Evaluation of a Blanket Supplementary Feeding Program in Two Counties in Kenya, August 2011 – March 2012

26 September 2012

US Centers for Disease Control and Prevention

EXECUTIVE SUMMARY

In response to a nutritional crisis, the World Food Programme (WFP) and its partners implemented a blanket supplementary feeding program (BSFP) in six counties across northern Kenya (Marsabit, Isiolo, Mandera, Wajir, Turkana, and Samburu). Children 6-36 months of age or less than <95 cm in length/height, and pregnant and lactating women (PLW) were initially the target population based on the funds available. Monthly rations of corn soy blend plus (CSB+) and oil were distributed; 200 gm CSB+ and 20 gm oil per day provided approximately 977 kilocalories per day. Systematic interventions (vitamin A supplementation, deworming and immunization per the national protocol) and health education were also included in the BSFP. Children and PLW were screened using mid-upper arm circumference (MUAC) at each distribution and referred to treatment if found to be acutely malnourished (moderate or severe). Caregivers were instructed to bring the registered child to each distribution to receive the ration. The initial program was planned for August–December 2011, or 5 monthly distributions, but extended until March 2012 as a result of delays in transport, mainly due to impassable roads during the short rains, and lack of prepositioned commodities caused by late contributions from donors.

The overall objective of the program evaluation was to describe the impact of BSFP in two Counties in northern Kenya. The evaluation was designed to determine if this specific program prevented deterioration of the nutritional status among children enrolled in the program by following a prospective, longitudinal cohort of non-malnourished children 6-36 months of age enrolled in the BSFPs in Turkana and Wajir Counties in northern Kenya. These counties were selected because they had some of the highest rates of acute malnutrition. The cohort was identified and enrolled at the first distribution with no further enrollment after the first distribution (Figure E1). The cohort was followed at each subsequent distribution where a questionnaire was administered and anthropometric (weight for height Z score [WHZ] and MUAC) measurements collected. Children were identified using unique identifiers, photographs, and wristbands if they consented. Each county is a separate program, so the cohort in each was evaluated independently. Additionally, multivariate logistic regression analyses were conducted to identify risk factors for the development of acute malnutrition among the children aged 6-36 months enrolled in the cohort.

For the BSFP evaluation, a total of 3856 children were screened during the first BSFP distribution at 59 sites (29 in Turkana and 30 in Wajir) of whom 2779 were eligible for enrollment in the evaluation program (Table E1); 1,386 and 1,393 children in Turkana and Wajir Counties, respectively. After further data cleaning, there were 1209 and 1266 children in Turkana and Wajir, respectively, with available data.

Five distributions intended for a thirty day cycle, occurred across eight months with significant variation in the length of individual cycles and the time between the receipts of ration by the beneficiaries (Table E2). Duration of distribution for a cycle was defined as the number of days between the distribution at the first cohort distribution

site and last cohort distribution site for a given distribution. Mean interval from prior distribution was defined as the average number of days between the current distribution and prior distribution across all cohort distribution sites. In Turkana, the duration of distribution in each cycle ranged between 33 days to 78 days with mean interval from the immediate prior distribution ranging between 27 days to 62 days. The distribution period between distribution two to three and three to four was approximately two months each.

In Wajir, the duration of distribution in each cycle ranged between 10 days to 49 days with mean interval from the immediate prior distribution ranging between 29 days to 78 days. The distribution period between distribution two to three and three to four was approximately two months each.

Over the course of the BSFP, overall mean WHZ improved (Tables E3, E4). The mean WHZ ranged from a low of -0.92 at the first distribution to a high of -0.69 at the fourth distribution in Turkana. Overall, the mean WHZ increased at each distribution, with a plateau at the final (fifth) distribution. In Wajir, WHZ rose from -0.89 at the first distribution to a high of -0.52 at the fifth distribution. In both Turkana and Wajir, the change in mean WHZ from the first to second distribution was not statistically significant. In Turkana, the change from the first to all subsequent distributions was significant. In Wajir, there was a significant change from the first to all subsequent distributions; however the mean WHZ decreased significantly from the first to third distribution.

A number of children developed acute malnutrition despite enrollment in and attendance at the BSFP. In Turkana and Wajir, 15% and 22% of children, respectively, who came to all five distributions became acutely malnourished at any time. At the distribution following identification of malnourished status (distributions 3 through 5), all Turkana severely malnourished children returned to normal, while 98% of moderately malnourished children improved to a normal status. In Wajir County, 54% of moderately malnourished children and 63% of severely malnourished children improve to a normal status at the subsequent distribution. Most children who were identified as malnourished did not report being treated by the subsequent distribution. In Turkana and Wajir, only 4% and 16% of children, respectively, reported interim treatment by the subsequent distribution.

In both counties, missing one or more distributions, child illness in the two week prior, receipt of other food and non-food aid, household size, number of children in the household, parent caregiver, measles vaccination, vitamin A history, and sharing of ration did not have a significant association with the mean change in WHZ from D1 to D5. In Wajir, breastfeeding was significantly associated with larger increases in WHZ from D1 to D5.

Attendance at a prior distribution and delays in distributions did not have an association with the occurrence of malnutrition. Logistic regression modeling of baseline risk factors and subsequent development of malnutrition by any measure showed that low baseline WHZ (-2 to -1.5) was the most significant risk factor for developing malnutrition during the program period.

Conclusions

1. Implementation of the intervention is problematic.
    a. Interval between distributions: There were significant delays in the distribution of the ration which resulted in a 30 day ration covering a 120 day period at a given site in the most extreme example.
2. The overall nutrition status of the cohort improved over time as indicated by the increase in mean WHZ of the entire cohort. It is not possible to attribute this to the BSFP, as there were significant humanitarian assistance inputs and external factors such as rain.
3. A substantial proportion of children developed acute malnutrition while receiving BSFP.
    a. Children with lower MUAC or WHZ at baseline were more likely to become malnourished.
    b. The majority of acutely malnourished children returned to a non-malnourished state at the next distribution without reporting participation in a treatment program.
4. It is feasible to collect the full range of anthropometric data (weight, height, oedema and MUAC) of high quality among a select group of individuals during a BSFP; however, resources and supervision must be allocated.
5. Simple and inexpensive methods can be used to minimize child substitution (a different child presenting for a subsequent visit).

Figure E1: Evaluation Design, Turkana and Wajir Counties, Kenya, August 2011-March 2012. Note: grey boxes indicate excluded populations from cohort.

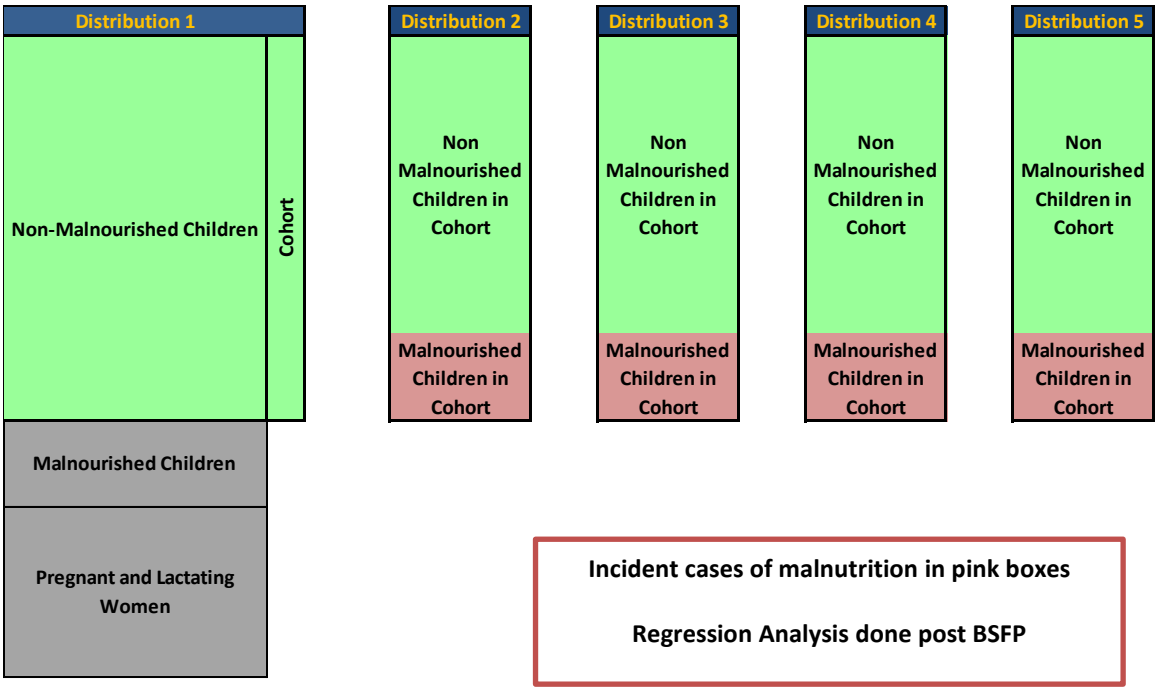


Table E1: Cohort Screening, Ineligible and Enrolled Children, Turkana and Wajir Counties, Kenya, August 2011

Category	Turkana - n (%)	Wajir - n (%)
Screened, 6-59 months	1897	1959
Ineligible at screening	511 (26.9)	566 (28.9)
WHZ < -2	227 (44.4)	419 (74.0)
MUAC <12.5	58 (11.4)	40 (7.1)
Oedema	5 (1.0)	27 (4.8)
Chronic illness	11 (2.2)	11 (1.9)
Decline consent	4 (0.8)	1 (0.2)
Mobile household	10 (2.0)	8 (1.4)
Currently under Treatment	196 (38.4)	60 (10.6)
Enrolled	1386 (73.1)	1393 (71.1)
Implausible values*	177 (12.8)	127 (9.1)
Final number (with plausible values) **included in analysis**	**1209 (87.2)**	**1266 (90.9)**

*WHO WHZ flag, implausible height/length increase or decrease, implausible weight increase or decrease, incorrect child by team leader.

Table E2: BSFP Distribution Cycle Durations, Turkana and Wajir Counties, Kenya, August 2011-March 2012

	Turkana (n=1386)					Wajir (n=1393)				
Measure	**D1**	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**	**D4**	**7D5**
Dates of Distribution	20 Aug – 24 Sep	22 Sep – 13 Nov	14 Nov – 25 Jan	12 Jan – 30 Mar	25 Feb – 29 Mar	25 Aug – 8 Sept	26 Sept – 6 Oct	30 Nov – 18 Jan	30 Jan – 21 Feb	5 Mar – 24 Mar
Number cohort sites visited	29	29	29	29	28	30	29	29	29	29
Duration of Distribution cycle for county (days)	35	52	72	78	33	14	10	49	22	19
Mean duration from prior distribution for each site (days)	-	41	62	58	27	-	29	78	54	33
Number enrolled (% of D1)	1386 (100)	1281 (92)	1180 (85)	1183 (85)	1124 (81)	1393 (100)	1243 (89)	1216 (87)	1295 (93)	1299 (93)

Table E3: Mean Weight-for-Height Z score (WHZ) of those attending all distributions, Turkana and Wajir Counties, Kenya, August 2011-March 2012

	D1 Mean WHZ (95%CI)	**D2 Mean WHZ (95%CI)**	**D3 Mean WHZ (95%CI)**	**D4 Mean WHZ (95%CI)**	**D5 Mean WHZ (95%CI)**
Turkana (n=757)	-0.92(-0.99, -0.87)	-0.85 (-0.95,-0.76)	-0.81 (-0.90,-0.71)	-0.69 (-0.78,-0.60)	-0.70 (-0.79,-0.61)
Wajir (n=1012)	-0.89 (-0.96,-0.82)	-0.90 (-0.99, -0.80)	-0.99 (-1.10, -0.88)	-0.66 (-0.77, -0.54)	-0.52 (-0.65, -0.38) 1.03

Table E4: Change in mean Weight-for-height Z score (WHZ) between distributions of those attending all distributions, Turkana and Wajir Counties, Kenya, August 2011-March 2012

Distribution	**Change in mean**	**95% CI**	**p-value ***
From First Distribution			
Turkana (n=757)			
D1 – 2	0.066	-0.011-0.144	0.09
D1 – 3	0.113	0.038-0.189	0.005*
D1 – 4	0.231	0.167-0.295	<0.001*
D1 – 5	0.218	0.150-0.286	<0.001*
Wajir (n=1012)			
D1 – 2	-0.004	-0.060 – 0.053	0.89
D1 – 3	-0.099	-0.196 – -0.004	0.04*
D1 – 4	0.234	0.146 – 0.323	<0.0001*
D1 – 5	0.377	0.268 – 0.486	<0.0001*

***=significant difference**

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

We wish to thank the following people and organizations all of which made necessary and significant contributions to the evaluation. Special thanks to the people of Kenya for their support, commitment, and cooperation.

- People of Kenya
- Turkana/Wajir Field Staff
- Implementing partners
  - International Rescue Committee
  - Islamic Relief
  - Merlin
  - Save the Children
  - World Vision
- Organizing partners
  - World Food Programme
  - UNICEF
- Ministry of Public Health and Sanitation
- US Office of Foreign Disaster Assistance
- CDC Kenya

Sudhir Bunga, CDC, USA

Cyrus Shahpar, CDC, USA

Leisel Talley, CDC, USA

September 2012

INTRODUCTION

This report provides the results of the evaluation of a Blanket Supplementary Feeding Program (BSFP) implemented in the Turkana and Wajir Counties of northern Kenya between August 2011 and March 2012. The information in this report is based on analysis from five distributions in each County. The poor 2011 long rains in the drought-affected pastoral, southeastern and coastal marginal agricultural areas culminated in poor or failed seasons in most parts of the rangelands and cropping lowlands. Many of these areas received 10%-50% of normal rains [1,2]. Areas reporting the largest deficits included the northern and eastern pastoral districts including Wajir, Marsabit, Isiolo, northern Garissa, northern Tana River and Mandera, and the southeastern marginal districts of Kitui, Makueni, Mwingi and Tharaka.

The repeated poor rainfall over the past agricultural seasons left wide parts of northern Kenya with severe drought conditions affecting an estimated 3.75 million people [2, 3]. Drastically increased food and non-food prices, limited household food stocks, and declining pastoral terms of trade were reported in the north and north-east and contributed to an overall decline in food security for the mainly pastoralist communities [2]. The shortage of water and pasture led to increased livestock deaths. On 30th June 2011 drought was declared a national disaster by the Kenyan president. At the time, the Famine Early Warning System Network (FEWSNET) predicted the current drought conditions to continue until early 2012 marking a period considered the driest in the Eastern Horn of Africa since 1995[2].

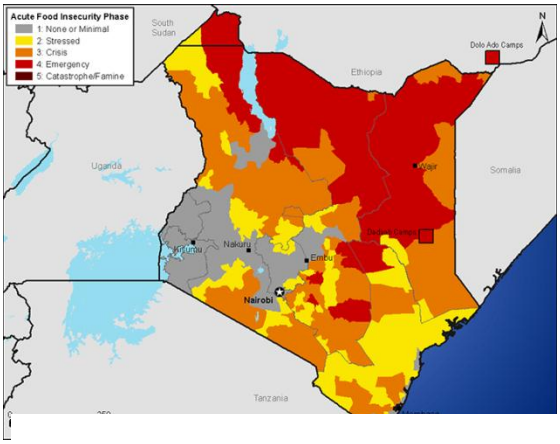


FIGURE 1: FOOD INSECURITY IN KENYA, JULY 2011

Source: Kenya Food Security Steering Group

As a result of the decline in food security in Kenya (Figure 1), acute malnutrition significantly increased with more than a 50% increase in admissions to selective feeding programs over the first quarter of 2011 [2,3,4]. Results from nutrition surveys conducted in second quarter of 2011 indicated high to very high rates of acute malnutrition. Nutritional assessments carried out in April-June 2011 in Turkana County, Kenya, found alarming rates of acute malnutrition among children less than five years of age. Estimates of global acute malnutrition (GAM) ranged from 24.4%-37.4%, representing a significant deterioration from 2010 and indicating a critical situation [5]. Across the other counties in the Arid and Semi-Arid Lands (ASALs) region, malnutrition was also notably increased ranging from 15.7%-32.6% GAM [5]. Based on these data, the population of northern and north-eastern Kenya was considered the most vulnerable to the drought and a further deterioration of the nutritional status of young children and pregnant and lactating women was expected unless preventive measures were implemented.

BLANKET SUPPLEMENTARY FEEDING PROGRAM

In response to the nutritional crisis, the World Food Programme (WFP) and its partners implemented BSFP in 6 counties across northern Kenya (Marsabit, Isiolo, Mandera, Wajir, Turkana, and Samburu). Children 6-36 months of age or less than <95 cm in length/height, and pregnant and lactating women (PLW) were initially the target population based on the funds available. Monthly rations of corn soy blend plus (CSB+) and oil were distributed; 200 gm CSB+ and 20 gm oil per day provided approximately 977 kilocalories per day. Systematic intervention (vitamin A supplementation, deworming and immunization per the national protocol) and health education were also included in the BSFP. Children and PLW were screened using mid-upper arm circumference MUAC at each distribution and referred to treatment if found to be acutely malnourished (moderate or severe). Caregivers were instructed to bring the registered child to each distribution to receive the ration. The initial program was planned for August –December 2011, or 5 distributions, but extended until March 2012 as a result of delays in transport, mainly due to impassable roads during the short rains, and lack of prepositioned commodities, caused by late contributions from donors. As the response matured and funding sources were identified, the target population was expanded to include all children up to 59 months of age from the third distribution onward. The ration composition changed to super cereal (CSB ++), a prepackaged commodity that contains CSB +, oil, sugar and milk. For the cohort study however, the ration remained the same throughout the program period. Despite an expansion of the target population, this evaluation only assessed children aged 6-36 months.

IMPACT EVALUATION BACKGROUND

During the 2010 BSFP in the ASALs region of Kenya, Save the Children implemented a real-time evaluation of the program which also provided beneficiaries with CSB and oil [{6}]. Significant challenges to data collection and therefore interpretation of results occurred but the findings were published [{7}]. The major challenge in the prior evaluation was data quality, and only 1/3 of children had plausible changes in height over a five month period. Building from the previous Save the Children evaluation and experiences in other contexts, this evaluation attempted to assess the impact of the BSFP using multiple methods and data collection strategies. Save the Children concurrently performed process monitoring for the whole BSFP including: monitoring the number of beneficiaries reached, default rates, key informant interviews on utilization, direct observation of distributions, and analysis of the logistics and implementation of the program. Helen Keller International performed supervisory monitoring which included: development and training of community mobilization; design, development and distribution of communication materials; and supportive supervision. Regular WFP post-distribution monitoring at the household level also took place. Finally, quantitative data were gathered to assess the impact of the BSFP package on the nutritional status of the population.

The overall objective of this quantitative program evaluation was to describe the impact of the BSFP in two counties in northern Kenya. While these programs are commonly implemented in emergencies, little is known

about their impact on preventing malnutrition. This evaluation was designed to determine if this specific program prevented deterioration of the nutritional status among children enrolled in the program, and make recommendations for improving the effectiveness of these programs.

