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Implementation of WHO, 2006 Child Growth Standards: Health Workers Knowledge, Attitudes and Practices in Kasarani, Kenya

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Authors' contributions

This work was carried out in collaboration between all authors. Author MCN designed the study and, wrote the protocol. Author SKC performed the statistical analysis and wrote the first draft of the manuscript. Authors JW and IAO managed the study protocol, the literature searches and data Analysis. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: In the populous Nairobi peri-urban setting, growth assessment of children, under five years of age is wanting (20%). Stunting, wasting and underweight were 17.2%, 2.5% and 3.8% respectively against the national statistics of 27%, 11% and 4%. A study was undertaken to assess health workers current levels of knowledge about WHO 2006 child growth standards, their attitudes, and practices.
Methodology: The study was undertaken in Kasarani using a facility based cross-sectional survey in 45 health facilities. Purposive sampling was used to recruit 129 participants. The data were collected using an interviewer-administered questionnaire adopted and modified from the previous

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studies. Data were entered and analysed using the Statistical Package for Social Science version 25.

Results: The study revealed that the calibration of the weighing instrument was more pronounced in private (66.7%) than in faith-based (28.6%) and public facilities (4.8%). Health workers with moderate knowledge were five times more likely (OR: 4.886, 95% CI 1.565-15.250) to implement WHO, 2006. Respondents who perceived growth assessment using the WHO growth standards as an effective method to detect malnutrition were thirteen times (OR=12.900; 95% CI 0.427 – 389.372) more likely to plot the child's measurements. Similarly, those who considered malnutrition as dangerous to child growth and development were three times (OR=2.671; 95% CI 1.042 – 6.573) more likely to be practitioners of the WHO growth standards. Significant positive correlations were found between knowledge with attitude (r=0.227), attitude with practice (r=0.226), as well as knowledge with practice (r=0.250).

Conclusion: The study revealed that informed health workers may eventually develop a positive attitude and good practice towards the WHO 2006 child growth standards. Training interventions on the importance of adherence of growth monitoring guidelines may improve growth assessment.

Keywords: Knowledge; attitude; practices and WHO; 2006 child growth standards.

1. INTRODUCTION

Growth assessment is an invaluable biological indicator in child development [1] and may be used to determine the effectiveness of certain interventions [2]. This assessment predicts growth patterns, monitors health status, identifies deviations from normality and determines the effectiveness of interventions [3]. The value further transcends to the illustration of malnutrition and the child overall development. More so, these growth assessment charts are key yardsticks in policy formulation [1]. Growth assessment according to the World Health Organization (WHO) 2006 child growth standards, is the process of following the growth rate of a child (0-59 months) in comparison to a standard through periodic anthropometric measurements to assess growth adequacy and identify faltering at early stages [4]. These World Health Organization (WHO) 2006 child growth standards, replaced the National Centre for Health Statistics/ World Health Organization Child (NCHS/WHO)/ growth reference that depended on the weight-for-age indicator alone in the year 2006 [5]. Anthropometric dimensions (weight, length/height) of children under five are widely used pointers for measuring health and nutrition position [6]. These measurements are assessed alongside growth charts, which are often used as a scale to gauge individual and population growth status [7]. The WHO 2006 child growth monitoring standards provide cut-off points that are a recommendation to identify infants and children having Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM). The evaluation of a child's growth trajectories and the decision to intervene is highly dependent on the interpretation of the growth curve by human resource for health [1].

Since 2006, the WHO growth standards have been domesticated by several countries. Findings of a global survey conducted in 178 countries on the WHO 2006 child growth monitoring standards, in national programs showed that growth charts are universally used to monitor children's growth and nutrition status [8]. Concerns about the adoption and implementation of this WHO 2006 growth standards have however been expressed by many authors across the globe [9]. De Onis et al. [3], reports that the implementation of the WHO growth standards has taken different pathways depending on national health systems and decision-making processes. Meanwhile, Kim et al. [10] affirm that the adoption and implementation are spreading sparingly across the globe. The weight-for-age indicator was adopted almost universally, followed by length/height-for-age and weight-for-length/height [10]. Nonetheless, more and more countries have switched to using these indicators to better characterise growth patterns [3].

Kenya adopted the WHO 2006 child growth monitoring standards, in 2009 with implementation starting in Nairobi city county in 2012 [11]. The growth monitoring was domiciled through a national nutrition action plan in November 2012. The plan envisions health workers to understand and comprehend the

WHO 2006 child growth standards when screening children for malnutrition. Mother-child booklets containing growth charts were developed to monitor children's nutrition status by measuring their weight and height monthly. Nevertheless, the Ministry of Health reporting system known as the Health Information System (HIS) has persistently reported low coverage (20%) in growth assessment in Kasarani, Nairobi County [12]. Stunting among children under age five is 17.2%, while 2.5% are wasted and 3.8% underweight against the national statistics of 27% stunting, 11% underweight and 4% wasted [12]. These indicators are friendly but not enough to spur the optimal detection of malnutrition in the sub-county's Maternal and Child Health (MCH) clinic.

