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Factors Influencing Adherence to Growth Monitoring Services For Children Under Five Yearsat Kibera Heath Centre, Nairobi, Kenya

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Abstract:
Introduction*: Growth monitoring services (GMS) is a key public health intervention that serves as the fundamental activity in an integrated child's healthcare and nutrition programme.Studies have shown that GMS have the potential to achieve improved breastfeeding and complementary feeding practices thus improving the nutrition status of children below five years.*
Objective*: To examine the factors influencing adherence to GMS for children under five years of age.*
Methods*: We conducted a health facility-based cross sectional study in the informal settlements of Kibera in the City of Nairobi, Kenya. Data were collected from caregivers of children (<5 years) using interviewer-administered questionnaires. Bivariate analyses were done to determine significant predictors of uptake of GMS.*
Results*: The study recruited a total of 279 caregiver-child pairs. Majority of the caregivers were married (79.2%) and had delivered the index child in a health institution (96.8%). The uptake of GMS was 58.1% (95% confidence interval (CI) 52.2% - 63.7%)).The drivers of GMS uptake included younger children (≤ 9 months and 10 – 18 months, odds ratio (OR) (95% CI) 41.7 (16.3-136.7) and 4.4(1.8-11.8) respectively), smaller household size (OR 1.9 (95% CI 1.1 - 3.3), getting feedback (4.0(2.3-6.7)) availability for consultations (2.2(1.1-4.7)), problems noted during growth monitoring (6.9(1.3-37.2)), shorter waiting time (2.0(1.4-4.1)), possession of a mother and child booklet (7.2(2.0-25.7)). Delivery of a child at home was found to be a barrier to adherence to GMS (OR (95% CI) 0.1(9.6-1.0).*
Conclusion*: The present survey documented sub-optimal utilization of GMS in the study population. Additionally, the study identified a set of modifiable determinants that should be addressed in order to boost the uptake of GMS in children. These includes promotion of child delivery in health facilities as well as enhancing utilization of family planning in order to promote smaller household sizes.*
Keywords*: Growth monitoring, children under five, adherence, informal settlements*

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I. Introduction

Growth monitoring and promotion services (GMS) refers to the process of evaluating the growth rate of a child (0-59 months) while comparing it to a set standard of periodic anthropometric measurements in order to assess growth adequacy and identify deviation at the early stages (UNICEF, 2008). It is normally carried out at the health facility and sometimes at the community levels (Government of Kenya (GOK),2005). Ideally, it should start at birth and continue until the child attains 59 months of age (WHO, 2006).

Poor nutrition in the first years of a child's life especially within the first 1000 days can lead to stunted growth, which is associated with impaired cognitive ability and reduced performance both in school and at work. Nearly half of all under 5 deaths are due to under nutrition, this leads to loss of about 3 million children under 5 per year. Poor nutrition puts children at greater risk of dying from common infections compared to than other children, also, it increases frequency and severity of these infections, and contributes to delayed recovery from the illnesses. (UNICEF, 2017)

Growth monitoring services (GMS) has continued to be promoted in developing countries to improve every child's health (Roberfroid et al, 2005). In the 1980s, GM was promoted as one of the key components of community nutrition programs. In areas where it was implemented as part of a package of nutrition and health programs, positive child growth outcomes were reported (Ashworth et al,2008).Maureen etal (2014) found that the GMP programme, designed in Afghanistan to be provided CHWs in tandem was associated with improved

nutritional status in children who had attended 50% or more sessions and who entered the programme before 9 months of age.

Kenya has plans to roll out 11 evidence-based High Impact Nutrition Interventions (HiNi) and has set the following nutrition targets for between 2010 and 2030: reduce severe and moderate stunting by one-third, eliminate iodine deficiency, and reduce anemia by 30 percent. The overall impact expected is a 30 percent reduction in child mortality and an increase in GDP of up to 3 percent, if implemented to scale (Mohajan,2014).

Poor management of malnutrition such as late diagnosis may lead to complications such as delayed recovery from malnutrition, disability and death. There are measures that have been to place to prevent this such as GMP. However, despite the measures placed by the government toward timely detection and preventing complications of malnutrition and improving its management, complications still occur. According to the 2014 Kenya Demographic and Health Survey estimates, 6% of the under five children are stunted, 11% are underweight while 4% are overweight. The survey alsoshowed that the greater burden lies in the rural parts of Kenya.In Nairobi County, Kenya, the proportion ofstunted and underweight children (<5 years) is estimated to be 17% and4%respectively (Kenya National Bureau of Statistics and ICF Macro 2015). Preliminary data collected at Kibera Heath Centre revealed low uptake of GMS with the targeted population for GMS on a monthly basis being 1000 children while, on average, 560 children benefit from GMS every month.