OBJECTIVES

The primary objectives of this project were to:

- Evaluate the impact of the BSFP as a whole (ration, education and systematic treatment) on preventing deterioration of nutritional status among children 6-36 months of age.
    - Specifically using weight-for-height Z score (WHZ) and mid-upper arm circumference (MUAC) for outcome determination
- Assess the prevalence of morbidity among children 6-36 months of age receiving the BSFP.
- Determine baseline risk factors that were associated with children in the BSFP cohort population who became malnourished by performing logistic regression analysis.
    - Factors other than nutritional intake which may contribute to development of malnutrition among children receiving BSFP
- Make recommendations for improving program effectiveness based on the findings of the evaluation during and post program.

METHODS

The evaluation was designed to follow a longitudinal cohort of non-malnourished children 6-36 months of age enrolled in the BSFPs in two counties in northern Kenya.

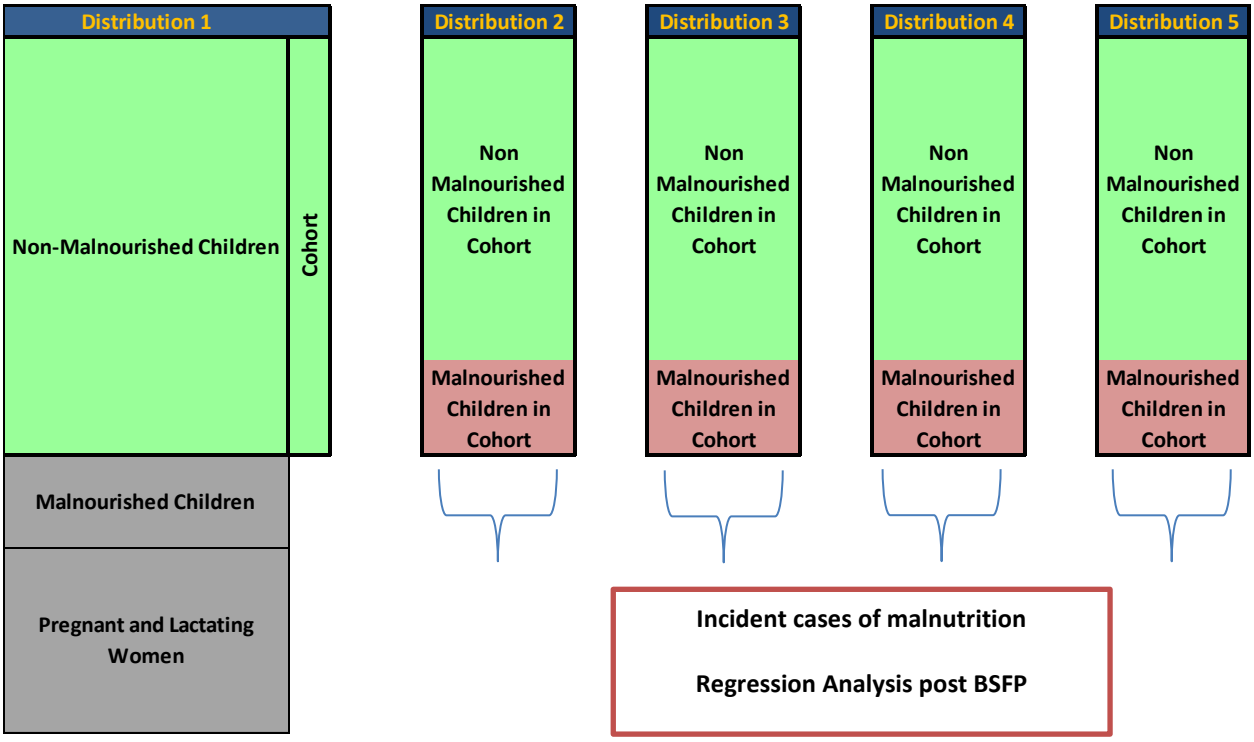
LONGITUDINAL COHORT

The evaluation was designed as a prospective cohort of non-malnourished children enrolled in the BSFP in Turkana and Wajir Counties. Data from the cohort were gathered to meet the objectives of evaluating the impact of BSFP, the prevention of deterioration in nutritional status among those in the BSFP, and the prevalence of morbidity among beneficiaries. The cohort was identified and enrolled at the first distribution with no further enrollment after the first distribution. The cohort was followed at each subsequent distribution where a questionnaire was administered and anthropometric measurements collected. Each county is a separate, independent cohort. Further detail is provided below.

Regression Analysis

The second component of the evaluation is a logistic regression analysis of children in the BSFP who become malnourished during the follow-up period. Incident malnutrition was identified at the end of the evaluation. The objective of this analysis was to identify baseline (first visit) risk factors for the development of subsequent malnutrition within the BSFP.

Figure 2: Evaluation Design



Sample size, sampling and statistical power

Sample size calculations were based on a paired t-test, which took into account the lack of independence of between the repeated measures. The sample size calculations were performed in SAS® version 9.3 software (SAS Institute Cary, NC) using the procedure *PROC POWER*. The sample size required for the longitudinal cohort was based on the primary outcome measure (WHZ), dropout rate, and the anticipated effect of BSFP based on past data.

Estimates used to calculate the sample size are listed in Table 1. A measurable difference in mean WHZ score between the distributions 1 and 5, of more than 0.15 was estimated based on past data (September 2010) from northern Kenya with a minimum correlation of WHZ between the two time periods of 0.4[6]. The mean WHZ difference of 0.15 was used as a conservative threshold because data from the previous year had issues with data

quality and increases may have been magnified by greater than expected rainfall. The study was designed to detect a difference of 0.15 with an alpha of 0.05 and 80% power (Table 2).

A design effect of two was factored and with a conservative estimate of difference of the mean WHZ of 0.15, we calculated a sample size of 900 children for the longitudinal cohort. Past program data showed a drop-out rate of 40% in BSFP. Accounting for the 40% drop-out rate, the revised sample size was calculated at 1500 children per sample (county). Overall, we estimated 50 children per distribution site in 30 sites to reach the final sample of 1500 children per sample (county). Each sample (county) is an independent sample. The study design does not allow for comparison between counties.

TABLE 1: PROPOSED ESTIMATES FOR THE DIFFERENT CHARACTERISTICS

Characteristic	Estimate/Fixed assumptions
Minimum difference in the mean WHZ detected	0.15
Minimum correlation in the outcome measure between the two time points	0.4
Drop-out rate over the distribution times 1 and 4	40%
Design effect	2
Level of statistical significance (α)	0.05
Value of the power desired (1-β)	80%
Two-sided t-test	

TABLE 2: ASSUMPTIONS USED TO DERIVE ESTIMATES [6]

Characteristics (from past data)	Past data	Assumption
Change in mean WHZ score from enrollment to distribution 5 (2010) in all counties	0.279	-
Change in mean WHZ score from enrollment to distribution 5 (2010) in Turkana	0.215	0.15-0.20
Change in mean WHZ score from enrollment to distribution 5 (2010) in Wajir	0.435	0.30-0.35

SITE SELECTION

The goal was to independently evaluate the BSFP in the two most affected counties in Kenya based on nutrition survey results and levels of food insecurity, specifically, Turkana and Mandera Counties. The level of insecurity and therefore feasibility of consistently accessing distribution sites and the population resulted in the exclusion of Mandera as a possible county in which to conduct this evaluation. The neighboring county of Wajir was selected to replace Mandera. There were 194 and 153 distribution sites in Turkana and Wajir Counties, respectively. Prior to site selection, sites falling within insecure areas or purely pastoral communities were excluded from the sampling frame. Insecurity in Turkana was primarily due to bandits and cattle raiders; while in Wajir, there was a risk of armed militants from Somalia along the border. Following exclusion, 172 sites (89%) in Turkana and 145 sites (95%) in Wajir remained with an estimated child beneficiary population of 45,566 in Turkana and 51,132 in Wajir. Using probability proportionate to size methodology, 30 sites were sampled from each county across all

implementing partners. Some sites initially selected had to be replaced because there were either more distributions sites allocated to one day than could be covered, the distance was too great to access the site in the time allotted, or communication challenges prevented access to the site during a distribution. In Turkana, 29 sites were visited at the first distribution. Delays in distribution prevented the replacement of the final site (number 30). In Turkana, the implementing partners were World Vision, MERLIN and the International Rescue Committee. Save the Children and Islamic Relief were the implementing partners in Wajir.

TRAINING

Sequential trainings were held in each county. The first training was in Turkana County during which CDC and WFP staff conducted a two-day classroom training (Annex 1). An additional anthropometry field practical with standardization activities was held at a nearby preschool. A delay in the start of distributions allowed for two additional days training on the administration of the questionnaire. A separate training with field practical was conducted in Wajir County by two CDC staff, who also conducted the training in Turkana. As in Turkana, delays in the commencement of distributions allowed for additional time to work on questionnaire administration.

Additional staff was trained in both Turkana and Wajir prior to the start of the first distribution. This was implemented to ensure sufficient staff to cover the field sites as well as account for potential loss of staff during the distributions. Refresher trainings were held before each distribution for current staff and newly hired replacement staff.

STAFFING

There were four teams per county for the first distribution. Teams consisted of a team leader, four enumerators and two anthropometrists. Two CDC and one WFP staff were based in each county to provide supervision and technical assistance. Each staff member was provided with specific instructions on their duties before, during, and after a distribution. This included methods on how to select children in the cohort on distribution day. To assist with this task, team leaders were provided with a sampling aid (Annex 2). On the day of distribution, staff members were also asked to engage the community using the same key messages that were distributed to the partners. To facilitate data collection, team sizes were increased to 6 to 7 staff per team and Wajir added an additional one to two teams per distribution.

As a result of increasing insecurity, CDC staff was removed from the field from distribution three onward. Field level program supervisors for each county ran the day-to-day operations. Thrice weekly calls were held between the field, CDC and WFP Nairobi staff from distribution three onward. CDC staff made one site visit to Turkana County in January 2012. The security situation in Wajir prevented additional site visits. In February 2012, CDC staff conducted a four-day data entry workshop in Nairobi to review data and the data cleaning processes.

ENROLLMENT OF COHORT

A cohort of children aged 6-36 months from Turkana and Wajir Counties of northern Kenya enrolled in BSFP was selected. Enrollment criteria included: children enrolled in the BSFP who were non-malnourished by MUAC, WHZ and without oedema. Exclusion criteria included: children with any form of acute malnutrition as assessed by MUAC, WHZ, and oedema; children with chronic illness, including cardiac disease, congenital abnormalities, or cancer; children from households, which would not be present during the whole course of the program (purely pastoral households); children currently receiving treatment for malnutrition; and those children whose caregivers did not consent to participation (Table 3). Because this cohort reflected the population enrolled in the BSFP and was an evaluation of the program as implemented, there were children in the cohort who exceeded the age limit of 36 months. This was largely due to non-adherence to BSFP height eligibility requirements.

WFP provided a projected number of beneficiaries for each distribution site. Sampling intervals were calculated based on these estimates. Once implementing partner enrolled and registered children in the BSFP, the evaluation teams selected every *nth* child for screening and potential enrollment into the cohort. If children fulfilled the enrollment criteria and consented, they were enrolled. Children were enrolled in the cohort until the sample size was achieved or the beneficiary population was exhausted (i.e., there were no additional eligible children available despite not achieving the desired sample size). Children were enrolled only during the first distribution.

ANTHROPOMETRIC AND QUESTIONNAIRE DATA COLLECTION

Data were collected during each of the five distribution cycles held between August 2011 and March 2012 (Table 4). Anthropometric measurements were obtained during the ration distribution. Height (length if <87 cm) was measured to the nearest 0.1 cm using Shorr boards (Shorr Products, Orney, Maryland) and standard techniques [8,9]. Weight was measured to the nearest 0.1 kg using Seca scales (UNICEF Warehouse, Copenhagen, Denmark). MUAC was measured to the nearest millimeter on the left arm using UNICEF non-stretchable calibrated tapes. Children were also assessed for the presence of bilateral pitting oedema, a clinical sign of Kwashiorkor, a form of severe acute malnutrition, and were referred for treatment. If a child was absent during the distribution, the teams communicated with community leaders to trace the child. It was not possible to trace all children missing distributions.

A standardized questionnaire was developed and administered at each distribution to the caregiver of the child in the cohort (Annex 3). The questionnaire collected data on: household demographics, recent morbidity and treatment, water and sanitation, utilization and consumption of the supplementary ration (sharing, selling etc.), access to general food distribution or other programs, like food for work, household food security, admission into therapeutic feeding programs, and feeding practices. This questionnaire was used at each distribution with minimal modifications.

The questionnaires were translated from English into Turkana (Turkana County) and Somali (Wajir County) and then back translated into English. The questionnaires were administered in the main language of the county. If the

respondent did not speak the language of the questionnaire, it was verbally translated to the local language/dialect.

CHILD IDENTIFICATION

Child substitution was highlighted as a major obstacle to meaningful data collection in the 2010 evaluation of the BSFP in northern Kenya. Based on the recommendations of Save the Children and other programs, a number of measures were put in place to assist in the identification of children [6,7].

First, WFP issued individual ration cards for the program. Inedible ink was also used at each distribution. A different finger was dipped at each distribution to mark that this child had attended the distribution (distribution 1: small finger, distribution 2: ring finger, distribution 3: middle finger, distribution 4: index finger). The ink was supposed to remain for 1 month on the finger.

Second, for the children in the cohort, additional measures were put into place. Each child was issued an individual cohort card that recorded information (Annex 4). Upon enrollment, the caregiver was asked permission to take a photograph of the child and place a wristband on the child. Both of these were voluntary. Uptake varied by county and during the course of the evaluation.

Each child included in the cohort was assigned a unique ID number, the cohort number. A set of pre-printed bar-coded sticker labels with the cohort number and station name were used to link the various cards and registers with the subject during all the 5 distribution visits.

The objective of unique identification numbers and linking were to:

a) Minimize child substitution
b) Establish good follow-up of individual child and minimize default and drop-out rates
c) Link the data in different cards and registers
d) Identify appropriate matched controls if the child is included into the case control analysis

The sticker labels were used to label the following records:

1. Cohort card
2. Ration card
3. Questionnaire – one questionnaire at each distribution visit, i.e. 5 questionnaires
4. Wrist band / bracelet
5. Cohort register

Finally, at each distribution, the data from the previous distribution were checked against the child presenting, specifically the photo, if used, and previous length/height measurement. If the team leader believed there to be child substitution based on the photo or a significant difference in length/height, it was noted, but data were still collected.

DATA ENTRY AND ANALYSIS

Data were collected by staff enumerators at distribution sites and then reviewed on-site by the team leader. Errors, such as missing values or failed simple logical checks, were corrected immediately with the caregiver. After the site was finished, the completed questionnaires were brought back to a central location and reviewed by CDC or WFP supervisory staff. Systematic errors and areas for improvement were identified and evaluation teams were retrained on these items.

Completed questionnaires were stored in locked facilities. Data entry forms were created using Epi Info™ 3.5.3 (CDC, Atlanta, GA) and dedicated data entry staff were hired and trained to complete data entry [10]. Double data entry was performed for all data. Once entered, these data were transmitted to Atlanta, Georgia, USA for analysis using Statistical Analysis Software (SAS®) version 9.3 software (SAS Institute Cary, NC). Emergency Nutrition Assessment software (http://www.cdc.gov/globalhealth/ierh/ResearchandSurvey/enasoftware.htm) was used to generate anthropometric indices based on WHO Growth Standards and assess the quality of measurements through the plausibility reporting (Annex 5) [11]. WHZ values between -5 and 5 were considered plausible. Data were further cleaned and measurements excluded with a difference between 2 time points in weight of greater than 10 g/kg/day, or a decrease of more than 1 cm in length/height. The maximum plausible increase in length/height was set at 1 cm per week. These cutoffs for plausible measurements were based on prior evaluation thresholds and WHO child growth charts. The intent of these thresholds was to exclude obvious errors in data collection. Additional data checks on child identity including consistency in name, gender, reported or calculated age and whether the team leader believed the child presenting was the same as the child enrolled were run.

Analysis within the report is divided into two sections. Per protocol analysis was conducted and therefore a portion of the analysis in this report includes only children who attended all five distributions and who had plausible anthropometric data at all five measurements. The second section of the analysis includes all children with plausible values, despite their attendance.

A p-value <0.05 was considered to be statistically significant. Mean WHZ and standard deviations were calculated for each sample (county) for each distribution. The difference in mean WHZ between distributions was tested for statistical difference using paired *t*-tests for comparing two group means. To account for the clustering of children within a distribution site, SAS complex survey procedures were used in the analyses. We made the following assumptions: the observations were independent, observations for each group were a random sample from a population with a normal distribution, and variances for the two independent groups are equal.

REGRESSION METHODS AND ANALYSIS

Non-experimental regression analysis was performed using logistic regression models for sample survey data analysis. The primary dependent (outcome) variable in the models was occurrence or non-occurrence of

malnutrition at any time in the distribution period. A child was classified as being malnourished if he/she had any measure of acute malnutrition (WHZ <-2 standard deviations, a MUAC <125 mm or the presence of bilateral pitting oedema) at any distribution following enrollment. The data in the model were limited to children enrolled in the cohort who had plausible anthropometric data. Separate analysis and regression model building was performed for Turkana and Wajir cohorts.

Potential risk factors for the development of acute malnutrition during the BSFP were assessed using multivariate logistic regression models. Data were selected from the questionnaire repeatedly administered at each distribution. Potential baseline risk factors identified and included were: the age and sex of the child, number of children under five in the household, the distribution site attended (a proxy for geographic location), the time traveled to the distribution site, household size, the primary caregiver, the sex of head of household, the educational status of the primary caregiver and the literacy of the head of household, the number of animals owned by the household, the number of animals that died in the prior six months, monthly income and percentage spent on food, water source, travel time to water source, latrine use, presence of children being treated for malnutrition in the household, child treated in the last month for malnutrition, child currently under treatment for malnutrition, vaccinated against measles, vitamin A supplementation receipt in last 6 months, illness reported in the last two weeks, current breastfeeding status, main source of food for the households, number of times the child ate on the prior day, dietary diversity of child, baseline WHO WHZ, BSFP ration receipt, and consumption pattern. Dietary diversity was calculated by summing the 7 food groups consumed on the prior day (1 point per food group: cereals, pulses, dairy, meat, eggs, vitamin A rich fruit and vegetables, other fruit and vegetables). The possible range was 0-7.

Hypothesis-driven regression modeling was used to identify risk factors potentially affecting the occurrence of malnutrition. Univariate analysis of both categorical and continuous variables was performed to evaluate risk factors of significance to include in the final model. Appropriate categorization of continuous variables was performed if the variable appeared to have a non-linear association with the outcome. Additional risk factors with sizable effects ($p<0.15$), but not statistically significant were considered for inclusion in the model. Evaluation of potential confounders was assessed by examining the effect of their inclusion in regression models on the coefficients estimates of main independent variables. Effect modification was assessed by including interaction terms in regression models and performing stratified analyses. Adjusted odds ratios were used to quantify the independent effect of baseline risk factors on occurrence of incident cases of malnutrition.

Data analysis was carried out in SAS using *Proc Reg* with variance inflation factor to assess for collinearity between independent variables and *Proc Surveylogistic* to perform logistic regression analysis for sample survey data.