The significance of efficient and timely recognition of deprived development in early life resides in its association with antagonistic functional consequences [3]. It is critical therefore to understand whether the introduction of the new indicators has posed considerable practical challenges to the health workers. It is postulated that health workers' knowledge, attitudes, and practices framework illustrates that health workers are inclined to appreciate the benefits of growth assessment based on the scope of understanding [13]. De Onis et al. [3] adds that the implementation of the growth charts is a complex task affecting all levels of the health system and all human resource for health. De Onis and others [3] further notes that understanding health workers' perspectives on the implementation of the WHO 2006 child growth monitoring standards, is important in the context of improving the quality of maternal and child health services.

2. MATERIALS AND METHODS

This was a cross-sectional survey, a study conducted in Kasarani sub-county, Nairobi City County. The site was purposively sampled due to low coverage (20%) of growth assessment of children under age five as reported in the 2014 Kenya Demographic and Health Survey [14]. A master facility list was obtained from Kasarani sub-county, Nairobi and 45 health facilities were purposively sampled from 84 registered health facilities. The sampling frame was limited to the health facilities that provide nutrition services, growth assessment and submit reports to the health information system (HIS). To optimise generalisation, the samples were stratified to health facilities operated by the government, faith-based organisations (FBOs) and Non-governmental organisations (NGOs). Probability proportion to size sampling was applied. Staff duty roster for growth assessment was used to select the participating health workers.

A pre-validated knowledge, attitude, and practice (KAP) structured questionnaire was adapted from Prachi et al. and synchronised to study objectives [15]. This was a modular questionnaire with socio-demographic characteristics, knowledge, attitudes and practices sections. It was then pre-tested for comprehensibility, consistency, and coherence with 15 health workers in Mbagathi sub-county hospital. These included nurses, nutritionists, and clinical officers. A total of 225 health workers who provide nutrition services and growth assessment were mapped. The sample size was calculated using Fisher et al. of a population less than 10,000 with a 95% confidence interval [16] Census was not possible since a proportion of health workers are out of station for a valid reason at a given time. The proportion of health workers with adequate knowledge, positive attitude and good practices towards the growth assessment monitoring standard was the outcome indicator used to calculate the sample size. A default 50% (0.5) proportion was used since the prevalence was unknown. This yielded a total of 141 health workers however 129 were sampled culminating to a response rate of 91.1%.

Focus group discussion (FGD) and Key informant interview (KII) guides and an observation checklist were applied to deduce qualitative data. An FGD guide was used to elicit information on perceptions and challenges faced during implementation of the WHO 2006 child growth monitoring standards. The discussants were health workers and Community Health Volunteers (CHVs) who participate in nutrition activities both at the health facility and functional community units. For homogeneity, several individual factors such as age, sex and years of experience, were used to cluster the discussants. Key informant interviews (KIIs) were conducted with health facility administrators. The informants' were purposively selected premised on the influence on the facilities' operational policies. Data were collected from six FGDs and six KIIs that were stratified as government, faith-based organisations (FBOs) and Non-governmental organisations (NGOs) facilities.

An observational checklist was used in the clinics. This was to ascertain the availability of anthropometric equipment and adherence to the standard procedure of conducting growth assessment. Five children were observed in each of the 45 facilities by author number one. The areas observed in the MCH clinics included the availability of functional anthropometric equipment, the job category of health workers conducting growth assessment, recording of the weight MUAC and height/length, feedback given to caregivers and the procedure of conducting growth assessment. The observation checklist was used to validate the study participants' responses.

Seasoned data collectors were recruited and trained. The training was tailored to growth assessment monitoring as stipulated in the IMAM guideline [17]. Research ethics, communication, interpersonal and interviewing skills were also extensively covered. Quantitative data were analysed using the Statistical Package for Social Scientists (SPSS) version 25.0. The scores for KAP were transformed into a percentage. The respondents' scores was divided by the possible maximum scores and multiplied by 100. The sum score of the knowledge outcome was assessed based on Blooms cut off reference points [18]. Grounded on the sum scores, level of knowledge was classified into low (less than 60%; 0-5 scores), moderate (60-80%; 6-8 scores) and high levels (80-100%; 9-11 scores). However, attitude and practice were categorised into dichotomous scale. Attitude levels were scored on a 5 point Likert scale then recoded into positive attitudes and negative attitudes.

The dependent variable, practice of growth assessment, was assessed using the seven core operational WHO 2006 child growth monitoring standards, procedures tabulated in Table 2. Good practices entailed scoring (correctly) four or more of the growth assessment procedures. The converse was true to poor practices. Chi-square test was used to determine whether there is a relationship between dependent and independent variables with an alpha of 0.05. Significant parameters were thereafter subjected to multinomial regressions. Spearman's rank correlation test was applied as appropriate. Qualitative data was manually transcribed, coded, and then analysed thematically. The key themes were: signs and symptoms of malnutrition, prevention of malnutrition, effective method of prevention of malnutrition, factors hindering growth assessment of children and cultural beliefs about malnutrition. The findings were then used to triangulate the quantitative information. All respondents were informed of their rights, consenting and assured of confidentiality prior to study participation.

