11.5% who valued education and had good anaemia management. (cPR = 3.1;95% CI;1.05-9.02; p-value=0.041). Those who valued health and practiced good anaemia management were 0% compared to 11.5% who valued education and had good anaemia management. (cPR = 0.0;95% CI,0.0--; p-value<0.0001).

Participants practicing good anaemia management and families' savings ranging between 1100-3000 Ksh and 3100-5000 Ksh were found to be 23.9% and 23.1% respectively compared to 39.7% participants whose family's savings were <1000 and had good anaemia management (cPR = 0.6; 95%CI, 1.33-2.70; p-value= 0.011) and (cPR = 0.0; 95% CI, 0.0--; p-value<0.0001).

And families who loose around 1100-3000 Ksh and 3100-5000 Ksh during anaemia case and practice good anaemia management were 45.8% and 45.2% respectively compared to 24.1 those who had good anaemia management and lost <1000 during anaemia case. (cPR = 1.9;95% CI,1.33-2.70; p-value<0.0001), (cPR =1.9;95% CI,1.19-2.92; p-value=0.006).

Table 2: Socio-Economic factors influencing Anaemia Management in Kisumu County Hospital

Variable		Overall N (%)	Poor Anaemia management n (%)	Good Anaemia Management n (%)	cPR (95%CI)	P-value
Source of Income	Farming	37(10.3)	28(75.7)	9(24.3)	Ref	
	Salary	75(20.9)	58(77.3)	17(22.7)	0.9(0.46-1.89)	0.845
	Business	239(66.6)	162(67.8)	77(32.2)	1.3(0.73-2.41)	0.357
	Donations	4(1.1)	4(100.0)	0(0.0)	0.1(0.0---)	<0.0001
	Others	4(1.1)	2(50.0)	2(50.0)	2.1(0.66-6.39)	0.213
Monthly Earning of family	<10000	114(31.8)	66(57.9)	48(42.1)	Ref	
	11000-30000	161(44.9)	121(75.2)	40(24.8)	0.6(0.41-0.83)	0.003
	31000-50000	68(18.9)	51(75.0)	17(25.0)	0.6(0.37-0.95)	0.028
	51000-100000	16(4.5)	16(100.0)	0(0.0)	0.0(0.0---)	<0.0001
Key expenditure areas	Education	26(7.3)	23(88.5)	3(11.5)	Ref	
	Food	288(80.2)	186(64.6)	102(35.4)	3.1(1.05-9.02)	0.041
	Health	45(12.5)	45(100.0)	0(0.0)	0.0(0.0---)	<0.0001
Family saves per month	<1000	126(35.1)	76(60.3)	50(39.7)	Ref	
	1100-3000	117(32.6)	89(76.1)	28(23.9)	0.6(0.041-0.89)	0.011
	3100-5000	65(18.1)	50(76.9)	15(23.1)	0.6(0.36-0.95)	0.031
	5100-10000	36(10.0)	28(77.8)	8(22.2)	0.6(0.29-1.07)	0.080
	>10000	15(4.2)	11(73.3)	4(26.7)	0.7(0.28-1.60)	0.369
Family lost during Anaemia case	<1000	257(71.6)	195(75.9)	62(24.1)	Ref	
	1100-3000	59(16.4)	32(54.2)	27(45.8)	1.9(1.33-2.70)	<0.0001
	3100-5000	31(8.6)	17(54.8)	14(45.2)	1.9(1.19-2.92)	0.006
	5100-10000	10(2.8)	8(80.0)	2(20.0)	0.8(0.24-2.992)	0.771
	>10000	2(0.6)	2(100.0)	0(0.0)	NA	NA

Statistically significant if p-value <0.05, cPR; Crude Prevalence rates, ref; Reference category

Table 3: Caregiver's factors influencing Anaemia Management in Kisumu County Hospital

Variable		Overall n (%)	Poor Anaemia management	Good Anaemia Management	cPR (95%CI)	P-value
Causes of Anaemia	Iron deficiency	144(40.6)	98(68.1)	46(31.9)	Ref	
	Sickle cell disease	77(21.7)	67(87.0)	10(13.0)	0.4(0.21-0.76)	0.005
	Parasitic infections	19(5.4)	17(89.5)	2(10.5)	0.3(0.09-1.25)	0.103
	Malaria	104(29.2)	61(58.7)	43(41.3)	1.3(0.93-1.80)	0.127
	Others	11(3.1)	11(100.0)	0(0.0)	0.0(0.0---)	<0.0001
Prevention of Anaemia	Prayer only	1(0.3)	1(100.0)	0(0.0)	0.0(0.0---)	<0.0001
	Good eating habits	237(66.0)	160(67.5)	77(32.5)	2.3(0.79-6.59)	0.131
	Consulting a witch doctor	12(3.3)	11(91.7)	1(8.3)	0.6(0.07-5.02)	0.624
	Observing hygiene	42(11.7)	37(88.1)	5(11.9)	0.8(0.22-3.16)	0.789
Other factors	No idea	46(12.8)	27(58.7)	19(41.3)	2.9(0.96-8.72)	0.060
	Going to hospital	21(5.9)	18(85.7)	3(14.3)	Ref	
Do when child is suspected to be Anaemic	Go to A witch doctor	5(1.4)	5(100.0)	0(0.0)	0.0(0.0---)	<0.0001
	Go to hospital	281(78.3)	195(69.4)	86(30.6)	1.1(0.75-1.74)	0.535
	Go to a religious leader	2(0.6)	2(100.0)	0(0.0)	0.1(0.0---)	<0.0001
	Buy drugs as a nearby shop/chemist	71(19.7)	52(73.2)	19(26.8)	Ref	
Ever participated in anaemia management	Yes	56(15.6)	49(87.5)	7(12.5)	0.4(0.19-0.79)	0.009
	No	303(84.4)	205(67.7)	98(32.3)	Ref	
Wish to be involved in anaemia management	Yes	133(39.5)	63(47.4)	70(52.6)	3.9(2.70-5.86)	<0.0001
	No	204(60.5)	177(86.8)	27(13.2)	Ref	