ETHICAL REVIEW, NON-RESEARCH DETERMINATION AND CONFIDENTIALITY

This evaluation was submitted for ethical review to the Institutional Review Board of the U.S. Centers for Disease Control and Prevention. It was determined to be non-research as the primary purpose of the activity was to evaluate an emergency blanket supplementary feeding program, its impact on the nutritional status of children and to guide future blanket feeding programs in Kenya. Therefore, it was not considered to be generalizable to other populations. Additionally, it was determined that there was a suspected imminent threat to the health of the population; specifically, acute malnutrition which needed to be addressed through appropriate and timely response.

The blanket supplementary feeding program was initially offered to all children 6-36 months who resided in the selected counties and further extended to all children 6-59 months as the response matured. The children chosen to be included in the cohort for the evaluation comprised a subset of all of the children in the program. Children in the cohort received no additional direct benefit from their inclusion in the evaluation and were not be treated any differently than those not participating in the cohort as far as the BSFP intervention was concerned. They received the same ration, MUAC measurements, systematic treatment and referral if found to be malnourished based on MUAC. All acutely (severe or moderate) malnourished children identified were referred for treatment.

Verbal consent for participation from the caregiver was sought (Annex 6). Caregivers could refuse to participate in the initial or any follow-up activities, at any point in time, without repercussions on the eligibility of their child to receive the supplementary ration. Specific children followed over the course of the blanket feeding program were assigned a serial number. All data collection forms contained this number and not written identifiable information, which was only be collected on the cover sheet at enrollment and the individual ration card held by the child/caregiver. A facial photograph was taken and a wrist band placed on each child in the cohort at enrollment, if there was consent, and used at each subsequent distribution (Annex 6). These photographs were available only to evaluation staff, and were destroyed at the completion of the evaluation. During the course of evaluation, all data, including the photographs and a master register of participants were kept in a secure location at the WFP field offices. Upon completion of data collection, this register was destroyed. The wrist band contained no personal identifiers.

RESULTS

SCREENING, ENROLLMENT AND PROGRAM SUMMARY

TABLE 3: COHORT SCREENING, INELIGIBILITY AND ENROLLMENT, TURKANA AND WAJIR COUNTIES, AUGUST 2011

Category	Turkana - n (%)	Wajir - n (%)
Screened	1897	1959
Ineligible at screening*	511 (26.9)	566 (28.9)
WHZ < -2	227 (44.4)	419 (74.0)
MUAC <12.5	58 (11.4)	40 (7.1)
Oedema	5 (1.0)	27 (4.8)
Chronic illness	11 (2.2)	11 (1.9)
Decline consent	4 (0.8)	1 (0.2)
Mobile household	10 (2.0)	8 (1.4)
Currently under Treatment	196 (38.4)	60 (10.6)
Enrolled	1386 (73.1)	1393 (71.1)

*Sequentially assessed, first ineligible criteria encountered

Summary information on the screening, eligibility, and enrollment of children in the evaluation cohort in presented in Table 3. All BSFP attendees were pre-screened for age (or height, if age was unavailable) and acute malnutrition by MUAC by BSFP implementing partner program staff during the screening and enrollment process of BSFP.

For the BSFP evaluation, a total of 3856 children were screened during the first BSFP distribution at 59 sites (29 in Turkana and 30 in Wajir) of which 2779 were eligible for enrollment in the evaluation program. Ineligibility at the time of enrollment was based on WHZ <-2, MUAC <12.5, child having oedema or chronic illness, not giving consent, a mobile household, or those children who were reportedly undergoing current treatment for malnutrition.

In Turkana, of the 1897 screened, 27% (511) were ineligible. WHZ and MUAC criteria accounted for over 55% ineligibles, while 38% were currently under treatment for malnutrition at the time of the first distribution. The final enrolled cohort in Turkana was 1386.

In Wajir, of the 1959 screened, 29% (566) were ineligible (Table3). WHZ and MUAC criteria accounted for over 80% of ineligibility and another 11% were ineligible because they were currently under treatment for malnutrition. The final enrolled cohort in Wajir was 1393.

TABLE 4: ENROLLMENT IN COHORT BY BSFP ELIGIBILITY BY AGE AND HEIGHT, TURKANA AND WAJIR COUNTIES, AUGUST 2011

Received	Correctly screened n (%)	Age less than 6 months n (%)	Age greater than 36 months n (%)	Height greater than 95cm n (%)
Turkana	1106 (79.8)	6 (0.4)	105 (7.6)	169 (12.2)
Wajir	1050 (75.4)	0 (0.0)	4 (0.3)	339 (24.3)

At the first distribution, the BSFP program entry criteria included children age 6-36 months. If age was not available, program implementers used height screening (height ≤95cm) to identify children less than 36 months. After enrollment of children into the BSFP program (making them eligible for receiving program benefits including food and health interventions), program evaluation staff gathered further information on age from immunization cards and height from measurements. In Turkana, 20% of enrolled children were not eligible by age or height entry criteria, mostly as a result of a height taller than 95 cm (Table 4). In Wajir, 25% of enrolled children were not eligible by age or height criteria, also mainly resulting from a height exceeding 95 cm.

TABLE 5: BSFP DISTRIBUTION CYCLE DURATIONS, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

	Turkana (n=1386)					Wajir (n=1393)				
Measure	**D1**	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**	**D4**	**D5**
Dates of Distribution	20 Aug – 24 Sep	22 Sep – 13 Nov	14 Nov – 25 Jan	12 Jan – 30 Mar	25 Feb – 29 Mar	25 Aug – 8 Sept	26 Sept – 6 Oct	30 Nov – 18 Jan	30 Jan – 21 Feb	5 Mar – 24 Mar
Number cohort sites visited	29	29	29	29	28	30	29	29	29	29
Duration of Distribution cycle (days)	35	52	72	78	33	14	10	49	22	19
Mean duration from prior distribution (days)	-	41	62	58	27	-	29	78	54	33
Number enrolled % out of D1	1386 (100)	1281 (92)	1180 (85)	1183 (85)	1124 (81)	1393 (100)	1243 (89)	1216 (87)	1295 (93)	1299 (93)

Overall, BSFP distributions started in August 2011 and ended in March 2012 (Table 5). BSFP distribution cycles varied significantly in the length of individual cycles, as well as the time between the receipt of ration by the beneficiaries. The third and fourth distribution cycles had longer durations in both counties.

In Turkana, the duration of distribution in each cycle ranged between 33 to 78 days, with distribution 4 lasting 78 days. There was overlap of distribution cycles 1-2, 3-4 and 4-5. Mean duration from the immediate prior distribution ranged between 27 to 62 days. The distributions 2 to 3 and 3 to 4 had approximately two months duration between the distributions (much longer than the intended one month duration). Site 21 (Kairiama) could not be followed up at the 5th distribution because of logistical challenges. Overall recapture rates of enrolled children were high at the second distribution with the majority of children recaptured; however, the rates declined as the program progressed to 81% by distribution five. .

In Wajir, the duration of distribution in each cycle ranged between 10 to 49 days with distribution 3 occurring over 49 days. Mean duration from the immediate prior distribution ranged between 29 to 78 days; distribution 3 had the longest mean duration from the prior distribution. Distributions 2 to 3 and 3 to 4 had approximately two months duration between the distributions (much longer than the intended one month duration) with a gap of 78 days between distribution 2 and distribution 3. Site 30 (Diff) was only accessible at the first distribution; insecurity prevented further follow-up. Overall recapture rates of enrolled children ranged between 87%-93%

DATA QUALITY

TABLE 6: BSFP EVALUATION DATA QUALITY INDICATORS, TURKANA AND WAJIR COUNTIES, AUGUST 2011—MARCH 2012

	Turkana (n=1386)					Wajir (n=1393)				
Indicator	**D1†**	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**	**D4**	**D5**
Records with name errors	-	9	14	7	18	10	3	8	9	1
(% of distribution cohort)		(0.6)	(1.0)	(0.5)	(1.3)	(0.7)	(0.6)	(0.6)	(0.6)	(0.1)
Records with gender errors	8	18	16	15	18	19	7	14	10	16
(% of distribution cohort)	(0.6)	(1.3)	(1.2)	(1.1)	(1.3)	(1.4)	(0.5)	(0.7)	(0.7)	(1.1)
Age determination method at D1										
- Card (exact date of birth)		763 (55%)								80 (6%)
- Recall (Months)		623 (45%)								1313 (94%)

†D, distribution

Data quality of was assessed for each distribution by examining name and gender errors. . Errors in recording of sex and/or name were identified and corrected; 48 name and 67 gender errors in Turkana and 31 and 66 in Wajir, respectively (Table 6). Age determination method in Turkana was almost equally based on immunization card and recall methods, while age determination method in Wajir was mostly based on recall method (94%). In Wajir, only 6% of caregivers presented cards at the time of enrollment.

TABLE 7: IMPLAUSIBLE VALUES AND EXCLUSION FROM FINAL COHORT, TURKANA AND WAJIR COUNTIES, AUGUST 2011—MARCH 2012

Exclusion characteristic	**Turkana – n (%)**	**Wajir – n (%)**
Total enrolled (normal)	**1386**	**1393**
Implausible values*	177 (12.8)	127 (9.1)
Final number (with plausible values) **included in analysis**	**1209 (87.2)**	**1266 (90.9)**

* see next table

Upon review of the data of the enrolled cohort, implausible nutritional measures were noted. Table 7 shows the number of subjects with implausible values. Implausibility by category is described in Table 8. The final data used for the primary analysis in this report were data which excluded subjects with one or more implausible value at any visit. No data imputation of implausible values was attempted.

TABLE 8: EXCLUSIONS OF RECORDS BASED ON IMPLAUSIBLE / FLAGGED VALUES AT ANY DISTRIBUTION, TURKANA AND WAJIR COUNTIES

Exclusion criteria*	**Turkana**	**Wajir**
Total enrolled, with all 5 visits	**N=1386**	**N=1393**
	Children n (%)	**Children n (%)**
WHO WHZ flag	11 (0.8)	7 (0.5)
Incorrect child by team leader	7 (0.5)	3 (0.2)
Implausible length/height decrease	117 (8.4)	75 (5.4)
Implausible length/height increase	64 (5.6)	50 (3.6)
Implausible weight decrease	4 (0.3)	7 (0.5)
Implausible weight increase	22 (1.6)	16 (1.1)
Final number (with plausible values) included for analysis	**1209 (87.2)**	**1266 (90.9)**
*May have more than one criteria		

Of the exclusions made due to suspected implausible data, the categories of criteria used for exclusions are listed in Table 8. The criteria for exclusion are not exclusive and an individual child may have had more than one implausible criteria.

Exclusions by team leader (where the team leader did not believe the child presenting was the same child enrolled) or because of implausible weight changes were small in both counties. In Turkana, 14% of the subjects had implausible length/height changes (increase or decrease). The final number with plausible values included for analysis in Turkana is 1209. In Wajir just under 9% of subjects were excluded due to implausible length/height changes (increase or decrease). The final number with plausible values included for analysis in Wajir is 1266.

TABLE 9: HEIGHT CHANGES FROM FIRST TO FIFTH DISTRIBUTION, BY PLAUSIBILITY LEVEL, 2010 AND 2011—2012 BSFP EVALUATIONS, KENYA

Evaluation	Too Low	Satisfactory	Too High
2010 (n=3,041)	10.8%	68.6%	16.8%
2011-12 Turkana (n=1124)	0.6%	95.4%	4.0%
2011-12 Wajir (n=1299)	1.0%	96.8%	2.2%

Further examination of height changes from the first to fifth distributions was performed to compare data quality with a prior evaluation (Table 9) and examine for evidence of child substitution. Height was categorized as 'Too Low' if the overall height change was less than -1 cm per month. Height was categorized as 'Too High' if the height change was greater than 1 cm per month of distribution. In Turkana (Table 9 and Figure 3), 95% of height changes were classified as satisfactory. In Wajir (Table 9 and Figure 4), just under 97% of height changes were classified as satisfactory.

FIGURE 3: NUMBER OF CHILDREN BY HEIGHT CHANGE FROM FIRST TO FIFTH DISTRIBUTION, TURKANA COUNTY, AUGUST 2011-MARCH 2012

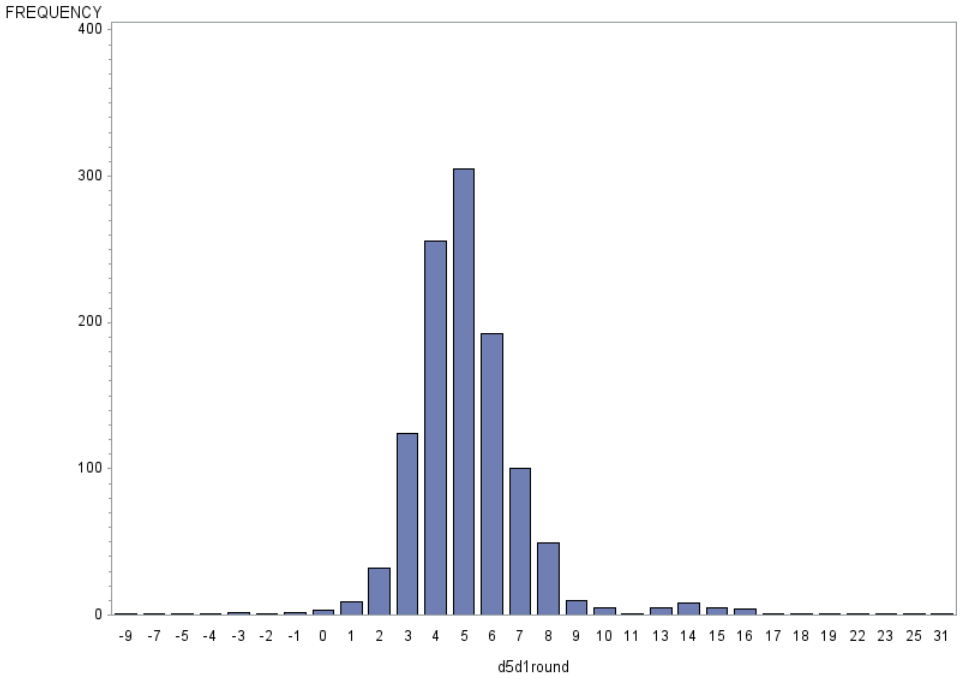
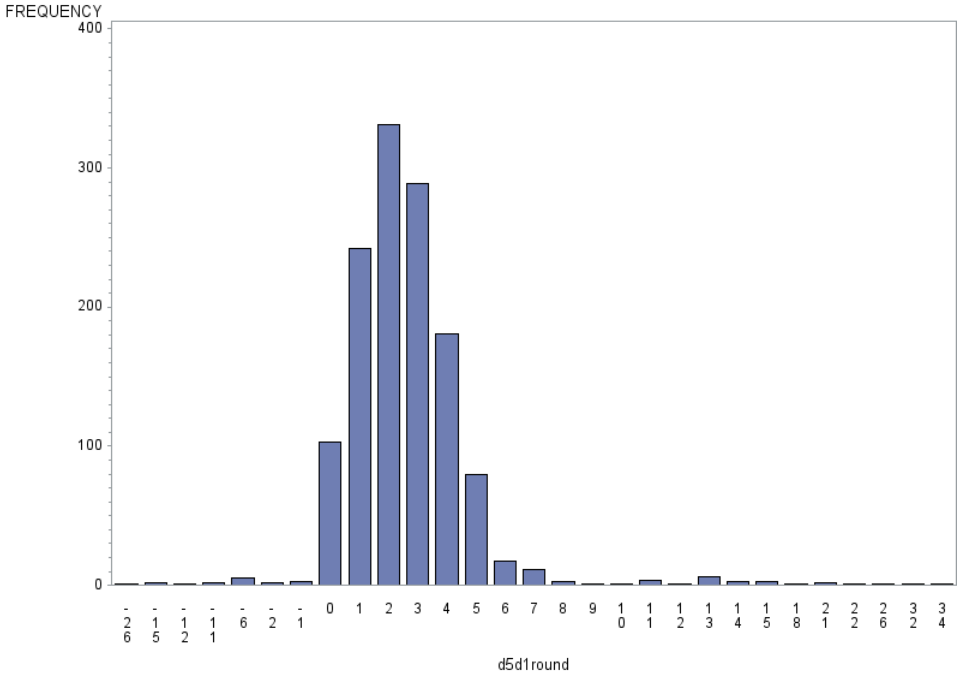


FIGURE 4: NUMBER OF CHILDREN BY HEIGHT CHANGE FROM FIRST TO FIFTH DISTRIBUTION, WAJIR COUNTY, AUGUST 2011-MARCH 2012



COHORT ATTENDANCE AND BASELINE CHARACTERISTICS

TABLE 10: COHORT ATTENDANCE AMONG CHILDREN WITH PLAUSIBLE VALUES, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Exclusion characteristic	Turkana – n (%)	Wajir – n (%)
Total enrolled (normal)	1386	1393
Final number (with plausible values) included for analysis	1209	1212*
Attended all 5 distributions	757 (62.6)	1012 (83.5)
Missed 1+ distribution	452 (37.4)	200 (16.5)
Any 4 distributions	267 (22.1)	141 (11.6)
Any 3 distributions	114 (9.4)	35 (2.9)
Any 2 distributions	53 (4.4)	20 (1.7)
Only attended first distribution	18 (1.5)	4 (0.3)

** Diff (58 children) excluded from this analysis as it was not accessible after D1 due to insecurity*

Enrolled subjects with plausible data did not attend all of the distributions (Table 10). Children may have missed consecutive or non-consecutive distributions. Total counts of missed distributions are presented above.

In Turkana of the 1209 children with plausible values, 63% (757) attended all 5 distributions; 452 children missed one or more distribution. Of note, cohort site 21 (Kairiama) was missed at the final distribution because of logistical challenges. This site did not receive a fifth distribution in the program. Only 1.5% (18) children were completely loss-to-follow up as they only attended the first distribution. At the fifth distribution, 267 were not in attendance, including the 35 children missed at site 21.

In Wajir of the 1212 children with plausible values, 83.5% (1012) attended all 5 distributions; 200 children missed one or more distribution. Of note, cohort site 30 (Diff) was missed due to insecurity for all subsequent distributions and excluded from the analysis. Only 0.3% (4) children were completely loss to follow-up as they only attended the first distribution. A total of 6.7% (94) children did not attend the fifth distribution and their final outcome was unknown.