The GMS concept lays much emphasis on child growth and development in the age bracket of below 5 years but the available data indicates that only a small proportion of the children visit the health facilities, especially after completion of immunization at the age of 9 months (GOK 2005). Opportunities to promote preventive health interventions each time a child is brought to afacility for consultation are being missed.

. Assessments of immunization, weight, and feeding practices for children less than 24 months occurred in only 66%, 53%, and 36% of cases, respectively (National Coordinating Agency for Population and Development (NCAPD) 2005).

There is a dearth of published information on the status of GMS particularly in the resource limited settings of Sub-Saharan Africa. The current study aimed at addressing this gap by documenting the adherence to growth monitoring services in children under five in a resource poor setting as well as its correlates.

II. Methods

Research design

The current healthfacility-based study adopted a descriptive cross sectional design.

Study Site

The study was conducted in Kibera slums in the city of Nairobi, Kenya.A survey on the nutritional status of children in the study area showed that the prevalence of stunting in children was 47%. Moreover, 11.8% of the surveyed children were underweight, while2.6% were wasted (Olack etal 2011).

Study population

The study population consisted ofcaregivers of children under five years of ageseeking services at the study health facility. Additionally, the caregivers were residents of Kibera at the time the study was being undertaken.

Sampling approach

The study participants were recruited consecutively as they sought services at the study health facility until the desired sample size was attained.

Data collection

Interviewer–administered structured questionnaires were used to collect data from the respondents. Secondary data was abstracted from the clients' records including the MOH's Mother and Child Health Booklet.

Data management and analysis

The completed questionnaires were assessed for consistency and completeness. Data entry was donein Microsoft Excel. Data were analyzed using Statistical Package for the Social Sciences v. 20. Statistical analysis involved both univariate and bivariate analysis. A p-value of less than 0.05 was designated as the threshold of statistical significance.

Ethical considerations

Approval to conduct the study was sought from Kenyatta National Hospital/University of Nairobi Ethics Review Committee(approval number UP411/06/2018)and the Department of Nursing ofThe Catholic University of Eastern Africa. Permission to conduct the research was obtained from the relevant authorities including the

health facility's administration. Written informed consent was obtained from the caregivers of the study children.

III. Results

Sociodemographic Characteristics of the study participants

The survey enrolled a total of 279 caregiver-child dyads. Assessment of the age of the caregivers showed that 46.2% were aged between 19 and 24 years, 42.7% were between ages 25 and 34 years while 9.3% were aged between 35 and 44 years. Those aged 45 years and above comprised 1.8% of the sample. Majority of the caregivers were married (79.2%), had not more than two living children (64.9%) and had delivered the study child in a health facility (96.8%). Analysis of the educational qualifications of the caregivers showed that 36.2%, 49.5% and 13.3% of the caregivers had primary, secondary and tertiary education qualifications respectively. The rest had no formal education (1.1%). Inquiries about religions practiced by the study participants revealed that 46.2% wereprotestants, 46.6% were Catholics and 7.2% were Muslims.In terms of employment status of the caregivers, 31.2% were casual laborers, 30.5% were self-employed, and 12.9% were permanently employed while 25.4% were unemployed. The distribution of monthly income of the caregivers was as follows; 29% earned less than KSh. 1000, 42.7% earned between KSh. 1001-5000, 19% earned between KSh. 5001 and 10000 and 9.3% earned more than KSh. 10,000.

Examination of the distribution of the children's age demonstrated that those who were less than 9 months were 45.9%, 24% were between 10 and 18months, 12.5% were between 19 and 27months, 9.7% were between 37 and 49months and7.9% were between 28 and 36months.

Adherence to growth monitoring services

Of the 279 children enrolled in the present study, 162 (58.1%) were found to have been adherent to the schedule ofattending the monthly growth monitoring services (95% confidence interval (CI) 52.2% - 63.7%).