3. RESULTS

The study respondents' characteristics are presented in Table 1. The results are derived from 129 eligible respondents', typically 123 (95.3%) in their reproductive age of 20 to 50 years. Female 89 (69%) and nurses 95 (73.6%) were the dominant gender and profession respectively. Diploma 109 (84.5%) was the common education level interspaced by certificate 11(8.5%) or degree 9 (7%) respectively. Record 90(69.8%) of the respondents had worked in the Maternal and Child Health (MCH) clinic for more than one year while 12 (9.3%) were less than five months old.

In our study, 104 (80.6%) of the health workers reported performing correctly four of the seven recommended practices as formulated in Table 2. Respondents did well in counselling caregivers on the benefits of growth assessment 124 (96.1%), growth assessment 92 (93.8%), encouraging caregivers to bring children for regular growth assessment 106 *(82.2%)* and plotting child's information after conducting growth assessment 92 (71.3%). However, a contrasting picture was reported qualitatively. The excerpts beneath expounds this finding very well *"In my experience, growth assessment is not conducted appropriately, due to inadequate facilitation items such as weighing scales and staff*".

Additionally, it was majorly reported by the discussants that, sick children are not usually weighed when referred. This was well pronounced by a discussant who stated that *"Children are only weighed when they are brought for immunisation, sick children are not usually weighed up in this health facility".*

Another added, "*When we CHVs refer malnourished children from the community to the health facility, the health workers only measure the weight, and sometimes height, and they do not re-check the MUAC."* There was a rejoinder that, "*We are usually told to refer children below five years to the health facility for nutrition assessment but, the same providers turn mother's away, if the child has completed*

immunisation". Observation summaries construed that compliance was compromised by the unavailability of the mother-child booklets and anthropometric equipment as presented in Table 3. It was observed that 26 (57.8%) of the health facilities did not have mother-child booklets. While 25 (55.6%) lacked baby beam weighing scales and length/height board respectively. The absence of the two items was common in private facilities.

Table 1. Demographic characteristics of respondents (n=129)

Characteristics	n	%†
Age		
≤ 20	2	1.6
21-30	49	38.0
31-40	47	36.4
41-50	27	20.9
>50	4	3.1
Sex		
Female	89	69.0
Male	40	31.0
Job category		
Nurses	95	73.6
Clinical officers	19	14.8
Nutritionists	15	11.6
Highest level of education		
Degree (BSc)	9	7.0
Diploma	109	84.5
Certificate	11	8.5
Period of service at current facility		
≥ 12 months	90	69.8
6 – 11 months	27	20.9
≤5 months	12	9.3

Abbreviations: n- Number of respondents per category; † Column percentages

The lack of children's MUAC tape was pronounced in 24 (53.3%) facilities with bias to private facilities 14 (58.4%). Protocol for taking the weight, length/height and MUAC of the children were less adhered in private and faith based facilities compared to public. However, health workers in private facilities 14 (66.7%) calibrated the weighing scale before use than their peers in faith based facilities 6 (28.6%) and public facilities 1 (4.8%) correspondingly. Similar results were observed with the tendency to weigh children with minimal clothing as illustrated in Table 3. Public and Faith based facilities lacked mother-child booklets likened to private. In absences of the mother-child booklets, three documents; an exercise book, child health card and pieces of paper were used to record child's measurements. Recording weight in child booklet was generally good 33 (73.3%) but wanting in public facilities. The converse was true to recoding height/length 37 (82.2%) and MUAC 43 (95.6%) in child booklet after nutrition assessment. The under compliance in the use of the WHO 2006 child growth monitoring standards to diagnose malnutrition, lack of adherence to growth assessment procedure and taking of height/length, weight, and mid-upper arm circumference (MUAC) may be explained by low training on Integrated Management of Acute Malnutrition (IMAM). Simply, 21 (16.3%) of the health workers reported that they had been trained on IMAM. The mode of training was mainly seminars 18 (85.7%) with a few 3 (14.3%) by job training.

The need for training was more pronounced qualitatively, with discussant captioning that "*It is important to empower all health workers in the MCH with knowledge on the WHO 2006 Growth Standards. We have several underutilised channels such as the continuing medical education (CMEs) which in my view is cost-effective".* Similar sentiments were reported by an informant that "*If health workers are not trained, the quality of health services will be affected, including growth assessment".* Table 4 illustrates the association between health workers' socio-demographic characteristics and their practices in implementing the WHO 2006 child growth monitoring standard. Respondents job cadre (p= 0.011) and period of service (p= 0.041) were significantly associated with the practice of WHO 2006 growth standards. However, age (p = 0.926), level of education (p = 0.799) and sex (p= 0.060) were not.