TABLE 11: BASELINE DEMOGRAPHICS AND CHARACTERISTICS OF COHORT POPULATION COMPARING THE FINAL COHORT (WITH PLAUSIBLE VALUES) TO THOSE EXCLUDED FOR TO IMPLAUSIBLE VALUES, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

Characteristic	Turkana (N=1386)				Wajir (N=1393)		
	n (%)	n (%)	p value		n (%)	n (%)	p value
	Plausible values (n=1209)	Implausible values (n=177)			Plausible values (n=1266)	Implausible values (n=106)	
Mean age (months)	25	25	0.76		25	25	0.86
Sex (female)	602 (50.0)	98 (55.0)	0.11		657 (51.9)	64 (50.0)	0.75
Photo acceptance	1205 (99.7)	177 (100)	0.47		655 (52.1)	59 (47.2)	0.18
Wristband acceptance	1166 (96.5)	170 (96.0)	0.53		359 (29.1)	35 (28.7)	0.93
Mean travel time to	59	59	0.91		55	52	0.85

distribution (minutes)							
Mean household (HH) size	7.3	7.1	0.27		8.5	8.9	0.15
Mean under-3 year old children in HH	1.4	1.4	0.21		1.8	1.9	0.12
Mean under-5 year old children in HH	2.1	2.0	0.26		2.5	2.6	0.13
Mean number of HH animals alive	14	12	0.15		17	15	0.20
Mean number of HH animals that died in past 6 months	33	34	0.84		47	49	0.78
Mean monthly HH income spent on food (KSH)	965	964	0.99		4706	4905	0.24
Mean monthly HH income spent on non-food (KSH)	447	593	0.54		2117	1955	0.76
Mean time to collect water (minutes)	64	58	0.12		35	34	0.94
HH using open field for defecation	1098 (90.8)	159 (89.8)	0.97		915 (72.3)	92 (72.4)	0.31
Cohort children being treated for malnutrition	36 (3.0)	4 (2.3)	0.61		45 (3.6)	4 (3.1)	0.82
HH with other children being treated for malnutrition	52 (4.3)	5 (2.8)	0.32		49 (3.9)	4 (3.1)	0.70
Cohort children vaccinated for measles			0.008*				0.76
Yes by card	509 (42.1)	64 (36.1)			201 (15.9)	22 (17.3)	
Yes by recall	511 (42.3)	74 (41.8)			985 (77.8)	98 (77.2)	
No by card / recall	164 (13.6)	37 (20.9)			74 (5.8)	7 (5.5)	
Don't know	25 (2.1)	2 (1.1)			6 (0.5)	0 (0.0)	
Cohort children with Vitamin A within 6 months			0.29				0.61
Yes by card	487 (40.3)	60 (33.9)			197 (15.5)	17 (13.3)	
Yes by recall	588 (48.6)	100 (56.4)			981 (77.5)	99 (77.9)	
No by card /	114 (9.4)	16 (9.0)			79 (6.2)	11 (8.7)	

recall Don't know	20 (1.6)	1 (0.6)			7 (0.7)	0 (0.0)	
Cohort children sick within 2 weeks	773 (63.9)	100 (56.5)	0.019*		529 (42.2)	49 (39.8)	0.62
Main source of food Market purchase Own Production Provided by govt/agency	 641 (53.0) 365 (30.2) 119 (9.8)	 97 (54.8) 52 (29.4) 21 (11.9)	0.75		 638 (50.3) 28 (2.2) 380 (30.0)	 55 (43.3) 4 (3.1) 43 (33.9)	0.16
HH receiving food from any other program	214 (17.7)	21 (11.9)	0.02*		878 (70.6)	91 (73.4)	0.62
HH that barter food	59 (4.8)	5 (3.1)	0.29		26 (2.1)	0 (0.0)	0.25
HH that sell food	21 (1.7)	4 (2.5)	0.55		23 (1.8)	3 (2.5)	0.71
HH that share food	873 (74.4)	118 (67.8)	0.13		358 (28.6)	53 (29.1)	0.89
Mean number of meals/snack child ate in prior day	1.9	1.8	0.67		3.4	3.3	0.25
Dietary Diversity (mean # items)	2.3	2.1	0.25		2.1	2.1	0.87
*statistically significant difference							

Table 11 compares key baseline demographics and characteristics of cohort population between those with plausible anthropometric measurements and the children who did not have plausible measures. Overall, in each county the subjects with implausible values, although a small group, were comparable to those subjects for whom we had plausible data with respect to the demographic and cohort characteristics. It is unlikely that the exclusion of data based on implausible values introduced bias into our analysis. In Turkana, children excluded from analysis had lower levels of measles vaccination and a lower prevalence of self-reported morbidity. Additionally, households of excluded children self-reported less external food assistance. There were no statistically significant differences in baseline demographics in Wajir between children with plausible and implausible values.

TABLE 12: BASELINE DEMOGRAPHICS AND CHARACTERISTICS OF FINAL COHORT POPULATION (WITH PLAUSIBLE DATA) COMPARING THOSE ATTENDING ALL DISTRIBUTIONS WITH THOSE THAT MISSED ONE OR MORE DISTRIBUTIONS, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

Characteristic	Turkana (N=1209)			Wajir (N=1212)		
	n (%)	n (%)	p value	n (%)	n (%)	p value
	Visited all 5 distributions (n=757)	Missed ≥1 distribution (n=452)		Visited all 5 distributions (n=1012)	Missed ≥1 distribution (n=200)	
Mean age (months)	26	23	<0.001*	25	24	0.35
Sex (female)	387 (51.1)	215 (47.6)	0.28	527 (52.1)	98 (49.0)	0.50
Photo acceptance	755 (99.7)	450 (99.6)	0.60	516 (51.2)	102 (52.0)	0.90
Wristband acceptance	736 (97.4)	430 (95.1)	0.04*	304 (30.7)	54 (28.0)	0.53
MUAC						
12.5 to 13.4	110 (14.6)	74 (16.4)	0.47	103 (10.0)	26 (10.1)	0.96
13.5 or greater	647 (85.4)	378 (83.6)		927 (90.0)	231 (89.9)	
WHZ score						
-2 to -1.5	187 (24.7)	104 (23.0)	0.92	259 (25.2)	66 (25.7)	0.88
-1.5 to 1.0	211 (27.9)	123 (27.2)		263 (25.5)	72 (28.0)	
-1.0 to -0.5	179 (23.6)	110 (24.3)		220 (21.4)	47 (18.3)	
-0.5 to 0	88 (11.6)	61 (13.5)		158 (15.3)	42 (16.3)	
0 to 0.5	54 (7.1)	34 (7.5)		77 (7.5)	17 (6.6)	
0.5 or greater	38 (5.0)	20 (4.4)		53 (5.5)	13 (5.1)	
Mean travel time to distribution (minutes)	54	65	0.16	52	75	0.36
Mean household (HH) size	7.3	7.3	0.90	8.6	8.2	0.28
Mean under-3 children in HH	1.4	1.4	0.52	1.8	1.7	0.13
Mean under-5 children in HH	2.1	2.1	0.39	2.5	2.4	0.11
Mean number of HH animals alive	15	13	0.18	16	22	0.07
Mean number of HH animals that died in past 6 months	34	30	0.28	48	44	0.63
Mean monthly HH income spent on food (KSH)	955 KSH	981 KSH	0.85	4102 KSH	7493 KSH	0.08
Mean monthly HH income spent on non-food (KSH)	493 KSH	373 KSH	0.13	1885 KSH	3119 KSH	0.35
Mean time to	64	65	0.77	36	31	0.38

collect water (minutes)							
HH using open field for defecation	692 (91.4)	406 (90.0)	0.34		765 (75.6)	106 (53.0)	<0.0001*
Cohort children treated for malnutrition in past month (not currently)	22 (2.9)	14 (3.1)	0.78		39 (3.8)	6 (3.0)	0.26
HH with other children being treated for malnutrition	32 (4.2)	20 (4.4)	0.83		40 (3.9)	8 (4.0)	0.78
Cohort children vaccinated for measles*							
Yes by card	336 (44.8)	173 (38.3)	0.27		160 (15.8)	41 (20.5)	0.62
Yes by recall	308 (40.7)	203 (44.9)			790 (78.1)	141 (70.5)	
No by card / recall	97 (12.8)	67 (14.8)			56 (5.5)	18 (9.0)	
Don't know	16 (2.0)	9 (2.0)			6 (0.6)	0 (0.0)	
Cohort children with Vitamin A within 6 months							
Yes by card	319 (43.4)	168 (37.1)	0.53		157 (15.5)	40 (20.0)	0.77
Yes by recall	354 (46.8)	234 (51.8)			789 (78.0)	138 (69.0)	
No by card / recall	69 (9.1)	45 (10.0)			60 (5.9)	19 (9.5)	
Don't know	15 (2.0)	5 (0.9)			6 (0.6)	3 (1.5)	
Cohort children sick within 2 weeks	486 (64.2)	287 (63.5)	0.80		444 (44.3)	58 (29.4)	0.002*
Main source of food							
Market purchase	404 (53.4)	237 (52.4)	0.30		489 (48.3)	108 (54.0)	0.009*
Own Production	216 (28.5)	149 (32.8)			19 (1.9)	8 (4.0)	
Provided by govt/agency	76 (10.0)	43 (9.5)			322 (31.8)	51 (25.5)	
HH receiving food from any other program	128 (16.8)	86 (19.2)	0.29		734 (72.6)	157 (62.3)	0.001*
HH that barter food	34 (4.4)	25 (5.5)	0.41		22 (2.2)	4 (1.6)	0.57
HH that sell food	9 (1.2)	12 (2.6)	0.18		18 (1.8)	6 (2.3)	0.53
HH that share food	546 (74.4)	327 (74.5)	0.96		289 (28.4)	75 (29.8)	0.67
Mean number of meals/snack child ate in prior	1.8	1.9	0.36		3.3	3.6	0.01*

day							
Dietary Diversity (Mean # items)	2.3	2.3	0.67		2.1	2.1	0.98
*statistically significant difference							

Key baseline data on demographics, nutritional status, socio-economic indicators, health indicators and food security measures for eligible for enrolled children attending all distributions and for children enrolled but excluded because they missed one or more distributions, are presented in Table 12 for both Turkana and Wajir Counties. Comparisons between the two groups within each county were conducted to determine if those not attending all distributions were different than those attending all distributions.

In Turkana, 757 subjects are compared with 452 who missed 1 or more distributions. Most characteristics were similar between the two groups. Age and wristband acceptance were significantly different. Those who failed to attend all distributions were slightly younger. While not significant, households of children missing distributions reported greater travel time to distribution sites.

In Wajir, 1012 children are compared with 200 that missed one or more distributions. Households of children missing distributions may have been of slightly higher socio-economic status as they reported less use of open defecation, buying more food in the market, receiving less assistance outside of BSFP, and children consuming slightly more meals/snacks. Recent morbidity was also lower in this group. While not statistically significant, the mean monthly income of households missing distributions was almost twice that of those attending all distributions and the distance to distribution site was longer for those missing distributions.

TABLE 13: PROGRAM AND HOUSEHOLD CHARACTERISTICS BY DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Category	Turkana (%)					Wajir (%)				
	D1*	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**	**D4**	**D5**
Number attending the distribution	1209	1105	1014	1019	972	1212	1141	1116	1191	1193
Sex (% female)	50.0	50.6	50.6	50.9	50.1	51.6	52.6	52.1	51.2	51.6
Wristband acceptance (%)	96.5	99.5	99.3	98.4	-	30.3	34.2	18.0	4.7	-
Have cohort card (%)		99.6	100.0	99.9	99.9		99.1	99.5	99.7	98.8
Mean household (HH) size	7.3	7.4	7.4	7.3	7.5	8.5	8.9	9.4	9.4	9.4
Mean under-3 children in HH	1.4	1.4	1.4	1.3	1.3	1.8	1.8	1.7	1.7	1.6
Mean under-5 children in HH	2.1	2.2	2.1	2.0	1.9	2.5	2.7	2.7	2.7	2.6
Mean number of HH animals alive	14.3	5.1	6.2	5.1	4.7	17.0	9.7	9.3	7.9	8.0
Mean number of HH animals that died in past 6 months (D1) *(in the last month 1 month D2-D5)*	32.5	7.0	5.5	4.2	3.0	47.3	17.6	7.9	0.8	0.02
Mean monthly HH income spent on food (KSH)	965	805	853	890	915	4900	6101	4857	4469	4333
Mean monthly HH income spent on non-food (KSH)	448	298	277	351	286	2130	1760	977	1547	1556
Mean time to collect water (minutes)	64.3	71	73	70	77	34.8	33.3	39.9	43.3	44.4

*D, distribution

TABLE 14: PROGRAM AND HOUSEHOLD CHARACTERISTICS BY DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Category	Turkana (%)					Wajir (%)				
	D1*	D2	D3	D4	D5	D1	D2	D3	D4	D5
Number attending the distribution	1209	1105	1014	1019	972	1212	1141	1116	1191	1193
Cohort child treated in last month for malnutrition (%)	3.0	6.6	4.4	0.8	0.7	3.7	7.2	3.2	11.3	6.8
HH with other children being treated for malnutrition (%)	4.3	6.2	5.4	4.5	5.1	4.0	8.0	2.6	5.6	5.3
Cohort children vaccinated for measles (%)	84.3	90.3	92.7	95.1	96.4	93.4	94.1	97.5	98.6	99.6
Cohort children with Vitamin A within 6 month (%)	88.9	93.6	93.4	92.9	93.7	92.7	66.2	90.1	98.2	99.5
Cohort children sick within 2 wks	63.9	68.0	69.4	57.1	51.9	41.8	56.1	66.7	48.7	46.4
Main source of food (%)										
Market	53.0	63.9	73.0	76.0	74.2	49.3	50.6	54.3	50.2	58.0
purchase	30.2	25.4	21.8	16.7	18.4	2.2	1.3	4.2	1.1	0.5
Own Production	9.8	6.2	2.1	4.1	3.2	30.8	31.2	20.9	28.4	25.7
Provided by govt/agency										
HH receiving food from any other program	17.9	17.5	15.9	19.1	12.7	71.0	57.2	20.0	28.1	0.2
HH that barter food	4.9	3.1	1.9	2.2	1.7	2.2	1.0	0.6	0.3	0.1
HH that sell food	1.7	1.5	1.7	1.9	1.6	1.8	2.3	0	0.5	0.8
HH that share food	74.4	73.1	75.8	70.9	67.5	28.3	29.7	28.3	30.6	24.7
Mean number of meals/snack child ate in prior day	1.9	1.9	1.8	2.0	2.1	3.4	3.4	3.3	3.5	3.5
Duration of ration use										
7 days or less				65.5	64.0				12.2	10.5
8-14				25.0	26.3				44.9	46.0
15-21				7.3	8.2				34.2	35.3
22-28				1.0	0.5				4.2	5.1
29 or more				1.3	1.0				4.5	3.1

*D, distribution

Tables 13 and 14 present the demographic, household and program indicators for each of the 5 distributions for the two evaluation areas. Strong consistency in responses was noted over time for all subjects included in the final analysis (children with plausible data and varying attendance at distributions).

Wristband acceptance was high in Turkana and consistently very low in Wajir. More than 99% of subjects returned with the green cohort card issued at enrollment for all the subsequent visits. Consistent responses were noted for family size and demographics, live-stock counts, socio-economic, health measures, and food security indicators.

Services provided in the BSFP were reflected with increasing rates of vitamin A and measles immunization coverage over the 5 distributions. There was a drop in vitamin A coverage in the second distribution in Wajir. It is unclear as to the exact reason for this decrease, but it may have been a reflection of a lack of vitamin A at the prior distribution. Widespread outages of micronutrient supplements, vaccines and associated supplies, including the cold chain were reported across BSFP implementation [(12)].

In Turkana, the BSFP ration lasted less than the planned 30 days. Approximately 90% of subjects reported that the ration lasted less than 14 days. Data from Wajir showed that 79% of respondents reported the ration to last anywhere between 8 to 21 days.

TABLE 15: PERCENT OF HOUSEHOLDS REPORTING FOOD AND NON-FOOD ASSISTANCE (IN ADDITION TO BSFP) AT EACH DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Category	**Turkana (N=1209) percent of households**					**Wajir (N=1266) percent of households**				
	D1*	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**	**D4**	**D5**
CSB†	4	4	2	1	1	54	26	5	<1	<1
Oil	12	9	7	8	7	63	39	16	6	<1
Cereals	17	14	12	15	9	45	40	15	22	<1
Pulse-beans	13	9	8	11	7	35	33	10	6	0
Plumpy'nut	1	<1	0	0	0	2	<1	<1	<1	0
Voucher	<1	0	0	0	0	<1	<1	<1	<1	0
Cash	1	2	3	2	2	1	6	2	<1	0
Other	0	<1	<1	<1	<1	17	15	3	15	0

*D, distribution; †CSB, corn soy blend

Data on non-BSFP assistance received by the households was collected, including food and non-food aid as shown in Table 15. Food-based assistance included CSB, oil, Plumpy'nut®, cereals, pulse-beans and non-food aid cash or vouchers. The receipt of additional food declined from the first to fifth distribution in both the counties and very few households reported the receipt of vouchers or cash in either county.

Weight-for-Height Z Score (WHZ) Changes

Table 16: Mean Weight-for-Height Z score (WHZ) of those attending all distributions, Turkana and Wajir Counties, August 2011-March 2012

	D1 Mean WHZ (95%CI)	D2 Mean WHZ (95%CI)	D3 Mean WHZ (95%CI)	D4 Mean WHZ (95%CI)	D5 Mean WHZ (95%CI)
Turkana (n=757)	-0.92(-0.99, -0.87)	-0.85 (-0.95,-0.76)	-0.81 (-0.90,-0.71)	-0.69 (-0.78,-0.60)	-0.70 (-0.79,-0.61)
Wajir (n=1012)	-0.89 (-0.95,-0.82)	-0.89 (-0.99, -0.80)	-1.00 (-1.10, -0.90)	-0.64 (-0.74, -0.53)	-0.51 (-0.64, -0.37)

The mean WHZ scores for each distribution in Turkana and Wajir Counties for those who *attended all distributions* are presented in Table 16. The mean WHZ ranged from a low of -0.92 at the first distribution to a high of -0.69 at the fourth distribution in Turkana. Overall, the means WHZ increased at each distribution, with a plateau at the final distribution. In Wajir, WHZ rose from -0.89 at the first distribution to a high of -0.52 at the fifth distribution. A statistically significant decrease in the mean WHZ was detected between the second to third distributions. Figures 5 and 6 are graphical representations of the data in table 16.