Assessment of factors associated with adherence to growth monitoring services

Sociodemographic and adherence to growth monitoring services

Table 1 presents the findings on the evaluation of the relationship between adherence to growth monitoring services and sociodemographic factors. A higher proportion of adherence to GMS was observed in younger caregivers (<35 years) when compared to their older counterparts (≥ 35 years) although this relationship was not statistically significant (60% versus 47% respectively, odds ratio(OR) 2.0 (95% CI 0.9-4.4), p=0.054). An inverse relationship was observed between highest educational qualifications of the caregivers and adherence to GMS. The proportion of children who had adhered to the GMS schedule were 41%, 54% and 69% for caregivers who had tertiary, secondary and primaryno formal education, respectively. Children whose caregivers had Primary school education or no formal education had about 3-fold increment in the odds of being adherent to GMS when evaluated against those whose caregivers had attained tertiary level of education (OR 3.3(95% CI 1.5-7.2), p=0.002). There was no statistically significant difference in adherence to GMS in children whose caregivers had secondary and tertiary education (OR 1.7(95% CI 5.8-3.6), p=0.136). Religion was significantly predictive of adherence to growth monitoring services (OR 14.5(95% CI 3.3-64.5), p<0.001). A trend of decreasing adherence to growth monitoring services increase in the child's age was observed. Children who were aged nine months had higher odds compared to children who were 28 months or more (OR 41.7(95% CI 16.3-136.7), p= 0.001). Similarly, children aged between ten and eighteen months were approximately four times more likely to be adherent to GMS compared to those of higher age (≥ 28months) (OR 4.4(95% CI 1.8- 11.8), p=0.001). The size of caregiver's household was partially associated with adherence to GMS in children with children whose caregivers had a household size of between three and five people having significantly higher odds of being adherent compared to those with a larger household size (OR 1.9(95% CI 1.1-3.3), p=0.025). Other sociodemographic attributes of the caregiver including the number of living children and marital status were not significantly associated with adherence to growth monitoring services.

Table 1 – Relationship between adherence to growth monitoring services and sociodemographic factors

Variable	Categories	Adherent to GMS		OR (95% CI)	P-value
		Yes [n(%)]	No [n(%)]		
Caregiver's age (years)	<35	149(60.1)	89(39.9)	2.0(0.9-4.4)	0.054
	≥ 35	13(41.9)	18(58.1)	Ref	
Marital status	Married	129(58.4)	92(41.6)	1.0(6.6-1.9)	0.839
	Not married	33(56.9)	25(43.1)	Ref	
Number of children	One	52(56.5)	40(43.5)	0.8(6.5-1.5)	0.607
	Two	51(57.3)	38(42.7)	0.8(9.5-1.6)	0.687
	≥ 3	59(60.2)	39(39.8)	Ref	
Religion	Christian	160(61.8)	99(38.2)	14.5(3.3-64.5)	<0.001
	Muslim	2(10.0)	18(90.0)	Ref	

Education	Primary/No formal education	72(69.2)	32(30.8)	3.3(1.5-7.2)	0.002
	Secondary	75(54.3)	63(45.7)	1.7(5.8-3.6)	0.136
	Tertiary	15(40.5)	22(59.5)	Ref	
Household members	1 - 2	31(51.7)	29(48.3)	1.0(7.5-2.1)	0.845
	3 - 5	91(65.5)	48(34.5)	1.9(1.1-3.3)	0.025
	> 5	40(50.0)	40(50.0)	Ref	
Child's age (months)	≤ 9	114(89.1)	14(10.9)	41.7(16.3-136.7)	0.001
	10-18	31(46.3)	36(53.7)	4.4(1.8-11.8)	0.001
	19- 27	9(25.7)	26(74.3)	1.7(7.6-5.2)	0.291
	≥ 28	8(16.3)	41(83.7)	Ref	

GMS = Growth monitoring services; OR= Odds ratio;CI= Confidence interval

Assessment of the association between economic factors and adherence to growth monitoring services

None of the economic attributes assessed in the current survey was a significant predictor of adherence to growth monitoring services as shown in Table 2.