Table 3 presents the knowledge level on the WHO 2006 child growth monitoring standard. Understanding the existence of the WHO 2006 child growth standards, was at 99 (76.7%) and that of anthropometric criteria to identify SAM at 101 (78.3%). Meaning of deviation of the lower reference of growth curve (79.8%) and the meaning of deviation of the horizontal line of the growth curve 103 (82.9%). However, reported knowledge level on admission criteria of malnourished children into the OTP program was 43 (33.3%) while the understanding on the steps taken during triage to determine the treatment of either severe of moderate malnutrition in children was 58 (44.9%). Likewise, only 58 (45.0%) could report the correct frequency of conducting nutrition assessment among children 0-59 months.

Table 2. Health workers' practices towards the WHO 2006 child growth monitoring standards

Aspects of practices	N=129	
	N	%†
Use the WHO 2006 growth monitoring to diagnose malnutrition		
Yes	86	66.7
No	43	33.3
Follow the growth assessment procedure		
Yes	83	64.3
No	46	35.7
Encourage caregivers to bring children for regular growth assessment		
Yes	106	82.2
No	23	17.8
Plot child's information after conducting growth assessment		
Yes	92	71.3
No	37	28.7
Conduct growth assessment		
Yes	121	93.8
No	8	6.2
Counsel caregivers on the benefits of growth assessment		
Yes	124	96.1
No	5	3.9
Complying with the WHO 2006 growth monitoring		
Yes	86	66.7
No	43	33.3

Abbreviations: n- Number of respondents per category; † Column percentages

Table 3. Status of key growth assessment items in the health facilities by observation

Items	Facility (n=45)			Total*
	Public+	Private+	FBO+	
Availability of Salter weighing scale				
Yes	13(29.2)	20 (45.5)	11(25)	44(97.8)
No	1 (100)	0	0	1 (2.2)
Availability of baby beam weighing scale				
Yes	12(48.0)	6 (24.0)	7(28)	25(55.6)
No	2(4.4)	14 (70.0)	4 (20.0	20 (44.4)
Availability of length/height board				
Yes	12(48.0)	5(20)	8 (55.6)	25(55.6)
No	2 (10)	15(75)	2(15)	20 (44.4)
Children's MUAC tape				
Yes	10(47.6)	6(28.6)	5 (23.8)	21(46.7)
No	4(16.7)	14(58.4)	6 (25)	24 (53.4)
Nutrition assessment for Weight				
Yes	10(52.6)	3(15.8)	6 (31.6)	19 (42.2)
No	4 (15.4)	17 (65.4)	5 (19.2)	26 (57.8)
Nutrition assessment for Length/height				
Yes	9(60)	1(6.7)	5 (33.3)	15 (33.3)
No	5 (16.7)	19 (63.3)	6 (20.0)	30 (66.7)
Nutrition assessment for MUAC				
Yes	5(45.5)	3(27.3)	3 (27.3)	11 (24.4)
No	9 (26.5)	17 (50.0)	8 (23.5)	34 (75.6)

Items	Facility (n=45)			Total*
	Public+	Private+	FBO+	
Calibrating weighing scale before use				
Yes	1(4.8)	14 (66.7)	6 (28.6)	21 (46.7)
No	13(54.2)	6 (25.0)	5 (20.8)	24 (53.3)
Weighing of children with minimal clothing				
Yes	5(17.9)	15(53.6)	8 (28.6)	28 (62.2)
No	9(52.9)	5 (29.4)	3 (17.6)	17 (37.8)
Availability of mother child booklet				
Yes	7(26.9)	12 (46.2)	7 (26.9)	26 (57.8)
No	7 (36.8)	8 (42.1)	4 (21.1)	19 (42.2)
Recoding weight in child booklet				
Yes	6(18.2)	17(51.5)	10 (30.3)	33 (73.3)
No	8 (66.7)	3 (25)	1(8.3)	12 (26.7)
Recoding height/length in child booklet				
Yes	2(25)	2(25)	4 (50)	8 (17.8)
No	12(32.4)	18 (48.6)	7 (18.9)	37 (82.2)
Recoding MUAC in child booklet				
Yes	1(50)	1(50)	0	2 (4.4)
No	13(30.2)	19 (44.2)	11 (25.6)	43 (95.6)

*Abbreviations: n, total number of facilities;*Column percentages; + row percentage*