Figure 5: Change in Mean Weight-for-Height Z score (WHZ) of those attending all distributions, Turkana County, August 2011-March 2012

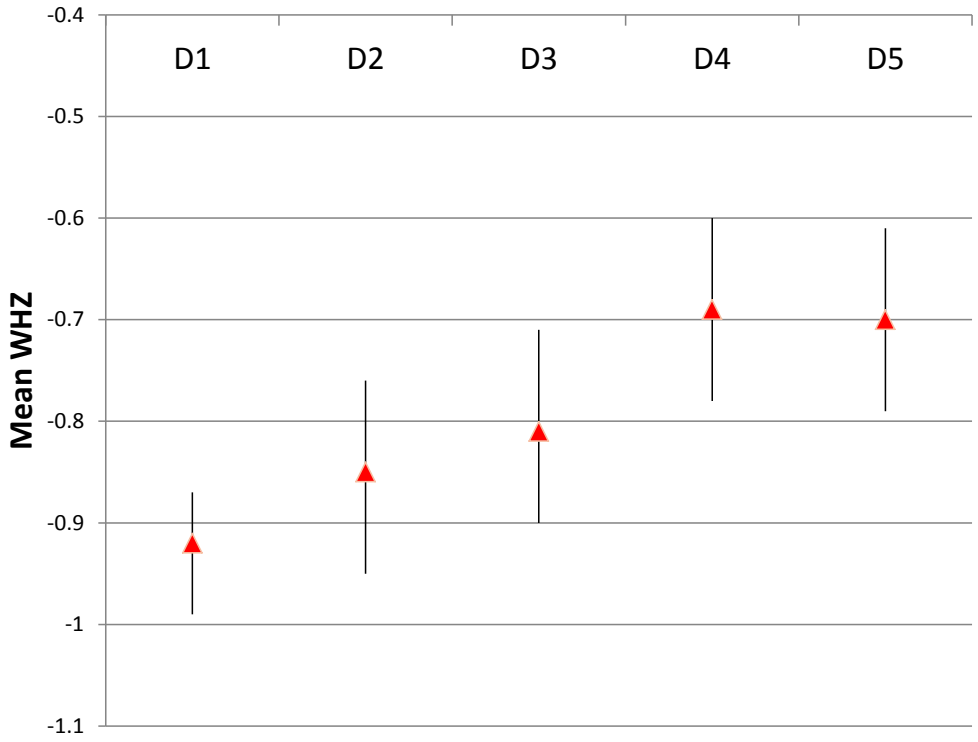


FIGURE 6: CHANGE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) SCORE OF THOSE ATTENDING ALL DISTRIBUTIONS, WAJIR COUNTY, AUGUST 2011-MARCH 2012

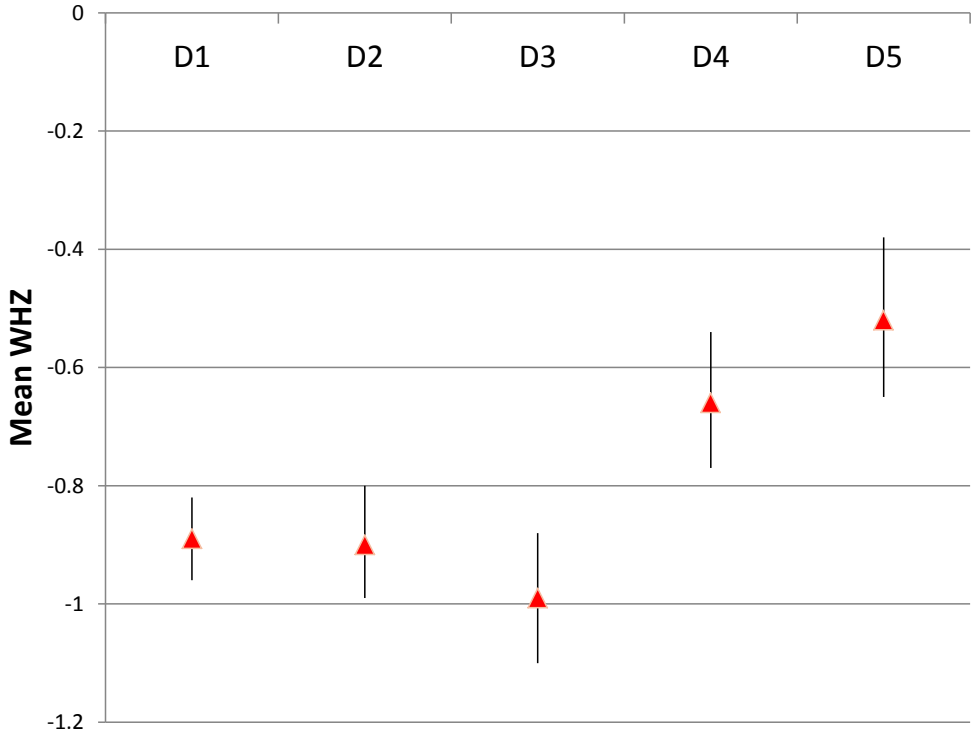


TABLE 17: CHANGE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) BETWEEN DISTRIBUTIONS OF THOSE ATTENDING ALL DISTRIBUTIONS, TURKANA, AUGUST 2011-MARCH 2012 (N=757)

Distribution (D)	Change in mean WHZ	95% CI	p-value[+]
From First Distribution			
D1 – 2	0.066	-0.011-0.144	0.09
D1 – 3	0.113	0.038-0.189	0.005*
D1 – 4	0.231	0.167-0.295	<0.001*
D1 – 5	0.218	0.150-0.286	<0.001*
Between Distributions			
D1 – 2	0.066	-0.011-0.144	0.09
D2 – 3	0.047	-0.024-0.119	0.188
D3 – 4	0.118	0.055-0.180	<0.001*
D4 – 5	-0.013	-0.086-0.061	0.725

[*] paired t-test

The changes in mean WHZ scores in Turkana were analyzed between successive distributions, as well as the change from the first distribution (baseline) (Table 17). A statistically significant ($p<0.001$) incremental change in mean WHZ was detected from distribution 3 (D3) to D4. While the change in WHZ from D1 to D2 was not significant, there was a significant change in the difference in mean WHZ from D1 to all other distributions.

TABLE 18: THE CHANGE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) BETWEEN DISTRIBUTIONS OF THOSE ATTENDING ALL DISTRIBUTIONS, WAJIR COUNTY, AUGUST 2011-MARCH 2012 (N=1012)

Distribution (D)	Change in mean	95% CI	p-value*
From first distribution			
D1 – 2	-0.004	-0.060 – 0.053	0.89
D1 – 3	-0.099	-0.196 – -0.004	0.04*
D1 – 4	0.234	0.146 – 0.323	<0.001*
D1 – 5	0.377	0.268 – 0.486	<0.001*
Between distributions			
D1 – 2	-0.004	-0.060 – 0.053	0.89
D2 – 3	-0.096	-0.187 – -0.006	0.04*
D3 – 4	0.334	0.241 - 0.428	<0.001*
D4 – 5	0.143	0.072 – 0.214	<0.001*

*paired t-test

Table 18 presents the same analysis for the Wajir cohort. The incremental change in mean WHZ detected in each subsequent distribution from the third distribution onwards both as compared with the preceding WHZ, as well as compared with the baseline (distribution 1) WHZ is statistically significant (p<0.001). The mean WHZ from the second to third distribution significantly (p<0.0.4) decreased.

FIGURE 7: BASELINE WEIGHT-FOR-HEIGHT Z SCORE BY SITE, TURKANA COUNTY, AUGUST 2011

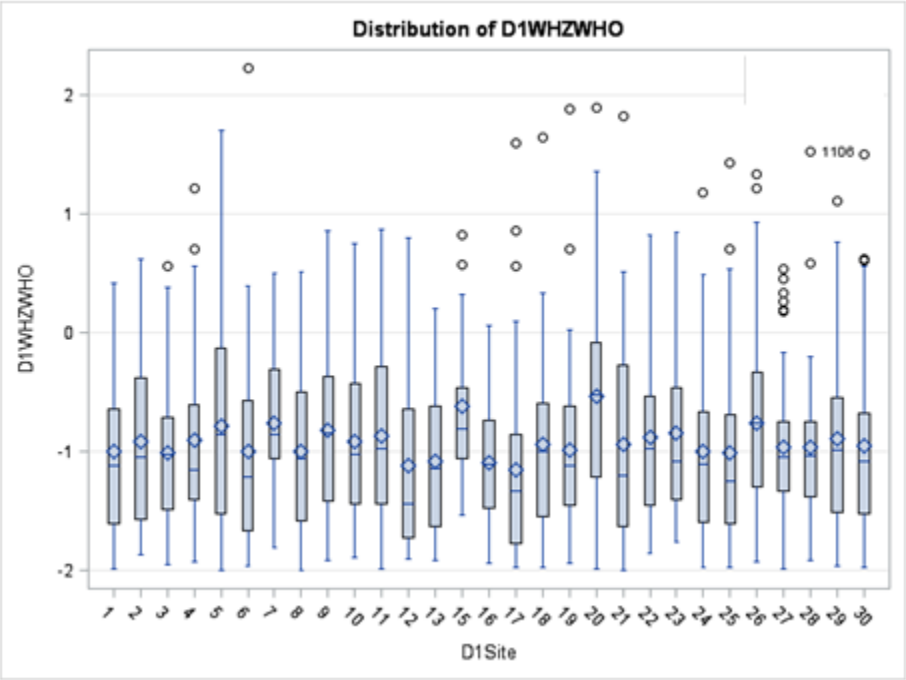


Figure 7 displays baseline WHZ by site for distributions in Turkana County. There was minimal variation in WHZ with all sites around a baseline WHZ of -1.

FIGURE 8: BASELINE WEIGHT-FOR-HEIGHT Z SCORE (WHZ) BY SITE, WAJIR COUNTY, AUGUST 2011

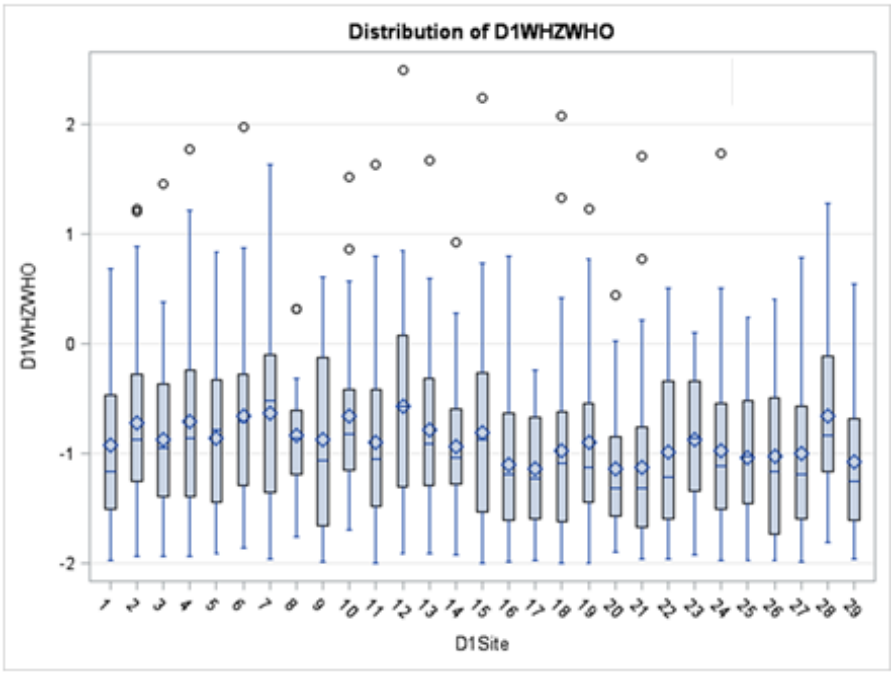


Figure 8 displays baseline WHZ by site for distributions in Wajir County. There was minimal variation in WHZ with all sites around a baseline WHZ of -1.

FIGURE 9: CHANGE IN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM FIRST (D1) TO FIFTH (D5) DISTRIBUTION BY SITE, TURKANA COUNTY, AUGUST 2011-MARCH 2012

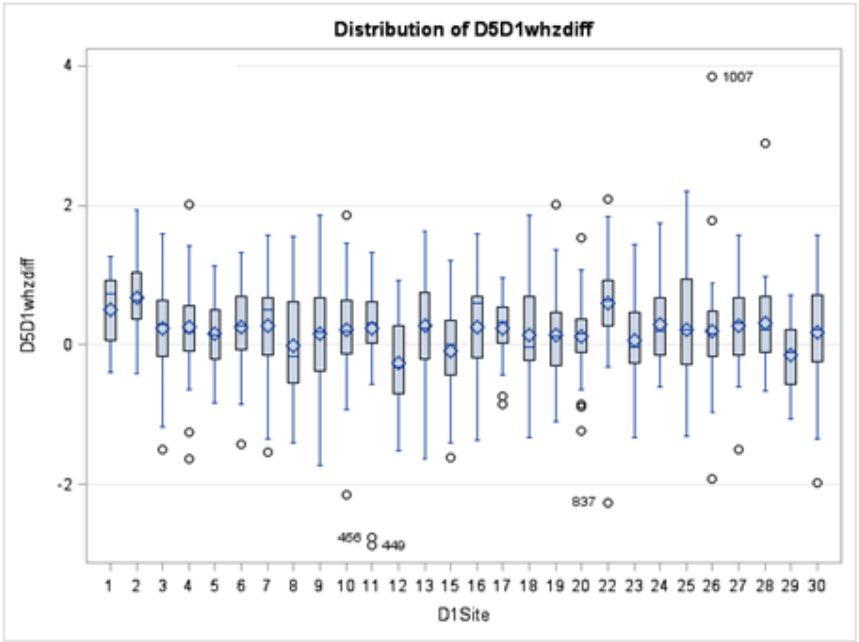


Figure 9 displays changes in WHZ from the first to fifth distributions by site for Turkana County. There is minimal variation in the measure. There are four sites (8, 12, 15, 29) with an overall change less than zero.

FIGURE 10: CHANGE IN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM FIRST (D1) TO FIFTH (D5) DISTRIBUTION BY SITE, WAJIR COUNTY, AUGUST 2011-MARCH 2012

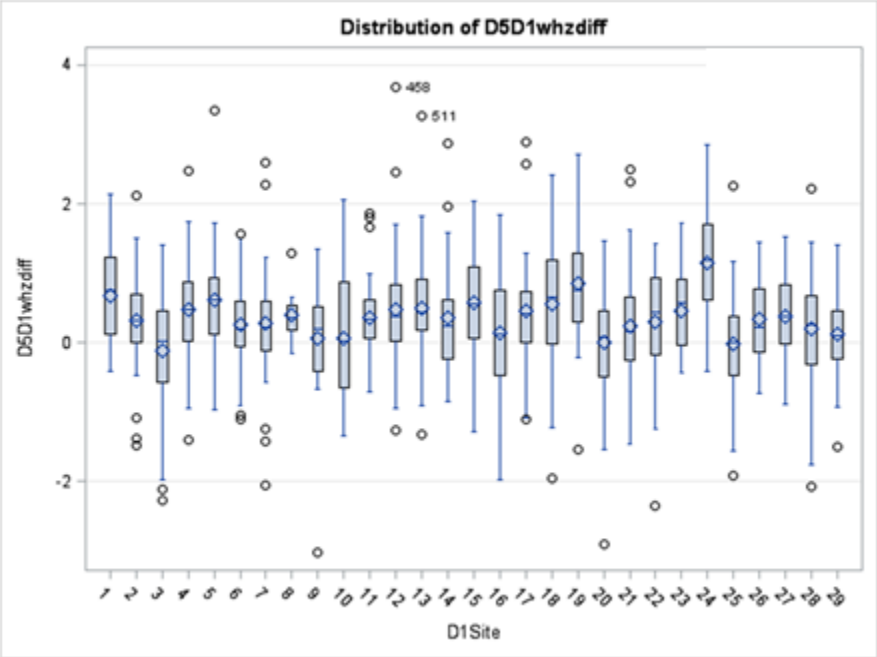


Figure 10 displays changes in WHZ from the first to fifth distributions by site for Wajir County. There is some variation in the measure. There were two sites (3 and 25) with an overall change less than zero.

MALNOURISHED CASES

TABLE 19: OCCURRENCE OF NEWLY MALNOURISHED CASES BY DISTRIBUTION AND CRITERION AMONG THOSE ATTENDING ALL DISTRIBUTIONS, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Distribution (D)	**Turkana (D1 n=757)**	**Wajir (D1 n=1012)**
D2 Never malnourished (n) =	757	1012
Malnourished by:	n (%)	n (%)
WHZ <-2 only	41 (5)	72 (7)
MUAC <12.5 only	4 (1)	1 (<1)
Oedema only	6 (1)	17 (2)
WHZ and MUAC	1 (1)	1 (<1)
MUAC and Oedema	0 (0)	0 (0)
WHZ and Oedema	0 (0)	1 (<1)
All three criteria	0 (0)	0 (0)
Total newly malnourished at D2	52 (6)	92 (9)
D3 Never malnourished (n) =	702	920
Malnourished by:	n (%)	n (%)
WHZ <-2 only	25 (3)	72 (7)
MUAC <12.5 only	0 (0)	4 (<1)
Oedema only	4 (1)	3 (<1)
WHZ and MUAC	2 (1)	9 (1)
MUAC and Oedema	0 (0)	0 (0)
WHZ and Oedema	0 (0)	2 (<1)
All three criteria	0 (0)	0 (0)
Total newly malnourished at D3	31 (4)	90 (9)
D4 Never malnourished (n) =	671	830
Malnourished by:	n (%)	n (%)
WHZ <-2 only	11 (1)	19 (2)
MUAC <12.5 only	3 (1)	2 (<1)
Oedema only	2 (1)	4 (<1)
WHZ and MUAC	1 (1)	0 (0)
MUAC and Oedema	0 (0)	0 (0)
WHZ and Oedema	0 (0)	0 (0)
All three criteria	0 (0)	0 (0)
Total newly malnourished at D4	17 (3)	25 (3)
D5 Never malnourished (n) =	654	805
Malnourished by:	n (%)	n (%)
WHZ <-2 only	9 (2)	11 (1)
MUAC <12.5 only	1 (1)	0 (0)
Oedema only	4 (1)	1 (<1)
WHZ and MUAC	2 (1)	0 (0)
MUAC and Oedema	0 (0)	0 (0)
WHZ and Oedema	0 (0)	0 (0)
All three criteria	0 (0)	0 (0)
Total newly malnourished at D5	16 (2)	12 (1)
Ever malnourished D2 – D5	**116 (15.3)**	**219 (21.6)**

Table 19 shows the number of incident cases of malnutrition at each distribution by classification of malnutrition. Of the 757 children included in the final analysis (children with plausible data and attendance at all distributions) for Turkana, 15% (116) became malnourished at any time during the BSFP intervention. The largest numbers of newly malnourished cases were seen at the second distribution with 6% (52) children developing malnutrition. The majority of cases of acute malnutrition were identified by a WHZ <-2.

Of the 1012 children included in the final analysis (children with plausible data and attendance at all distributions) for Wajir, 21.6% (219) became malnourished during the BSFP intervention. The largest numbers of newly malnourished cases were seen at the second and third distribution with 9% of children developing malnutrition at each distribution. The majority of cases of acute malnutrition were identified by a WHZ <-2.