Table 2 – Relationship between adherence to growth monitoring services and economic factors

Variable	Categories	Adherent to GMS		OR (95% CI)	P-value
		Yes [n(%)]	No [n(%)]		
Employment status	Casual	56(64.4)	31(35.6)	1.8(1.6-3.5)	0.057
	Permanent	17(47.2)	19(52.8)	0.9(2.4-2.1)	0.839
	Self-Employed	54(63.5)	31(36.5)	1.7(9.9-3.4)	0.074
	Unemployed	35(49.3)	36(50.7)	Ref	
Breadwinner of the family	Self	33(55.9)	26(44.1)	0.8(9.5-1.7)	0.729
	Spouse	51(54.8)	42(45.2)	0.8(5.5-1.5)	0.585
	Parents	21(70.0)	9(30.0)	1.6(4.7-3.9)	0.269
	Self and spouse	57(58.8)	40(41.2)	Ref	
Monthly income (KSh.)	0-1000	42(51.9)	39(48.1)	0.4(8.2-1.2)	0.120
	1001-5000	73(61.3)	46(38.7)	0.7(1.3-1.8)	0.451
	5001-10000	29(54.7)	24(45.3)	0.5(4.2-1.5)	0.217
	> 10000	18(69.2)	8(30.8)	Ref	

GMS = Growth monitoring services; OR = Odds ratio;CI = Confidence interval

Adherence to growth monitoring servicesand health facility related factors

The current study also evaluated the association between adherences to growth monitoring services and selected health facilityrelated attributes. The results are displayed in Table 3. The venue of child delivery was associated with compliance with growth monitoring services. Children delivered at home had 90% reduction in the odds of being adherent to GMS compared to children delivered in a health facility (OR 0.1(95% CI 9.6-1.0), p=0.038). Mothers who were found to be in possession of the mother and child booklet were about seven times more likely to be adherent to GMS (OR 7.2(95% CI 2.0- 25.7), p<0.001). Shorter waiting time at the health facility (<30 minutes)was associated with increased compliance to GMS schedule as compared to longer waiting periods (>1 hour) (OR 2.0(95% CI 1.4-4.1), p = 0.038).

Children whose caregivers reported that they always get feedback from the healthcare provider on the child's status were more likely to be adherent to GMS (OR 4.0 (95% CI 2.3 - 6.7), p=0.001). Other health system related variables which were found to be drivers of adherence to GMS were: availability for consultations (OR 2.2(95% CI 1.1 - 4.7), p=0.034) and having had a problem spotted while seeking growth monitoring services (OR 6.9 (95% CI 1.3-37.2), p=0.027). Caregiver having been subjected to growth and promotion counselling, time taken to get to the health facility as well as the distance between the health facility and the place of residence were not significant correlates of adherence to growth monitoring services.

Table 3 – Relationship between adherence to growth monitoring services and health facility related factors

Variable	Categories	Adherent to GMS		OR (95% CI)	P-value
		Yes [n(%)]	No [n(%)]		
Place of delivery	Home	2(22.2)	7(77.8)	0.1(9.6-1.0)	0.038
	Hospital	160(59.3)	110(40.7)	Ref	
Carrying mother and child booklet	Yes	159(60.7)	103(39.3)	7.2(2.0-25.7)	<0.001
	No	3(17.6)	14(82.4)	Ref	
Waiting time at the facility	<30minutes	39(72.2)	15(27.8)	2.0(1.4-4.1)	0.038
	31-60minutes	44(52.4)	40(47.6)	0.8(6.5-1.5)	0.595
	> 1 hour	79(56.0)	62(44.0)	Ref	
Growth and promotion counselling	Yes	135(57.9)	98(42.1)	0.9(7.5-1.8)	0.924
	No	27(58.7)	19(41.3)	Ref	
Availability for consultations	Yes	149(60.3)	98(39.7)	2.2(1.1-4.7)	0.034
	No	13(40.6)	19(59.4)	Ref	
Classification of visit	Educative	146(59.6)	99(40.4)	1.6(6.8-3.4)	0.165
	Non-educative	16(47.1)	18(52.9)	Ref	
Problem duringgrowth monitoring	Yes	21(58.3)	15(41.7)	6.9(1.3-37.2)	0.027
	No	141(58.0)	102(42.0)	Ref	
Time taken to facility	< 1 hour	96(56.5)	74(43.5)	0.8(5.5-1.4)	0.500
	>1 hour	66(60.6)	43(39.4)	Ref	

Distance To H/facility (Km)	<1	81(60.4)	53(39.6)	0.6(6.2-1.8)	0.412
	1-3	67(53.6)	58(46.4)	0.5(0.2-1.4)	0.170
	> 3	14(70.0)	6(30.0)	Ref	
Feedback/Updates on child's progress	Always	92(68.7)	42(31.3)	4.0(2.3-6.7)	0.001
	Never/Sometimes	70(48.3)	75(51.7)	Ref	