Table 4. Association between health workers' socio-demographic characteristics and their practices in implementing the WHO 2006 child growth monitoring Standards

demographic characteristics	Level of practice of the WHO 2006 child growth monitoring Standards (N=129)			χ^2	df	p-value
	Good n (%)*	Bad n (%)*	Total n (%) +			
Age group						
<30	33(64.7)	18(35.2)	52(39.4)	0.419	2	0.839
31-40	33(70.2)	14(28.8)	47(36.4)			
>41-50	20(64.5)	11(35.5)	31(24.0)			
Sex						
Female	64(71.9)	25(28.1)	89(69.0)	3.551	1	0.060
Male	22(55.0)	18(45.0)	40(31.0)			
Job category						
Nurses	67(70.5)	28(29.5)	95(73.6)	8.736	2	0.011*
Nutritionist	12(80.0)	3(20.0)	15(11.6)			
Clinical officers	7(36.8)	12(63.2)	19(14.7))			
Level of education						
Degree	7(77.8)	2(22.2)	9(7.0)	0.645	2	0.799
Diploma	71(65.1)	38(34.9)	109(84.5)			
Certificate	8(72.6)	3(27.4)	11(8.5)			
Period of services						
≥12 months	2(25.0)	6(75.0)	8(6.2)	6.716	2	0.041*
6 – 11 months	21(67.7	10(32.3)	31(24.0)			
1 – 5 months	63(70.0)	27(30.0)	90(69.8)			
IMAM training(N=21)						
On job training	1(33.3)	2(66.7)	3(14.3)	0.515	1	0.586
Seminar	10(55.6)	8(44.4)	18(85.7)			

*Abbreviations: n, total number of respondents; CI, confidence interval; **row *percentages; + Column* percentage; *Significant chi-square values in bold* at p<0.05*. Fisher exact test applied accordingly*

Table 5. Health workers' knowledge regarding the WHO 2006 growth standards

Knowledge aspects	N=129	
	n	%†
The existence of the WHO child growth monitoring Standards, 2006		
Yes	99	76.7
No	30	23.3
The benefits of routine growth assessment among children aged 0-59 months	82	63.6
Yes	47	36.4
No		
The correct frequency when growth assessment should be conducted among children 0-59 months		
Yes	58	45.0
No	71	55.0
The Anthropometric criteria to identify SAM among children aged 6-59 months	101	78.3
Yes	28	21.7
No		
The Importance of growth charts		
Yes	82	63.6
No	47	36.4
The meaning of deviation of plotted line above upper reference curve on the growth chart		
Yes	84	65.1
No	45	34.9
The meaning of deviation of plotted line below lower reference curve on the growth chart		
Yes	103	79.8
No	26	20.2
The meaning of plotted horizontal line on the growth chart		
Yes	107	82.9
No	22	17.1
The admission criteria of malnourished children into the OTP program using the WHO 2006 growth standards		
Yes	43	33.3
No	86	66.7
The admission criteria to determine in-patient care for malnourished children using the WHO 2006 growth standards		
Yes	67	51.9
No	62	48.1
The interventions to take depending on the graphical display of the child's growth chart		
Yes	58	45.0
No	71	55.0
The alarming indicators on the growth chart		
Yes	75	58.1
No	54	41.9
The triage steps to determine treatment for malnourished children		
Yes	58	44.9
No	42	55.1

Abbreviations: n- Number of respondents per category; † Column percentages

The respondents' level of knowledge regarding the WHO 2006 child growth monitoring standards, varied per category. The data in Table 5 shows that 57 (44.2%) of the health workers had moderate knowledge while, 40 (31.0%) had low knowledge. Only 32 (24.8%) had in-depth knowledge on the WHO 2006 child growth monitoring standards. Clinical officers had the

least knowledge level on the WHO 2006 child growth monitoring standards, compared to nurses and Nutritionist. The knowledge items with the appropriate percentage in relation to respondent job category are displayed in Table 6. Respondent job category was significantly associated (p=0.014) with knowledge of WHO, 2006 growth standards.

A large majority, 101 (78.3%) of the health workers interpreted correctly a cut-off for weight-for-height of below -3 standard deviations (SD) of the WHO growth standards to identify infants and children as having severe acute malnutrition (SAM). There was also high understanding 103 (79.8%) on a deviation of the plotted line below lower reference curve on the growth chart. This knowledge transcended to qualitative discussants with proper child growth and mental development being articulated as key benefits of growth assessment using the WHO 2006 child growth standards. This was summarized very well by a discussants that: *"Growth assessment provides a good opportunity to counsel and educate caregivers and other family members about nutrition and general health".* She was supported by her a peer, *"I believe if mothers can bring their children regularly to the health facility for growth assessment we can arrest malnutrition early".* However, knowledge on the admission criteria of malnourished children into OTP program using the WHO 2006 child growth monitoring standards, and steps to take during triage to determine the treatment of either severe of moderate malnutrition in children was 43 (33.3%) and 58 (44.9%) respectively. Respondents knowledge level was statistically associated (p=0.017) with the practice of the WHO 2006 child growth monitoring standard. Those who had moderate knowledge had a higher odd (4.886) of good practices.