FIGURE 11: CASES OF MALNUTRITION BY SITE, TURKANA COUNTY, AUGUST 2011-MARCH 2012

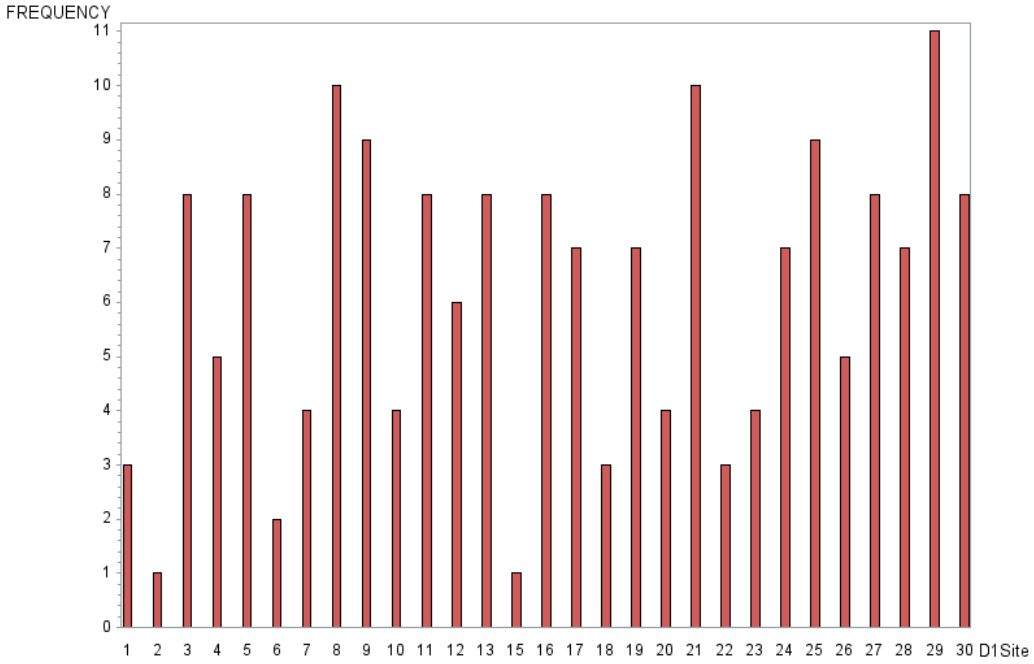


Figure 11 shows the number of incident cases of malnutrition from the first to last distributions by site, for Turkana County. There were no sites without cases of malnutrition, and there was significant variation in the number of cases of malnutrition per site, ranging from 1 to 11 cases.

FIGURE 12: CASES OF MALNUTRITION BY SITE, WAJIR COUNTY, AUGUST 2011-MARCH 2012

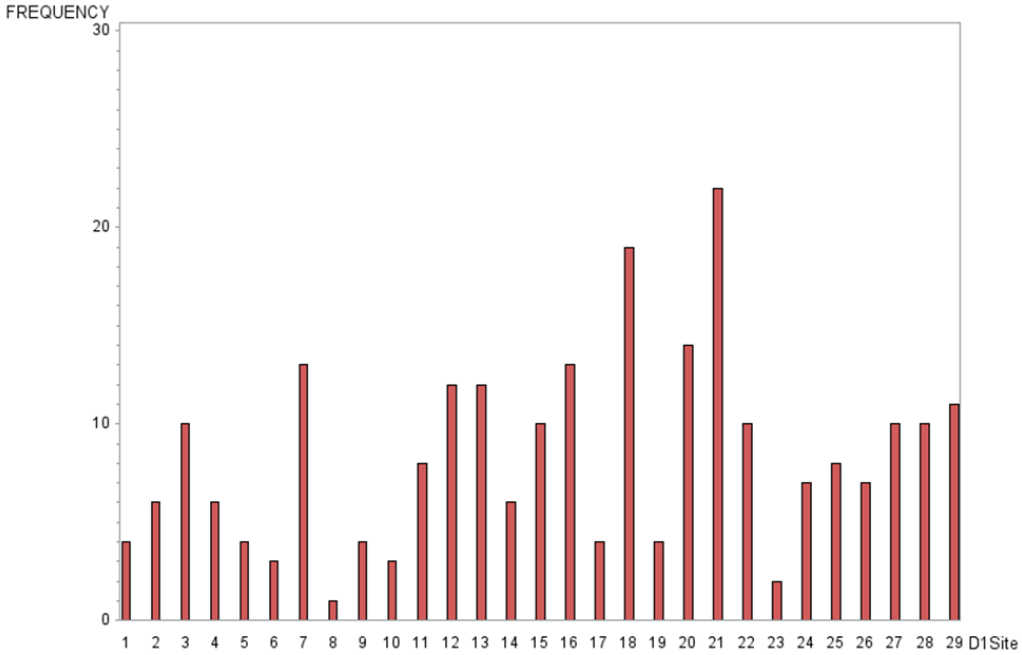


Figure 12 shows the number of incident cases of malnutrition from the first to last distributions by site, for Wajir County. There were no sites without cases of malnutrition, and there was significant variation in the number of cases of malnutrition per site, ranging from 1 to 23 cases.

TABLE 20: NUTRITIONAL STATUS OF MALNOURISHED SUBJECTS AT THE FOLLOWING DISTRIBUTIONS (DISTRIBUTIONS 2-5), TURKANA COUNTY, SEPTEMBER 2011-MARCH 2012*

Outcome at next distribution (D3,D4,D5) Status at prior distribution (D2,D3,D4)	Normal n (% of row)	Moderate n (% of row)	Severe n (% of row)
Moderate (n=86)	84 (98)	2 (2)	0
Severe (n=14)	14 (100)	0	0

*Including malnourished by WHZ, MUAC and/or Oedema

Table 20 presents information on children who became malnourished at any time from the second to fourth distribution and their subsequent nutritional status at the next distribution. Children who were malnourished and improved may have become malnourished again and two were counted more than once in this table. Of the 98 malnourished children identified between the second and fourth distributions who attended all distributions in Turkana, 86 (88%) were moderately malnourished and 14 (12%) were severely malnourished. Table 20 shows the outcome of these children as recorded in the immediate subsequent distribution. Of the 86 moderately malnourished children, 84 (98%) became normal, while 2 (2%) continued to be moderately malnourished. All 14 severely malnourished children improved to a normal nutritional status.

TABLE 21: NUTRITIONAL STATUS OF MALNOURISHED SUBJECTS AT THE FOLLOWING DISTRIBUTIONS, WAJIR COUNTY, SEPTEMBER 2011-MARCH 2012*

Outcome at next distribution (D3,D4,D5) Status at prior distribution (D2,D3,D4)	Normal n (% of row)	Moderate n (% of row)	Severe n (% of row)
Moderate (173)	93 (54)	72 (41)	8 (5)
Severe (40)	25 (63)	8 (20)	7 (17)

*Including malnourished by WHZ, MUAC and Oedema

Of the 213 malnourished children identified between the second and fourth distributions who attended all distributions in in Wajir, 173 (81%) were moderately malnourished and 40 (19%) were severely malnourished. Table 21 shows the outcome of these children as recorded in the immediate subsequent distribution. Of the 173 moderately malnourished children, 93 (54%) became normal, 72 (41%) continued to be moderately malnourished and 8 (5%) deteriorated to a severely malnourished status. The majority of the 40 severely malnourished children improved; 25 (63%) improved to a normal nutritional status and 8 (20%) improved to moderately malnourished; 7 (17%) continued to be severe.

TABLE 22: BASELINE DEMOGRAPHICS AND CHARACTERISTICS OF FINAL COHORT POPULATION (WITH PLAUSIBLE DATA) COMPARING THOSE NEVER MALNOURISHED WITH THOSE MALNOURISHED AT ANY DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011 THROUGH MARCH 2012

Characteristic	Turkana (N=757)			Wajir (N=1012)		
	n (%)	n (%)	p value	n (%)	n (%)	p value
	Never malnourished (n=641)	Malnourished at any time (n=116)		Never malnourished (n=793)	Malnourished at any time (n=219)	
Mean age (months)	26	26	0.61	25	25	0.92
Sex (female)	336 (52.4)	51 (44.0)	0.07	425 (53.6)	102 (46.6)	0.04*
Photo acceptance	640 (99.9)	115 (99.1)	0.17	399 (50.6)	117 (53.7)	0.52
Wristband acceptance	626 (97.7)	110 (95.7)	0.42	245 (31.6)	59 (27.7)	0.46
MUAC						
12.5 to 13.4	74 (11.5)	36 (31.0)	<0.001*	66 (8.3)	37 (16.9)	0.001*
≥13.5	567 (88.5)	80 (69.0)		727 (91.7)	182 (83.1)	
WHZ score						
-2 to -1.5	127 (19.8)	60 (51.7)	<0.001*	125 (15.8)	128 (58.4)	<0.001*
-1.5 to 1.0	173 (27.0)	38 (32.8)		203 (25.6)	56 (25.6)	
-1.0 to -0.5	168 (26.2)	11 (9.5)		200 (25.2)	17 (7.8)	
-0.5 to 0	86 (13.4)	2 (1.7)		146 (18.4)	9 (4.1)	
0 to 0.5	50 (7.8)	4 (3.4)		72 (9.1)	4 (1.8)	
0.5 or greater	37 (10.5)	1 (0.1)		47 (5.9)	5 (2.3)	
Mean travel time to distribution (minutes)	55	49	0.27	48	67	<0.001*
Mean household (HH) size	7.3	7.3	0.95	8.6	8.4	0.24
Mean number of under-3 year old children in HH	1.4	1.4	0.90	1.8	1.8	0.60
Mean number of under-5 year old children in HH	2.0	2.1	0.38	2.5	2.5	0.91
Mean number of HH animals alive	14	19	0.44	16	18	0.30
Mean number of HH animals that died in past 6 months	34	36	0.86	48	49	0.87
Mean monthly HH income spent on food (KSH)	954	959	0.97	4048	4331	0.63
Mean monthly HH income spent on non-food (KSH)	523	314	0.003*	1745	2157	0.38
Mean time to collect water (minutes)	63	65	0.85	36	35	0.63

HH using open field for defecation	587 (91.6)	105 (90.5)	0.67		588 (74.1)	177 (80.8)	0.18
Cohort children treated for malnutrition in past month (not currently)	18 (2.8)	4 (3.4)	0.67		26 (3.3)	13 (5.9)	0.07
HH with other children being treated for malnutrition	27 (4.2)	5 (4.3)	0.96		27 (3.4)	13 (5.9)	0.02*
Cohort children vaccinated for measles*			0.92				0.90
Yes by card	285 (44.4)	51 (44.0)			122 (15.4)	38 (17.4)	
Yes by recall	257 (40.1)	51 (44.0)			622 (78.4)	168 (76.7)	
No by card / recall	83 (12.9)	14 (12.1)			44 (5.5)	12 (5.5)	
Don't know	16 (2.5)	0 (0)			5 (<1)	1 (<1)	
Cohort children with Vitamin A within 6 months			0.82				0.87
Yes by card	268 (41.8)	51 (44.0)			121 (15.3)	36 (16.4)	
Yes by recall	298 (46.5)	56 (48.3)			623 (78.6)	166 (75.8)	
No by card / recall	60 (9.7)	9 (7.8)			44 (5.5)	16 (7.3)	
Don't know	15 (2.3)	0 (0)			5 (<1)	1 (<1)	
Cohort children sick within 2 weeks	417 (65.1)	69 (59.5)	0.28		347 (44.1)	97 (44.9)	0.86
Main source of food			-				-
Market purchase	347 (54.1)	57 (49.1)			390 (49.2)	99 (45.2)	
Own Production	185 (28.9)	31 (26.7)			15 (1.9)	4 (1.8)	
Provided by govt/agency	62 (9.7)	14 (12.1)			235 (29.6)	87 (39.7)	
HH receiving food from any other program	111 (17.5)	17 (14.8)	0.49		559 (70.5)	164 (76.3)	0.26
HH that barter food	26 (4.5)	8 (6.9)	0.06		20 (2.5)	2 (0.9)	0.16
HH that sell food	8 (1.3)	1 (0.1)	0.70		13 (1.7)	4 (1.9)	0.88
HH that share food	463 (74.7)	83 (72.8)	0.68		226 (28.8)	58 (27.0)	0.59
Mean number of meals/snack child ate in prior day	1.9	1.8	0.71		3.4	3.3	0.38
Dietary Diversity (Mean # items)	2.3	2.0	0.004*		2.2	2.1	<0.001*

Baseline WHZ at distribution 1 (D1)	-0.83	-1.40	<0.001*		-0.75	-1.40	<0.001*
WHZ Change from D1 to D5	0.27	-0.08	<0.001*		0.47	0.03	<0.001*
*statistically significant difference							

Table 22 compares the baseline demographics of children who came to all five distributions who maintained their nutritional status with those children who developed acute malnutrition during the BSFP. In Turkana, children developing acute malnutrition started the program with both a significantly lower MUAC and WHZ compared those who remained normal. Households of children developing malnutrition spent less of their income on non-food items, while spending similar amounts on food as those remaining normal, indicating that those household had fewer funds left for other expenses. Additionally, children who developed acute malnutrition had a significantly lower dietary diversity. In Wajir, children developing acute malnutrition started the program with both a significantly lower MUAC and WHZ compared with those who remained normal. Households of children developing malnutrition were more likely to have other children in the household being treated for malnutrition and had a longer travel time in minutes to the distribution site. Additionally, children who developed acute malnutrition had a significantly lower dietary diversity.

TABLE 23: MALNOURISHED CHILDREN BY BASELINE WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) (VULNERABLE VS. NON VULNERABLE), TURKANA AND WAJIR COUNTIES, AUGUST 2011 THROUGH MARCH 2012

Characteristic	Turkana				Wajir		
	n (% or row)	n (% or row)			n (% of row)	n (% of row)	
	Malnourished*	Non-malnourished	Total		Malnourished*	Non-malnourished	Total
Vulnerable (Baseline WHZ -2 to -1.5)	94 (32)	197 (67)	291		142 (47.8)	155 (52.2)	297
Non-vulnerable (Baseline WHZ ≥1.5)	84 (9)	834 (91)	918		101 (11.0)	814 (89.0)	915
Total	178 (15)	1031 (85)	1209		243 (20)	969 (80)	1212
p-value			<0.001				<0.001

*MALNOURISHED BY WHZ, MUAC, OR OEDEMA

Table 23 shows the proportion of children who were ever malnourished by their baseline WHZ classification. In Turkana, 32% of vulnerable (WHZ -2 to -1.5) became malnourished, compared with 9% of those with a baseline WHZ greater than -1.5. In Wajir, nearly 48% of vulnerable (WHZ -2 to -1.5) became malnourished, compared with 11% of those with a baseline WHZ greater than -1.5. Both of these differences were statistically significant.

Risk Factors for malnutrition

Table 24: Malnourished Children and Attendance at Prior Distribution, Turkana and Wajir Counties, August 2011 through March 2012

Characteristic	Turkana				Wajir		
	n (% or row) Malnourished*	n (% or row) Non-malnourished	Total		n (% of row) Malnourished*	n (% of row) Non-malnourished	Total
Missed Prior Distribution	14 (12)	106 (88)	120		6 (15)	35 (85)	41
Attended Prior Distribution	159 (15)	876 (85)	1035		236 (20)	921 (80)	1157
Total	173 (15)	982 (85)	1155		242 (20)	956 (80)	1198
p-value			0.35				0.28

*Malnourished by WHZ, MUAC, or oedema

Table 24 shows the proportion of children who were ever malnourished by their attendance at the prior distribution. Prior distribution was defined as the distribution immediately before the distribution at which they were identified as malnourished. These children were compared to non-malnourished children at the same distribution and their attendance at the prior distribution. In Turkana, 12% of those who missed the prior distribution became malnourished, compared with 15% of those who attended the prior distribution. In Wajir, 15% of those who missed the prior distribution became malnourished, compared with 20% of those who attended the prior distribution. Neither of these differences was statistically significant.

Table 25: Malnourished Children and Attendance at Subsequent Distribution, Turkana and Wajir Counties, August 2011 through March 2012

Characteristic	Turkana				Wajir		
	n (% or row) Malnourished*	n (% or row) Non-malnourished	Total		n (% of row) Malnourished*	n (% of row) Non-malnourished	Total
Missed Subsequent Distribution	43 (14)	254 (86)	297		12 (19)	51 (81)	63
Attended Subsequent Distribution	135 (15)	753 (85)	888		231 (20)	912 (80)	1143
Total	178 (15)	1007 (85)	1185		243 (20)	963 (80)	1206
p-value			0.35				0.78

*Malnourished by WHZ, MUAC, or oedema

Table 25 shows the proportion of children who were ever malnourished by their attendance at the subsequent distribution. Subsequent distribution was defined as the distribution immediately after the distribution at which they were identified as malnourished. These children were compared to non-malnourished children at the same distribution and their attendance at the next distribution. In Turkana, 14% of those who became malnourished missed the subsequent distribution, compared with 15% of those who attended the subsequent distribution. In Wajir, 19% of those who became malnourished missed the subsequent distribution, compared with 20% of those who attended the subsequent distribution. Neither of these differences was statistically significant.

Tables 24 and 25 suggest that occurrence of malnutrition was not related to attendance at the prior or subsequent distribution.

TABLE 26: INCIDENT CASES OF MALNUTRITION AND SELF-REPORTED TREATMENT AT SUBSEQUENT DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011 THROUGH MARCH 2012

	Turkana			Wajir		
Distribution (D) Malnourished status	**Treated by next distribution**	**Not treated by next distribution**	**p-value**	**Treated by next distribution**	**Not treated by next distribution**	**p-value**
D2						
Normal	37	842	0.52	30	900	0.39
Moderate	4	54		4	68	
Severe	0	8		0	22	
D3						
Normal	7	832	0.70	95	830	0.01†
Moderate	1	52		21	106	
Severe	0	10		5	14	
D4						
Normal	6	846	0.24	65	985	0.001†
Moderate	1	27		11	70	
Severe	0	6		4	9	

*WHZ, Weight-for-Height Z-score; †statistically significant

Incident cases of malnutrition from the second to fourth distributions, and subsequent reporting of treatment in the time until the next distribution, is shown in Table 26. In Turkana, a total of 6 (4%) of children who were moderately or severely malnourished reported being treated by the next distribution, compared with 157 children who were malnourished but did not report treatment. In Wajir, a total of 45 (16%) of children who were moderate or severely malnourished reported being treated by the next distribution, compared with 289 children who were malnourished but did not report treatment.

TABLE 27: INCIDENT CASES OF MALNUTRITION AND SELF-REPORTED TREATMENT AT SAME DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

	Turkana			Wajir		
Distribution (D) Malnourished Status	**Under treatment**	**Not under treatment**	**p-value**	**Under treatment**	**Not under treatment**	**p-value**
D2						
Normal	70	942	0.37	70	949	0.89
Moderate	4	68		5	71	
Severe	2	10		1	22	
D3						
Normal	42	901	0.51	31	913	0.04†
Moderate	4	52		10	121	
Severe	0	10		1	18	
D4						
Normal	37	937	0.34	69	1004	<0.0001†
Moderate	3	33		12	69	
Severe	0	6		5	9	
D5						
Normal	27	893	0.47	26	1072	0.13
Moderate	0	38		4	59	
Severe	0	12		0	9	

*WHZ, Weight-for-Height Z-score; † statistically significant

Incident cases of malnutrition from the second to fifth distributions, and reporting of current treatment for malnutrition is shown in Table 27. In Turkana, a total of 13 children who were moderately or severely malnourished reported being under treatment at the same distribution, compared with 219 children who were malnourished but did not report being under treatment. In Wajir, a total of 38 children who were moderately or severely malnourished reported being under treatment at the same distribution, compared with 378 children who were malnourished but did not report being under treatment. These differences were statistically significant in Wajir for distributions 3 and 4.