GMS = Growth monitoring services; OR = Odds ratio;CI = Confidence interval

IV. Discussion

The importance of growth monitoring and promotion (GMP) as partof preventive and curative health to reduce malnutrition and mortalityis recognized worldwide(Ashworth et al 2008).Regular weighing, with correct plotting of the weight andheight and interpretation of the growth curve, form the coreof the growth monitoring and promotionstrategy. This allows for early identification and appropriate classification of malnutrition which ispivotal to appropriate and timely intervention, especially in children <5years of age(GOK 2005).

The present study revealed that only slightly over one-half adherence of the children enrolled in the survey had adhered to GMS. This is not very different from the findings of a similar study conducted in Nyamira, western Kenya, which reported aGMScoverage of 53.3% (Nyabuti 2015). On the other hand, the prevalence of utilization of GMS observed in the current study is lower when compared with studies done in Uganda (59%), South Africa (67%); Dominican Republic (85%) and Honduras (87%) (Faber 2003; Griffiths 2007). Other studies have reported much lower prevalences of utilization of GMS compared to the currentsurvey findings. These includes Southern Ethiopia (16.9%) (Feleke et al 2017) and Brazil (42%) (Faber 2003).The wide variations in the findings in the variousresearch studies most probably is a reflection of thedifferences in operational definitions, study designs and timings of the researches.Another probable explanation could bedisparities in the mothers'/caregivers' participation in GMS as well as variations in the knowledge, attitudes and perceptions of GMS among mothers/caregivers in the different settings.

Just like in the current survey, a study conducted in South Africa found that less than half of caregivers had their child's growth explained to them every time they sought GMS in a health facility (Thandrayen & Saloojee 2010; Blaauw et al 2017). A study done in Cote d'Ivore also found that most of the caregivers were not given feedback following the growth evaluation of their children (Coulibaly 2002). This represents missed opportunities in provision of health education to the mothers which could promote uptake of GMS and other recommended child healthcare services.Shortages in staffing and the attendant workload as well as the time constraints could explain, at least in part, the inability, of the healthcare providers, to allocate adequate time to the caregivers in order to provide feedback to them.

Institutional delivery (adjusted oddsratio (aOR) (95% CI) 3.01(1.65-5.50)), index child age 12-17 months (aOR (95% CI) 4.03(2.16-7.51)) and 18-23 months (aOR (95% CI): 3.08(1.70-5.57)), family size (4-5) (aOR (95% CI) 0.14(0.06-0.33)), family size (>5) (aOR(95% CI) 0.34(0.14-0.82)), regular GMP attendance (aOR (95% CI) 4.37(2.45-7.80)), medium wealth index (aOR(95% CI) 3.14(1.51-6.52)) and high wealth index (aOR(95% CI) 3.24 (1.59-6.62)) were reported as the correlates of uptake of GMS in Ethiopia according to a research conducted by Feleke et al (2017).In the present study, children of caregivers had a household size was between three and five members were found have had significantly higher odds of being adherent to GMS compared to those who hailed from households witha larger size (>5 members). Likewise, Feleke et al (2017) noted an inverse relationship between family sizes and utilization of GMP services. The most probable explanation for this observation is the increased workload that the caregivers with large family sizes face at home. This is reinforced by studies done elsewhere which have incriminated large family size as a constraint to optimal child healthcare (Peter,2014), non-adherence to antenatal careservices and unfavourable attitude of caregivers toward GMS (Yonas, 2016).

In agreement with our study's findings, an Ethiopian study reported that women who delivered in health institutions were more likely to utilize the growth monitoring and promotion services as compared to their colleagues who had delivery their index child at home (Yonas 2016; Feleke et al 2017). Correspondingly, research has shown that delivery in health facilitiesis a predictorof uptake of recommended child healthcare practices including infant and young child feeding practices and minimum dietary diversity (Beyene 2015; Yonas 2016).

V. Conclusion And Recommendations

The present study demonstrated that age of the child, household size, religion and caregiver's education as sociodemographic correlates of uptake of GMS. The health system related attributes that were associated with compliance with GMS included; place of delivery, availability for consultations, being in possession of a Mother And Child Health Booklet, problem during growth monitoring and provision of feedback on the progression of a child's growth.

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