Only 58 (45.0%) of the respondents could tell the correct frequency for growth assessment among children 0-59 months. This was corroborated by qualitative findings. One discussant précised that: *"Most children don't come for growth assessment after the measles vaccine because they are informed by health workers at the MCH clinic that the clinic is over".* The low knowledge level on diagnosis, admission, and steps taken during triage was attributed to inadequate nutrition training information in medical school by the informant. The informant clearly spelled out that: *"The nutrition education we had in medical school was just an introduction, it was too general with no emphasis on the* WHO 2006 child growth standards, 2006*. Therefore, there is a need for continuous medical education on nutrition updates so that health workers' can have the relevant information needed to prevent malnutrition".* Another concurred *"Health workers need in-service training on the WHO 2006 child growth standards since we come from different training institutions and are of different disciplinary backgrounds".* Findings on the meaning of deviation of the plotted line below the lower reference curve (p=0.013) and on the horizontal line (p=0.001) were significantly associated with the practice.

Table 6. Respondent job category in relation to knowledge of WHO 2006 child growth monitoring standards

Job category	Knowledge level (N=129) n (%)				Fisher exact test
	High*	Moderate*	Low*	Total+	
Nurses	29(30.5)	38 (40.0)	28 (29.5)	95(73.7)	0.014*
Nutritionist	2(13.3)	11 (73.3)	2 (13.3)	15 (11.6)	
Clinical officers	1(5.3)	8 (42.1)	10 (52.6)	19 (14.7)	

*Abbreviations: n, total number of respondents; CI, confidence interval; *row percentages; + Column* percentage; *Significant chi-square values in bold at p<0.05. Fisher exact test applied appropriately*

Table 7. Knowledge of the respondent relative to practice of WHO child growth monitoring Standards, 2006 (N=129)

Knowledge aspects	Practices of the WHO 2006 growth monitoring n (%)			OR (95% C.I.)	P value
	Good	Poor	Total		
High knowledge	27 (84.4)	5 (15.6)	32 (24.8)	Reference	
Moderate knowledge	38 (66.7)	19 (33.3)	57 (44.2)	4.886 (1.565-15.250)	0.006
Low knowledge	21(52.5)	19 (47.5)	40 (31.0)	2.700 (0.897-8.125)	0.077

*Abbreviations: n, total number of respondents; CI, confidence interval; *Column percentages; OR, odds ratio; Significant odds ratio values (unadjusted) in bold* at p<0.05

The study revealed a positive attitude 118 (91.5%) towards the WHO 2006 child growth monitoring standards as presented in Table 8. Many of the health workers strongly agreed 84 (65.1%) or agreed 40 (31.0%) with the preposition that growth assessment is an essential component in reduction of malnutrition. Meanwhile, only 2 (1.6%) and 3 (2.3) % of the health workers strongly disagreed and disagreed. In response to the statement that malnutrition is dangerous to children, only 32 (24.8%) strongly agreed and 64 (49.7%) agreed, while 16 (12.4%) and 17 (13.1%) strongly disagreed and disagreed respectively.

However, the definite results were reported qualitatively. Discussants agreed that malnutrition is a threat to the society, normally precipitated by ignorance, poverty and low knowledge level. The caption under may drive this point home: ‘‘*Well, malnutrition is common in this area; particularly among the young single mothers who rarely give their children balanced meals".*

There was parity in the insight that growth assessment is a time-consuming process. Similar inconclusive findings were reported qualitatively as capped by the caption below: *"I have discovered that most health workers feel that the removal of children's heavy cloths before weighing takes a lot of time".* Another interjected, "*Some health workers only take the children's weight and not the height and MUAC because they say it's a lot of work and there is no time".* Others disagreed and noted that it's easy and faster as summarised in this caption *"Malnutrition is dangerous because when I bring malnourished children referred to the health facility from my area, the health workers attend to them appropriately".* The finding that growth assessment is an effective process in the reduction of malnutrition (p = 0.042) and that the process of growth assessment is time-consuming (p=0.001) were significantly associated with the practice of the WHO 2006 child growth monitoring.

The overall attitude score was expressively linked (p = 0.003) to the overall practice scores. Health workers who had perceived growth assessment to be an effective tool in the reduction of malnutrition were thirteen times more likely to plot the child's measurements (OR=12.900; 95% CI 0.427 – 389.372; p=0.046). Similarly, those who perceived malnutrition to be dangerous to child growth and development were three times more likely to practice the WHO 2006 child growth standards (OR=2.671; 95% CI 1.042 – 6.573; p=0.041). With regard to the Knowledge, Attitude and Practice (KAP) towards WHO 2006 child growth monitoring standards, it was found that the health workers who had higher knowledge level would have a better attitude and greater practice towards the practice of WHO 2006 child growth standards,. Significant positive correlations were found between knowledge with attitude (r=0.227, p<0.010), attitude with practice (r=0.226, p=0.010), as well as knowledge with practice (r=0.250, p=0.004). Table 10 provides the correlations coefficient summaries.