TABLE 28: COMPARISON IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) OF CHILDREN ATTENDING 5 DISTRIBUTIONS COMPARED WITH THOSE THAT MISSED AT LEAST 1 DISTRIBUTION, TURKANA COUNTY, AUGUST 2011-MARCH 2012

Distribution (D)	**Received all distributions [Mean WHZ (95% CI)]**	**Missed ≥1 distribution [n, Mean WHZ (95% CI)]**	**p-value**
Turkana	**N=757**		
D1	-0.92 (-0.99,-0.85)	n=452 -0.91 (-0.96,-0.86)	0.77
D2	-0.85 (-0.95,-0.76)	n=347 -0.87 (-0.97,-0.77)	0.69
D3	-0.81 (-0.90,-0.71)	n=257 -0.80 (-0.90,-0.71)	0.92
D4	-0.69 (-0.78,-0.60)	n=262 -0.71 (-0.79,-0.62)	0.66
D5	-0.70 (-0.79,-0.61)	n=214 -0.73 (-0.88,-0.59)	0.70
Wajir	**N=1012**		
D1	-0.89 (-0.96, -0.82)	n=200 -0.85 (-0.95, -0.74)	0.37
D2	-0.90 (-0.99, -0.80)	n=111 -0.84 (-1.03, -0.64)	0.54
D3	-0.99 (-1.10, -0.88)	n=84 -1.07 (-1.22, -0.93)	0.35
D4	-0.66 (-0.77, -0.54)	n=158 -0.49 (-0.68, -0.30)	0.09
D5	-0.52 (-0.65, -0.38)	n=160 -0.45 (-0.65, -0.24)	0.46

The mean WHZ between those who attended all five distributions with those who missed one or more distributions are compared in Table 28. In Turkana and Wajir, there were no significant differences in the mean WHZ score between the two groups at any distribution.

TABLE 29: MEAN CHANGE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) OF CHILDREN ATTENDING 5 DISTRIBUTIONS COMPARED TO THOSE THAT MISSED AT LEAST 1 DISTRIBUTION, WAJIR COUNTY, AUGUST 2011-MARCH 2012

Distributions (D)	Received all distributions [Mean WHZ (95% CI)]	Missed ≥1 distribution [n, Mean WHZ (95% CI)]	p-value
Turkana	**N=757**		
D1 to D2	0.07 (-0.01, 0.14)	n=347 0.03 (-0.04,0.11)	0.43
D1 to D3	0.11 (0.04,0.19)	n=257 0.16 (0.08, 0.25)	0.29
D1 to D4	0.23 (0.17, 0.30)	n=262 0.22 (0.14, 0.30)	0.83
D1 to D5	0.22 (0.15, 0.29)	n=214 0.14 (0.01, 0.28)	0.35
Wajir	**N=1012**		
D1 to D2	-0.01 (-0.06 – 0.05)	n=111 0.02 (-0.06, 0.11)	0.51
D1 to D3	-0.10 (-0.20 – -0.01)	n=84 -0.15 (-0.28, -0.03)	0.53
D1 to D4	0.23 (0.15 – 0.32)	n=158 0.34 (0.23, 0.47)	0.09
D1 to D5	0.38 (0.27 – 0.49)	n=160 0.39 (0.27, 0.52)	0.90

The changes in mean WHZ across distributions are compared in Table 29. Comparisons were made between those who attended all five distributions with those who missed one or more distributions. There was no significant difference in the change in mean WHZ between the two groups for any of the distribution pairs that were compared.

TABLE 30: CHANGE IN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) BY DISTRIBUTIONS MISSED BETWEEN FIRST AND LAST DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

County	Missed two or more distributions [Mean WHZ (95% CI)]	Missed one distribution [Mean WHZ (95% CI)]	Missed no distributions	p-value
Turkana	n=42 -0.05 (-0.43,0.33)	n=172 0.19 (0.07, 0.32)	n=757 0.22 (0.15,0.29)	0.10
Wajir	n=28 0.38 (0.07,0.68)	n=132 0.39 (0.19, 0.59)	n=1012 0.38 (0.27,0.49)	0.99

Table 30 shows there was no significant association between distribution attendance and change in WHZ between distribution 1 and 5. In Turkana, increased attendance was associated with increased WHZ score changes when comparing those who missed one distribution with those who missed two or more distributions; however, this difference was not statistically significant. In Wajir, the mean WHZ changes were nearly identical for children regardless of attendance.

TABLE 31: INCIDENT CASES OF MALNUTRITION BY DELAY IN NEXT DISTRIBUTION AT NEXT VISIT FROM FIRST TO FIFTH DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Characteristic	Turkana			Wajir		
	n (% or row)	n (% or row)		n (% of row)	n (% of row)	
	Malnourished*	Never Malnourished	Total	Malnourished (n=793)	Never Malnourished (n=219)	Total
Delayed (More than 30 days since prior)	144 (5)	2860 (95)	3004	39 (5)	685 (95)	724
On-time (30 days or less since prior)	29 (3)	815 (97)	844	204 (6)	3450 (94)	3654
Total	173	3675	3848	243	4135	4378
p-value			0.09			0.83

*MALNOURISHED BY WHZ, MUAC, OR OEDEMA

Table 31 examines the relationship between delays in distributions beyond 30 days and the incidence of malnutrition during the evaluation period. In Turkana, 5% of those who attended delayed distributions were malnourished compared with 3% of those who attended on-time distributions; this difference was not statistically significant. In Wajir, 5% of those who attended delayed distributions were malnourished, compared with 6% of those who attended on-time distributions.

TABLE 32: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) BY DELAY* IN RATION DISTRIBUTION FOR EACH DISTRIBUTION PERIOD, TURKANA AND WAJIR COUNTIES, AUGUST 2011-MARCH 2012

Distributions (D)	Non-delayed [Mean (95% CI)]	Delayed [Mean (95% CI)]	p-value
Turkana (n=757)			
D1 to D2	n=210 0.15 (0.06, 0.25)	n=547 -0.03 (-0.06, 0.13)	0.08
D2 to D3	All delayed		NA
D3 to D4	All delayed		NA
D4 to D5	n=557 -0.01 (-0.09, -0.06)	n=200 -0.01 (-0.20, 0.18)	0.96
Wajir (n=1012)			
D1 to D2	n=786 -0.02 (-0.09, 0.04)	n=226 0.06 (-0.04, 0.17)	0.16
D2 to D3	All delayed		NA
D3 to D4	n=109 0.08 (-0.06, 0.23)	n=903 0.36 (0.27, 0.46)	0.002*
D4 to D5	n-258 0.06 (-0.01, 0.12)	n=754 0.17 (0.08, 0.26)	0.04*

*significantly different

Table 32 compares the WHZ changes between successive distributions based on occurrence of distribution delay. The delay within distribution cycles varied among sites (i.e., not all sites had the same delay). A distribution gap of greater than 30 days between two successive distributions was considered as a delayed distribution. Caution should be used in interpreting these data as the numbers were quite small. This is an area of analysis which needs

further exploration. The effect of delay of the distribution in the nutrition status of children who attended all distributions did not yield a clear pattern.

For Turkana, a non-statistically significant difference was noted for WHZ change from the first to second distribution with an increase in WHZ by 0.15 among those who did not have a delay compared with a decrease by 0.03 among those who had a delay. However, by distribution five, the delay seemed to translate to a slight increase in nutritional status.

For Wajir, all the sites had a delay for distribution 3 thus no comparisons could be made. The delays of distributions four and five were counter-intuitively associated with a better nutritional status. These differences were statistically significant.

TABLE 33: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) OF CHILDREN ALWAYS REPORTING ILLNESS (AT ALL FIVE DISTRIBUTIONS) COMPARED WITH THOSE NOT ALWAYS REPORTING ILLNESS FROM THE FIRST TO FIFTH DISTRIBUTION, TURKANA AND WAJIR COUNTIES, AUGUST 2011 THROUGH MARCH 2012

County	Never or sometimes sick [Mean (95% CI)]	Always sick [Mean (95% CI)]	p-value
Turkana	n=641 0.22 (0.15, 0.29)	n=116 0.20 (0.05, 0.35)	0.69
Wajir	n=964 0.38 (0.28, 0.50)	n=48 0.18 (-0.13, 0.49)	0.18

Table 33 shows there was no apparent association between occurrence of sickness in the past two weeks with a change in WHZ between the first and fifth distributions. In Turkana, the mean change of 0.22 for children who were never or sometimes sick was higher than those that were always sick, however this difference was not statistically significant. In Wajir, the mean change of 0.38 for children who were never or sometimes sick was higher than those who were always sick (mean change = 0.18), however this difference was not statistically significant.

TABLE 34: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY HOUSEHOLDS REPORTING OTHER FOOD-AID AND ASSISTANCE AT BASELINE, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	Did not receive food-aid at D1 [Mean (95% CI)]	Received food-aid at D1 [Mean (95% CI)]	p-value
Turkana	n=621 0.22 (0.14, 0.29)	n=128 0.21 (0.10, 0.32)	0.88
Wajir	n=723 0.35 (0.25, 0.45)	n=270 0.45 (0.21, 0.69)	0.42

Table 34 shows that receiving food aid from other sources had no association to change in WHZ between the first and fifth distributions. In Turkana, the mean WHZ change was the same among households receiving food aid or assistance from other sources as those that never received food aid or assistance. In Wajir, the mean WHZ change of 0.35 for households ever receiving food aid or assistance was lower than the 0.45 for households that never received food aid; however, this difference was not statistically significant.

TABLE 35: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BASED ON HOUSEHOLD SIZE, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	Household size 1-5 [Mean WHZ (95% CI)]	Household size 6-10 [Mean WHZ (95% CI)]	Household size 11+ [Mean WHZ (95% CI)]	p-value
Turkana	n=206 0.23 (0.12, 0.35)	n=502 0.21 (0.13, 0.29)	n=46 0.28 (0.11,0.46)	0.68
Wajir	n=155 0.31 (0.12, 0.51)	n=643 0.39 (0.27, 0.51)	n=196 0.38 (0.23, 0.53)	0.66

Table 35 shows there was no association between change in WHZ between the first and fifth distributions and household size. In Turkana, the mean change was similar for households with 1-5 persons as compared with the mean change for households with more than 5 people.

In Wajir, the mean change for households with size 1-5 (0.31) was lower compared with 0.38 for households with more than 5 people; however this difference was not statistically significant.

TABLE 36: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY THE NUMBER OF UNDER-3 YEAR OLD CHILDREN IN THE HOUSEHOLD, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	1 child under 3 years old [Mean WHZ (95% CI)]	More than 1 child under 3 years old [Mean WHZ (95% CI)]	p-value
Turkana	n=464 0.22 (0.15, 0.30)	n=285 0.22 (0.14, 0.31)	0.96
Wajir	n=334 0.37 (0.23, 0.51)	n=672 0.38 (0.26, 0.50)	0.90

Table 36 shows there was no association between change in WHZ between the first and fifth distributions and the number of children under three years of age in the household. In Turkana and Wajir, the mean change was same for households with one child under three years old as compared to the mean change for households with more than one child under three years of age, 0.22 and 0.37 to 0.38, respectively.

TABLE 37: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY NUMBER OF UNDER-5 CHILDREN IN THE HOUSEHOLD, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	1 child under 5 years old [Mean WHZ (95% CI)]	More than 1 child under 5 years old [Mean WHZ (95% CI)]	p-value
Turkana	n=203 0.17 (0.08, 0.26)	n=546 0.24 (0.16, 0.32)	0.20
Wajir	n=121 0.46 (0.29, 0.63)	n=885 0.37 (0.26, 0.48)	0.17

Table 37 shows there was no association between changes in WHZ between the first and fifth distributions and the number of children under 5-5 children in the household. In Turkana, the mean WHZ change of 0.17 for households

with one child under five years of age was lower than 0.24 in households with more than one child under five years of age; however, this difference was not statistically significant.

In Wajir, the mean change of 0.46 for households with one child under five years of age was higher than 0.37 in households with more than one child under five years of age; however, this difference was not statistically significant.

TABLE 38: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY CAREGIVER AT BASELINE, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	**Parent Caregiver [Mean WHZ (95% CI)]**	**Non-parent caregiver [Mean WHZ (95% CI)]**	**p-value**
Turkana	n=678 0.21 (0.14, 0.29)	n=77 0.26 (0.12, 0.40)	0.57
Wajir	n=983 0.39 (0.28, 0.49)	n=27 0.11 (-0.25, 0.47)	0.02*

*significantly different

Table 38 shows the association between changes in WHZ between the first and fifth distributions and the primary caregiver of the cohort child (parent vs. non-parent). In Turkana, the mean WHZ change of 0.21 for households with a parent caregiver was lower than 0.26 in households with a non-parent caregiver; however, this difference was not statistically significant. In Wajir, the mean change of 0.39 for household with a parent caregiver was significantly higher than the mean change of 0.11 in households with a non-parent caregiver.

TABLE 39: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY BREASTFEEDING AT BASELINE, ALL AGE GROUPS, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	**Breastfed at First Distribution [Mean WHZ (95% CI)]**	**Not Breastfed [Mean WHZ (95% CI)]**	**p-value**
Turkana	n=269 0.18 (0.07, 0.29)	n=485 0.24 (0.17, 0.31)	0.19
Wajir	n=240 0.54 (0.39, 0.69)	n=755 0.33 (0.21, 0.44)	<0.001*

*significantly different

Table 39 shows the association between changes in WHZ between the first and fifth distributions and breastfeeding at baseline (first distribution). In Turkana, the mean WHZ change of 0.18 for breastfed children was non-significantly lower than 0.24 for non-breastfed children. In Wajir, the mean change of 0.54 for breastfed children was significantly higher than 0.33 for non-breastfed children.

TABLE 40: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY MEASLES VACCINATION HISTORY AT BASELINE, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	Measles vaccine by First Distribution [Mean WHZ (95% CI)]	No Measles vaccine by First Distribution [Mean WHZ (95% CI)]	p-value
Turkana	n=644 0.23 (0.16, 0.29)	n=97 0.12 (-0.01, 0.25)	0.12
Wajir	n=950 0.38 (0.27, 0.49)	n=56 0.37 (0.01, 0.73)	0.96

Table 40 shows the association between changes in WHZ score between the first and fifth distributions and measles vaccination at baseline (first distribution). Both locations had a small proportion of children who were not vaccinated at baseline. In Turkana, the mean WHZ change of 0.23 for children with baseline measles vaccination (by card or recall) was non-significantly higher than 0.12 for non-vaccinated children. In Wajir, the mean change of 0.38 for children with baseline measles vaccination (by card or recall) was nearly equal to the 0.37 for non-vaccinated children.

TABLE 41: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY SIX MONTH VITAMIN A HISTORY AT BASELINE, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	Recent Vitamin A by First Distribution [Mean WHZ (95% CI)]	No recent Vitamin A by First Distribution [Mean WHZ (95% CI)]	p-value
Turkana	n=673 0.22 (0.15, 0.28)	n=69 0.16 (-0.02, 0.34)	0.44
Wajir	n=946 0.38 (0.27, 0.49)	n=60 0.32 (0.06, 0.58)	0.55

Table 41 shows the association between changes in WHZ between the first and fifth distributions and Vitamin A within prior six months at baseline (first distribution). Both locations had a small proportion of children who reported no recent history of Vitamin A administration by baseline. In Turkana, the mean WHZ change of 0.22 for children with baseline measles vaccination (by card or recall) was non-significantly higher than 0.16 for non-vaccinated children. In Wajir, the mean change of 0.38 for children with baseline measles vaccination (by card or recall) was also non-significantly higher than the 0.32 for non-vaccinated children.

TABLE 42: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) DISTRIBUTION 1 TO DISTRIBUTION 5 CHANGE BY HOUSEHOLDS SELF-REPORTING SHARING OF RATION, TURKANA AND WAJIR COUNTIES, AUGUST 2011 THROUGH MARCH 2012

County	Never shared ration [Mean WHZ (95% CI)]	Ever shared ration [Mean WHZ (95% CI)]	p-value
Turkana	n=188 0.21 (0.11, 0.32)	n=546 0.22 (0.14, 0.30)	0.92
Wajir	n=284 0.36 (0.26, 0.47)	n=716 0.39 (0.26, 0.51)	0.66

Table 42 shows there was no apparent association between sharing rations outside of the household with a change in WHZ between distributions one and five. In Turkana, the mean HWZ changes in WHZ score were nearly identical for those who share and did not share rations. In Wajir, the mean change in WHZ was also similar for both groups.

TABLE 43: DIFFERENCE IN MEAN WEIGHT-FOR-HEIGHT Z-SCORE (WHZ) FROM THE FIRST TO FIFTH DISTRIBUTION BY DIETARY DIVERSITY (# OF ITEMS) AT BASELINE, TURKANA AND WAJIR COUNTIES, AUGUST 2011 AND MARCH 2012

County	0-2 food types at First Distribution [Mean (95% CI)]	3 or more food types at First Distribution [Mean (95% CI)]	p-value
Turkana	n=508 0.21 (0.14, 0.29)	n=249 0.23 (0.12, 0.33)	0.83
Wajir	n=698 0.40 (0.28, 0.53)	n=314 0.32 (0.21, 0.44)	0.13

Table 43 shows there was no apparent association between prior day dietary diversity with a change in WHZ between distributions one and five. In Turkana the mean changes in WHZ score were nearly identical for those who with low and high dietary diversity. In Wajir, the mean change in WHZ was less similar for both groups, but neither difference was statistically significant.

Multivariate Analysis

Table 44: Baseline Child, Household, and Distribution Characteristics and Incident Cases of Malnutrition, Turkana County, August 2011 and March 2012

Risk Factor at Baseline	Adjusted Odds Ratio (95% CI)*	p-value
Sex		
Male	1.0**	0.04†
Female	0.71 (0.51-0.98)	
Age		
Greater than 24 months	1.0**	0.01†
24 months or less	0.57 (0.37-0.88)	
Child breastfed at baseline		
No	1.0**	0.01†
Yes	1.79 (1.16-2.74)	
Dietary Diversity		
Each additional 1 item	0.85 (0.74-0.97)	0.01†
Child ill within prior 2 weeks before baseline visit		
No	1.0**	0.02†
Yes	0.63 (0.42-0.93)	
Baseline WHZ		
Greater than -1.5	1.0**	<0.001†
-2 to -1.5	5.19 (3.78-7.12)	

*Adjusted Odds Ratios were adjusted for all other LISTED VARIABLES in the model and interaction terms.

†Statistically significant

**This group served as the reference group

Table 44 shows the results of multivariate logistic regression models for sample survey data analysis for Turkana County. Baseline child, household, and distribution characteristics were modeled as independent predictors for incident malnutrition as defined as the first distribution when a child was identified by any measure of acute malnutrition (WHZ score of <-2 standard deviations, a MUAC <125 mm or the presence of bilateral pitting oedema). In Turkana, female sex (aOR=0.71 [0.51-0.98]), age 24 months or less (aOR=0.57 [0.37-0.88]), dietary diversity (aOR=0.85 [0.74-0.97]), and recent child illness within 2 weeks prior to baseline visit (aOR=0.63 [0.42-0.93]) were all significant protective factors for the development of malnutrition. Conversely, breastfeeding at baseline (aOR=1.79 [1.16-2.74]) and baseline WHZ score -2 to -1.5 (aOR=5.19[3.78-7.12]) were significant risk factors for the subsequent development of malnutrition. Overall, low baseline WHZ score had the strongest relationship with the malnutrition during the distribution period.