**Statistically significant if p-value <0.05, cPR; Crude Prevalence rates, ref; Reference category*

DISCUSSION

Results showed that 32.6% of the participants suffered severe anaemia, 42.9% had moderate anaemia and 24.5% mild anaemia. Globally, anaemia prevalence is 43% and Africa 64.6%. (WHO, 2008) and in Kenya the Prevalence of anaemia among children under-fives in Kenya was 46.30% which is the lowest value in 21 years.(WHO, 2011).

The study also shows factors related to anaemia management amongst under five children in Kisumu County. In Kisumu having test done in time seem to be a significant determinant of anaemia management. This is consistent with a study carried out by (Armstrong et al., 2002) who found that early diagnosis and appropriate treatment are essential in reducing morbidity and mortality among children.

Families losing money during anaemia case was also found to be a significant determinant of anaemia management. According to Aly Thera *et al.* (2000), study, patients were more likely to start with self-treatment at home as this allows them to minimize expenditure.

In developed countries, poor dietary iron intake is very infrequent however, it is very common in developing countries and the Prevalence of iron deficiency is quite high causing health problems like anaemia. (Aspuru et al., 2011). In agreement to this study, our study observed that there is association between the type of food and anaemia management. Similarly in Nigeria, malnutrition is one of the leading factors of mortality amongst under five children with anaemia. (Muoneke et al., 2012). Emphasis on diet as a major determinant of anaemia in children, this has been demonstrated by previous studies which showed that consumption and bioavailability of iron are the main determinants of anaemia (da Silva Ferreira et al., 2016).

In Tanzania, factors associated with anaemia among children under five were found to be malaria parasitaemia, parent's unemployment, and presence of sickle haemoglobin. (Simbauranga et al., 2015). In contrast, our study found no association between sickle cell disease and anaemia management.

CONCLUSION

Anaemia causes high economic burden in children under five in Kisumu County, there is need to control the Co-morbidities and genetic factors associated with anaemia such as malaria and sickle cell disease as well as improve care giver knowledge on anaemia and its management.

Recommendations

Anaemia factors: Enhance Strategies to identify and manage anaemia, anaemia related factors such as malaria, sickle cell anaemia and parasitic infections. Measures that reduce the prevalence of malaria will consequently reduce anaemia in young children and the need for blood transfusions associated with the risk of HIV-transmission. There is a need to conduct further studies on home and hospital management outcomes for anaemia in children under five in Kisumu County Hospital.

Socioeconomic factors: Empower and protect the indigenes with robust economic and social insurance /financial protection through social/ solidarity insurance cover and sound economic policies. There is a need to map, register, and provide support for sickle cell anaemia patients by the Government, especially the county Government.

Health system and facility strengthening: Train and capacity build staffs to ensure effective and efficient anaemia management and stock facilities with drugs and diagnostic commodities and services as well as prompt service provision. There is a need to hire more health care staff, such as nutritionists, to educate and sensitize the patients on various types of anaemia management and prevention strategies. This helps in delivery, quality counselling, and high adherence to anaemia drugs, especially for sickle cell prophylactic drugs. Establish a comprehensive Centre for Sickle Cell Disease (SCD), which will help sensitize, mobilize, and encourage more caregivers to seek timely health services for their sick children. There is need to source and stock more anaemia drugs, especially sickle cell anaemia drugs such as hydroxyurea, supply adequate lab reagents, and provide more tests for anaemia, especially electrophoresis, CT scan, etc.

Health seeking behaviour strengthening: Awareness and sensitization on anaemia through

community education to ensure early detection, diagnosis, and treatment of anaemia and improved health seeking behaviour. Form more patient support groups and allocate finances for running such support groups with refreshers and locally available food demonstrations to support good nutrition. Educate patients on the need for disclosure, especially for sickle cell anaemia and its timing, treatment buddy (caregiver), and adherence support items like alarm, clock, calendar, etc.

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