Table 8. Health workers' attitudes towards the WHO 2006 child growth monitoring standards

Attitude scale		n= 129	
		n	%†
Growth assessment is effective in reducing malnutrition	Strongly agree	84	65.1
	Agree	40	31.0
	Disagree	5	3.9
Children 0-59 months should have their growth assessed	Strongly agree	51	39.5
	Agree	73	56.6
	Disagree	2	1.6
	Strongly disagree	3	2.3
Malnutrition is dangerous	Strongly agree	32	24.8
	Agree	64	49.7
	Disagree	17	13.1
	Strongly disagree	16	12.4
Growth assessment is time-consuming	Strongly agree	19	14.7
	Agree	51	39.5
	Disagree	49	37.9
	Strongly disagree	10	7.9

Abbreviations: n- Number of respondents per category; † Column percentages

Table 9. Interpretation of plotted horizontal line on growth chart (n=129)

	Practices of the WHO child growth monitoring standards, 2006 n (%)			OR (95% C.I.)	P value
	Good*	Bad *	Total†		
Plotting of horizontal line					
Plotted information	85 (68.5)	39 (31.5)	124(96.1)	12.900(0.427-389.37)	0.046
Did not plot	1 (20.0)	4 (80.0)	5 (3.9)	Reference	_
Encouraging caregivers to bring children					
Encouraged	70 (72.2)	27 (27.8)	97 (75.2)	2.671 (1.042-6.573)	0.041
Did not encourage	16 (50.0)	16 (50.0)	32 (24.8)	Reference	_

*Abbreviations: n, total number of respondents; CI, confidence interval; *Row percentages; † column percentages: OR, odds ratio; Significant odds ratio values (unadjusted) in bold* p<0.05

Table 10. Correlation coefficient between WHO 2006 child growth monitoring Standards, Knowledge, Attitude and Practice

	Knowledge	Attitude	Practice
Knowledge	_		
Attitude	0.227**	-	-
Practice	0.250***	0.226**	-

All r values are Spearmen's correlation coefficients, significant at 0.001 and 0.01 respectively

4. DISCUSSION

This study revealed a glaring discrepancy in the self-reported outcome and observed practices. The self-reported practice on the WHO 2006 child growth monitoring standards, by health workers, was good. Health workers scored well in counselling caregivers on the benefits of growth assessment, encouraging caregivers to take children for regular growth assessment and plotting child's information after conducting growth assessment. These results contrast with ACF, Ministry of Health and Food for the Hungry Kenya, Mercy USA, International Medical Corps, World Vision, and UNICEF (2012) that reported moderate results in West Pokot, Kenya [19]. The current findings may infer that binary outcomes of yes or no questions do not provide reliable answers. It may be also possible that the health workers might not have reported the truth on their practice, a social desirability bias common in self-reported studies. However, qualitative data exposed conflicting image. The observed health facilities, lacked mother-child booklets, anthropometric equipment, and functional anthropometric equipment. In absences, exercise books and child health card were used to record child's measurements. It is important to interrogate how health workers utilize this data recorded in exercise books and child health card relative to the child growth. The revelation of qualitative research, cement its value of revealing and interpreting developments behind statistics [20]. This occurrence informed the inclusion of observations and discussion aspect in the current study. The blending of qualitative and quantitative methods has been found to produce a richer understanding of Phenomenon [21].

Mother-child booklets, baby beam weighing scales and length/height boards were inadequate in many of the observed facilities. Lack of basic equipment's deters the effort to implement the WHO 2006 Child Growth Standards. The protocol for taking the weight, length/height and MUAC of the children were less adhered. Inconsistency in recording child body weight can have negative impact on child growth monitoring [22]. This finding is consistent with evidence from developed countries settings which suggest that carers often misuse child growth monitoring by applying it selectively [23]. Furthermore, weighing scales were not calibrated properly or consistently before use. A similar finding has been reported by Conkle et al. (2018) who elucidated debate on the practicability of implementing the full WHO child growth monitoring standards, 2006 protocol in a clinical setting [24]. A proposition supported by the current study. Using inaccurate or inappropriate weighing equipment can increase the risk of errors in diagnosis, interventions, treatment, or medication dosage [22].

Overall, a small proportion of the respondents' reported having been trained on Integrated Management of Acute Malnutrition (IMAM) that

has components of the WHO 2006 growth standards. Similar results have been documented [25]. The training was through seminars and on the job training. Job category, years of service, and training on IMAM were significantly associated with the practice of WHO 2006 child growth monitoring standards. The study finding differs with Agbozo et al. who reported insignificant results to worker type and experience [26]. Knowledge among the health workers was in indifferent. Nurses and nutritionist were more abreast of WHO 2006 child growth monitoring standards than clinical officers. The differences between health workers cadres and years of services could possibly be ascribed to variations in training in medical schools, exposure and functional features of the office types. This finding is consistent with other studies [27]. Age, level of education and sex were not. The finding that age is not an influencer resonates to the literature [27]. Ngidi and company explains that age may be less important over time as monitoring operating procedures spreads through post-professional training. The outcomes of education have been documented [28]. Nevertheless, the conclusions on years of services contrast that of Villar, Carroli and Gülmezoglu who reported that the knowledge of health workers deteriorate with time and new practices are introduced without the proper channel of absorbing [29].

Health workers were poorly informed on the admission criteria of malnourished children into the outpatient program using the WHO 2006 child growth monitoring standards. Likewise, steps to take during triage to determine the treatment of either severe or moderate malnutrition in children was deprived. A key aim of the anthropometric assessment is to accurately identify individuals at high risk. Given the knowledge inadequacy, there could be a potentially harmful misinterpretation of WHO 2006 child growth monitoring standards. It is vital therefore that they are properly understood and appropriately used. The sentiments are well pronounced elsewhere [30,31]. The converse was however true to benefits of growth standard and a deviation of the plotted line below the lower reference curve on the growth chart. Likewise to the understanding of a cut-off for weight-for-height of below -3 standard deviations (SD) of the WHO monitoring to identify children as having severe acute malnutrition (SAM). Level of knowledge was identical with practice of the WHO 2006 child growth monitoring standards. Practice increased with knowledge. However, health workers could not tell the correct frequency for growth assessment among children under age five. The finding has implications for quality of care for children and child growth indicators. With suboptimal growth assessment of children under age five, health workers may wrongly categorise and manage malnutrition among children. Nonetheless, the results, resonates with a finding by Ahmad et al. [31] that reported that health workers did not ask questions about key nutritional measurements' such as weight-for-length; length-for-age; mid-upper arm circumference (MUAC), nor did they comment on clinical appearance. Familiarity with a deviation of the plotted line below the lower reference curve and understanding on the horizontal line were significantly associated with the practice. Awareness of the benefits of WHO 2006 child growth monitoring standards and the criteria for identifying malnourished children were inversely associated with the practice. Health workers who understood the meaning of the plotted horizontal line were seven times more likely to plot a child's information on the growth chart.

The study reported a positive attitude on WHO 2006 Child Growth monitoring Standards. Similar results have also been reported elsewhere [32]. Growth assessment was perceived as an essential and effective component in the reduction of malnutrition but time-consuming. We can deduce that nutrition screening and assessment is important to this group of human resource for health. This assurance offers a tremendous opportunity to optimise the input of health workers working in the maternal and child health clinics in scaling up the implementation of growth monitoring. Ignorance, poverty and low knowledge level play a significant role in assessing the burden of under or over nutrition. The synthesis of ignorance, poverty, and malnutrition is elaborated scholarly [33]. It's our proposition that enhanced awareness improves people feeding practices and food diversity. Plotting the child's measurements increased with the perception that growth assessment is an effective tool in the reduction of malnutrition. The role of attitudes of health service in the implementation of policies and interventions have been documented too [32]. The practice of the WHO 2006 child growth standards was also synonymous with the thought that malnutrition is dangerous to children.

The finding demonstrated that knowledge, attitudes, and practices were strongly correlated with each another. The coefficient correlation suggested that human resource for health behaviour was a result of knowledge, practice, and attitude. This consequently suggests that that knowledge, attitudes, and practices are intertwined domains. Nonetheless, professional education may have had more impact on knowledge, attitudes and application equitably. This finding corresponds with other scholarly articles that advance the uses of knowledge, attitude and practice surveys to evaluate health programs [34] and [35]. The finding, however, differs with Pretto et al. [36] and Wang et al. [37] who reported a weak correlation between the knowledge, attitude and application.

5. CONCLUSIONS

The overall self-reported knowledge of the respondents on WHO 2006 child growth standards was low. The study revealed that informed health workers may eventually develop positive attitudes and good practices towards WHO 2006 child growth standards. The importance of KAP towards health care interventions and practices such as the implementation of WHO 2006 child growth standards is affirmed by this study. We suggest further training activities to propel the understanding and application of the WHO 2006 child growth standards. Secondly, resources need to be mobilized to acquire and maintain key instruments. There is a need to undertake a detailed assessment of growth monitoring using the WHO 2006 child growth standards per se, without lumping variables. Also, there is need to conduct detailed research from recipient perspectives to expound the utilization of data recorded on exercise books.

6. LIMITATION

This was a self-reported data and main indicators for WHO 2006 child growth standards were lumped into binary outcomes. However, this was triangulated by observations and discussions. The respondents were not proportionately stratified to the job category.

CONSENT

Informed consent was obtained from the all respondents' and were assured of their rights and confidentiality prior to study. The purpose of the survey was also explained.

ETHICAL CONSIDERATIONS

This study was approved by Kenyatta University Ethics and Scientific Review Committee National Commission for Science, Technology, and Innovation and Nairobi County Health Research Committee and Kasarani Sub-County Health Management Team.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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