TABLE 45: BASELINE CHILD, HOUSEHOLD, AND DISTRIBUTION CHARACTERISTICS AND INCIDENT CASES OF MALNUTRITION, WAJIR COUNTY, AUGUST 2011 AND MARCH 2012

Risk Factor at Baseline	Adjusted Odds Ratio (95% CI)*	p-value
Sex		
Male	1.0**	0.66
Female	0.95 (0.74-1.21)	
Age		
Greater than 24 months	1.0**	0.05
24 months or less	1.34 (1.01-1.79)	
Any other child in the HH malnourished		0.04†
No	1.0**	
Yes	1.73 (1.02-2.92)	
Open defecation		
No	1.0**	0.05
Yes	1.55 (1.01-2.39)	
Baseline WHZ score		
Greater than -1.5	1.0**	<0.001†
-2 to -1.5	7.46 (5.26-10.58)	

*ADJUSTED ODDS RATIOS WERE ADJUSTED FOR ALL LISTED OTHER VARIABLES IN THE MODEL AND INTERACTION TERMS.
†STATISTICALLY SIGNIFICANT
**THIS GROUP SERVED AS THE REFERENCE GROUP

Table 45 shows the results of multivariate regression analysis based on logistic regression models for sample survey data analysis for Wajir County. Baseline child, household, and distribution characteristics were modeled as independent predictors for Incident malnutrition as defined as the first distribution when a child was identified by any measure of acute malnutrition (WHZ score of <-2 standard deviations, a MUAC <125 mm or the presence of bilateral pitting oedema). In Wajir, the baseline presence of another child in the household who was being treated for malnutrition (aOR=1.73 [1.02-2.92]) and the primary practice of open defecation (aOR=1.55 [1.01-2.39]) were both statistically significant risk factors for the subsequent development of malnutrition. Younger age at baseline was also a risk factor, with children 24 months or less having an elevated risk of malnutrition (aOR=1.34 [1.01-1.79]). Low baseline WHZ score was strongly associated with the development of malnutrition. Children in the vulnerable group of baseline WHZ score from -2 to -1.5 had over seven times (aOR=7.46 (5.26-10.58]) greater odds than those with a baseline WHZ greater than 1.5 to subsequently develop malnutrition at any time in the program period. Overall, multivariate logistic regression models of Wajir data showed that lower baseline WHZ score was the strongest measured risk factor for subsequent development of malnutrition.

DISCUSSION

In 2011, Kenya experienced a critical nutrition emergency based on surveys showing high rates of global acute malnutrition. A large-scale BSFP was implemented that reached 641,000 children and women: standard programming in nutrition emergencies. The evaluation of BSFP is methodologically difficult largely because of the inherent design of BSFP where individuals are not followed and the lack of a control comparison group. The effect of the absence of a BSFP is unknown since the entire child population received the intervention. Additionally, the BSFP in northern Kenya was an integrated program with a ration and a package of interventions including immunizations, vitamin A, deworming, and health education. Finally, there are many potential confounders at the child, household, and regional levels. All of these reasons present significant challenges to conducting rigorous evaluations of such programs.

The analysis presented in this report takes a conservative approach. If an individual had one implausible value in an anthropometric measure or index at any visit, they were excluded from analysis. Overall, there was high quality data. Despite the exclusion of children from the cohort, we were still able to achieve the desired target sample size of 900 children per county. After removing implausible values, the number of children in Turkana was less than the goal 900. Further analysis was conducted on a subset of children attending all distributions.

Several measures to minimize child substitution were instituted. Overall, the people of Turkana and Wajir were very accepting of strategies used to identify children, such as photographs and cohort cards, and cooperated well with the evaluation as evident by the high recapture rate. Photograph acceptance in Wajir was initially low, but increased in subsequent distributions. Wristband acceptance was varied by county. Feasible and inexpensive methods to reduce child substitution were identified in this evaluation; however these must be tailored to the specific context.

The use of evaluation teams separate from the distribution teams allowed for dedication to the specific task and identification of children. However, the evaluation teams need to be closely linked to the food distribution teams because of the dynamic nature of program implementation. The use of local staff for data collection and entry resulted in good to excellent quality data, but implausible measures were still present which may reflect measurement error or child substitution. Despite this, those who had implausible data did not appear to be significantly different than those with valid measures with regard to child and household characteristics. Strong field supervision with feedback and refresher trainings was essential for maintaining data quality, especially in extended programs. Heavy external supervision was provided for the first three distributions until the deteriorating security situation resulted in the evacuation of CDC staff; local staff effectively ran the evaluation after this point. Continual contact between the field, CDC Atlanta and WFP Nairobi assisted in the use of consistent evaluation methodology and follow-up.

The implementation of BSFP was challenging. This evaluation assessed the BSFP as it was actually implemented. Our data highlighted issues with the application of admission criteria into the program where 20% and 25% of children in the cohort were ineligible by height or age in Turkana and Wajir, respectively. The BSFP program was designed as five monthly distributions, but challenges such as insecurity, coordination, inconsistent food pipeline, and transport difficulties led to delays in ration distribution, which were not unique to this program. In this evaluation, the majority of sites had long intervals between distributions. The effect of delays on nutritional status was not consistent and should be carefully interpreted.

As expected, not all children attended all five distributions, which may reflect movement, lack of awareness of the distribution date, or lack of need for supplementary food or perceived value of the program. Only 1.5% (18) and

0.3% (4) children in Turkana and Wajir, respectively, were completely lost to follow-up. At the fifth distribution 18.9% (262) and 6.7% (94) children in Turkana and Wajir, respectively, did not attend the distribution and their status was unknown. An important finding was distance affected attendance, albeit not statistically significant; those who missed distributions in Turkana and Wajir had longer travel times to the distribution point. Distance to a distribution site can be addressed in the program planning. In Wajir, wealth appeared to be a factor influencing attendance, with households of higher socio-economic status (by proxy indicators) attending fewer distributions.

Clearly, the situation in these counties was not static, and overall household indicators improved from the first distribution to the last distribution. This includes immunization rates (itself a BSFP intervention), and child morbidity reductions. A key finding was that the ration was consumed in less than 30 days; over half of households reported that the ration lasted less than 2 weeks in both Turkana and Wajir Counties. Although this is not a new finding in ration based programs, nevertheless it is important to consider in the analysis and interpretation of the data.

Our primary goal was to evaluate the impact of the BSFP as a whole integrated package (ration, immunization, systematic treatment, and education) on preventing deterioration in nutritional status among children 6-36 months of age. This entailed specifically using WHZ, MUAC and presence of bilateral oedema for outcome determination. These results suggest that children enrolled in BSFP experienced an overall improvement, not a decline in nutritional status by WHZ. This improvement was significant from the first to the last distribution in each county.

The results of the analysis provide a detailed look at the cohort children in Turkana and Wajir over an eight month period. While there are many remarkable findings, as expected it is impossible to fully attribute these findings to BSFP. In addition to the receipt of BSFP, there were a number of factors which could influence the nutritional status of the cohort over time. In both Turkana and Wajir Counties, there was a slight improvement at the household level, with reduction in the proportion of the income spent on food with an increase in the percentage of food bought in the market. It is important to assess the impact of other programs, such a food security data and the effect of the short rain in relation to the cohort data. Immediately preceding and during part of the third distribution in Wajir there was significant rainfall leading to localized flooding and an increase in morbidity as well as a decrease in the mean WHZ. After the short rains which largely occurred between the first and second distributions, improved pasture, water sources and access to milk followed as well as a significant increase in mean WHZ. Improving food security and pasture and animal condition could have had a substantial effect on the nutritional status of this population.

Attendance did not appear to affect nutritional status. There was no difference in nutritional status between those who attended all distributions and those who missed at least one distribution; however, a small percentage of children missed distributions. Sharing of food, recent illness, receipt of other food aid, household size, and presence of other children in the household did not appear to be associated with differences in WHZ score.

Despite the overall improvement in WHZ score, a subset of children attending all distributions (15% in Turkana, 21% in Wajir) developed malnutrition at any distribution, mostly classified using the WHZ threshold for malnutrition. In both Turkana and Wajir, children who developed acute malnutrition were more likely to have a lower WHZ or MUAC upon enrollment and a lower dietary diversity. In general, some malnourished children will spontaneously recover to a normal nutritional status and this happened in both counties. In both Turkana and Wajir, very few malnourished children reported treatment in the prior month or that they were currently in treatment. Once they became malnourished, the majority improved to normal nutritional status at the next distribution in both counties, although the rate was much higher (98% vs. 54% for moderately malnourished and

100% vs. 63% for severely malnourished) in Turkana County compared with Wajir County. This occurred despite the fact that most children were not enrolled in selective feeding programs.

Risk factors for developing acute malnutrition while enrolled in the BSFP varied by County, highlighting the complexity of implementing standardized BSFP across large geographic areas and diverse populations). Overall, the inconsistency between significant risk factors by location may be due to spurious associations expected when examining a large number of variables in a statistical model. Clearly, children in a vulnerable group (low baseline WHZ score) were at significant risk for subsequent malnutrition.

Several questions were identified during analysis. A key question addresses the development of acute malnutrition. There will always be a number of children who develop acute malnutrition despite the presence of interventions; the question that presents itself is what is an acceptable level of malnutrition in a BSFP? We do not have consensus or guidance on this question. The absence of established benchmarks for both of our outcome indicators (change in WHZ score and incident malnutrition) make evaluation of BSFP program effectiveness difficult to qualify. Change in WHZ score is also difficult to easily interpret. The change in WHZ score we sought to detect (0.15) was based on prior evaluations, not biologically meaningful changes. The absence of a clear threshold for acceptable change in WHZ score makes interpretation and evaluation of the observed changes difficult. Finally, given the complexity of BSFP and the implementation of the strategy, what is the best evaluation methodology for BSFP?

LIMITATIONS

There are a number of limitations in this evaluation:

1. Evaluation Design: The gold standard for demonstrating impact is a randomized controlled trial where children would randomly be assigned to receive a ration or not. This was not possible as this was a population-level intervention and all children within the target group were eligible to receive the ration. As well, it would be unethical and unpractical to withhold supplementary rations from populations already identified as vulnerable and in need of emergency assistance.
2. Selection of sites: Distribution sites identified as insecure or purely pastoral were excluded from the sampling frame. The data presented in this evaluation were not representative of the entire county population. BSFP may have impacted these populations differently.
3. Selection of cohort: Ideally, the cohort should have been chosen prior to the distribution to have a true representation of the population. Feasibly this was not possible. The cohort was selected from those children presenting at the first distribution. There may have been some selection bias if this group was different from those who did not present at the first distribution. Therefore, translation of the results to the underlying population needs to take into account coverage and possible factors affecting participation to the first distribution. Selection was also based on prior estimates of the number of beneficiaries at each distribution. If the actual number of beneficiaries varied, then selection of cohort children may not have been evenly distributed over the distribution day, which may have resulted in selection bias.
4. Cohort eligibility: The cohort selected was representative of the children enrolled in BSFP, however a large proportion of these children did not meet program eligibility criteria at the first distribution. These

children were frequently taller or longer than thresholds for eligibility, which implies that the cohort was older than expected.

5. Recall Bias: Recall bias is a potential limitation in all evaluations, which use retrospective data collection through questionnaires. It is possible that some respondents did not provide accurate data. As well, certain data may have been more prone to inaccuracies, such as the number animals owned, household income, and receipt of other food. Age data may also have been inaccurate. Since the BSFP was for children 6-36 months of age, some caregivers may have been reluctant to provide an accurate age. Some children in the cohort had differing reported ages and birth dates during the course of follow-up. There were also significant differences methods for age determination by county. Additionally, the majority of implementing partners enrolled based on the height criteria of <95 cm, and therefore it is likely that some older but shorter children were enrolled.
6. Measurement Error: Anthropometrists were trained to measure length/height, weight, MUAC and oedema. Despite training and constant supervision, some measurements were not plausible. This may have been due to measurement error or in some cases child substitution. Data from 159 and 106 children in Turkana and Wajir, respectively, indicating implausible gains or losses in stature and weight were discarded.
7. Child substitution: Despite additional measures to minimize child substitution, a number of cases were identified. Data was discarded where substitution was easily identifiable; however there is the possibility that some repeated measures may have been on different individuals. Less than 1% of children in both Counties were identified onsite as a different child. Data from 159 and 106 children in Turkana and Wajir, respectively, were discarded for implausible gains or losses in stature and weight and may present some cases of child substitution.
8. Loss to follow-up: The final outcome of 280 (20.4%) children in Turkana and 152 (10.9%) children in Wajir was not known, due to loss to follow up either at the fifth distribution or never attending after enrollment. In a worst case scenario (i.e., all these children either developed severe acute malnutrition or died for other reasons) the results of the evaluation would be biased and underestimate measures of malnutrition and nutritional status.
9. Attribution: An observational design cannot provide definitive conclusions attributing change to a specific intervention. We tried to overcome this limitation by documenting the intermediary steps between the intervention (i.e., BSFP) and the outcomes of interest (i.e., prevention of malnutrition). This included measures of utilization of the product distributed, attendance and compliance. The results are presented in tables 9 -12.
10. Analysis Cohort Selection: For this report, we chose to include children who came to all five distributions in the main analysis. Exclusion of those children who missed one or more visits may have resulted in bias associated with selection of our final cohort.

11. No intervention exists in isolation: At the time of the BSFP, there were other interventions provided to parts of the same population, including health care, water, sanitation, hygiene, livelihoods and food security, which were either established or scaled up in response to the crisis. Climatic and seasonal changes occurred during the implementation of the BSFP with rains producing damaging flooding and loss of livestock in some areas and improving pasture and crops in others. It is not possible to attribute gains in nutritional status solely to the presence of the BSFP. Although we made an effort to document at the individual level, the study could not capture the effect of each and all interventions affecting nutritional status.
12. Absence of established benchmarks: There are no established criteria for our two main outcomes. WHZ score and incident malnutrition. The absence of these thresholds makes qualification of the BSFP program as a success and failure difficult.

RECOMMENDATIONS

The following recommendations are based upon both the data from the evaluation and field observations made during the distributions. Additionally, implementing partners expressed interest for concrete recommendations on how to improve BSFP in the future.

1. Child substitution
    - Simple and inexpensive methods can minimize child substitution in future evaluations.

2. One admission criteria
    - Height may be the easiest to assess in the field, given the lack of documented age data in Wajir as well as many other locations. It is important to ensure that all programs use the same height cut-off for age (i.e., 95 cm for 36 months) for admission, and that use of this criterion is consistently applied across all distribution sites. For communities use to age-based admission, an educational component will have to be implemented prior to the program.

3. Timely distributions
    - To obtain the greatest impact of the program, the provision of the ration must be timely and with minimal delays. Distribution delays dilute the ration in terms of kilocalories per day and potential nutritional impact. Prepositioning of stocks, if possible, could reduce some delays; however, funding must be secured in advance as well as procurement of commodities.

4. BSFP standardization and operations
    - Distance to distribution sites should be balance with logistical constraints of accessing numerous sites.
    - Staffing levels must be achievable.
    - Referrals of malnourished children need to be strengthened. Clear guidance on referral (MUAC and WHZ) and follow-up of cases should be provided to the implementing partners in collaboration with the organizations and ministry of health providing services for treatment.
    - Systematic treatment supplies should be secured in advance of the programs, including vitamin A, zinc, iron/folate tablets, the cold chain, and consumable materials.
    - Distribution of the ration should be standardized. There was great variation in the actual intervals between distributions of food. It was not clear if beneficiaries received the appropriate quantities of food given their statements of running out within two weeks of receipt.

5. Post distribution monitoring
    - Monitoring of the ration at the distribution site and at the household level should be incorporated into the BSFP.

6. Timing of implementation of BSFP
    - The combination of current nutritional data and the risk of deterioration should be considered to inform decision making and program implementation prior to actual severe deterioration in the population.

7. Alternative programs to address excess malnutrition
    - Expanded general food distribution (GFD) of a greater caloric content may have a similar effect to the BSFP ration with the added benefit of multiple commodities at a potentially lower cost than BSFP. This would be difficult in situations where only a small proportion of households are GFD beneficiaries. It would also mandate a change in current GFD since it does not include food specifically tailored for children less than 2 years of age and information about the age of household members is not currently collected.
    - Cash/Vouchers may be an option where markets are functional and quality food is accessible to the population. Targeting specific children may be more difficult in this program and targeting of household would be more feasible.
    - Expanded admission criteria in Targeted Supplementary Feeding Programs TSFP to a MUAC of 115 to 135 and /or WHZ -2 to -1.5 for a defined programmatic period would target those most likely of developing acute malnutrition. Large scale screenings would have to be conducted to identify these children and the cost of the screenings versus the cost of a traditional BSFP would have to be weighed. Additionally, the infrastructure to treat the additional caseload would need to be in place and supported.

REFERENCES

1. FEWS NET. Special Report: Kenya Food Security. June 2011. http://www.fews.net/docs/Publications/Kenya_Special_Report_2011_06_final.pdf
2. FEWS NET. Kenya Enhanced Food Security Monitoring. July 22, 2011. http://www.fews.net/docs/Publications/KE_Dekadal_Report_2011_07_final.pdf
3. Kenya Food Security Steering Group. 2011 Long Rains Mid-season Assessment Report. http://reliefweb.int/sites/reliefweb.int/files/resources/Full_Report_1607.pdf
4. Nutrition Information Working Group. Monthly Update, August 2011. http://ochaonline.un.org/kenya/SectoralWorkingGroups/NutritionWG/tabid/4444/language/en-US/Default.aspx
5. Nutrition Working Group. Kenya Nutrition Survey Summary August 5, 2011. http://ochaonline.un.org/kenya/SectoralWorkingGroups/NutritionWG/tabid/4444/language/en-US/Default.aspx
6. Save the Children. Evaluation of the Emergency Blanket Supplementary Feeding Programme in Five Districts of Northern Kenya. September 2010.
7. Hall A, Oirere M, Thurstans S, Ndumi A, Sibson V (2011). The Practical Challenges of Evaluating a Blanket Emergency Feeding Programme in Northern Kenya. PLoS ONE 6(10): e26854. Doi:10.1371/journal.pone.0026854.
8. United Nations, editor. How to Weigh and Measure Children, Assessing the Nutritional Status of Young Children in Household Surveys. New York: United Nations; 1986.
9. World Health Organization. Training Course on Child Growth Assessment. Geneva; 2008.
10. Dean AG AT, Sunki GG, Friedman R, Lantinga M, Sangam S, Zubieta JC, Sullivan KM, Brendel KA, Gao Z, Fontaine N, Shu M, Fuller G, Smith DC, Nitschke DA, and Fagan RF. Epi Info™, a database and statistics program for public health professionals. C. Epi Info™, a database and statistics program for public health professionals. Atlanta, Georgia, USA: Centers for Disease Control and Prevention; 2007.
11. WHO Multicentre Growth Reference Study Group. WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age; methods and development. Geneva: WHO 2006.
12. Save the Children. Blanket Supplementary Feeding Programme Turkana, Mandera, Wajir, Marsabit, Samburu and Isiolo. Distribution Progress Monitoring Report, 28th February 2012.

ANNEX 1: TRAINING SCHEDULE

Program Evaluation of Blanket supplementary feeding program – Kenya 2011

Training Day 1 Agenda

Time	Topic	Duration & Method	Objectives / Details
8:00-8:30	Introductions and Ground Rules	30 min Group	Stakeholder and Staff introductions
8:30-8:45	Basics of Nutrition and Definitions	15 min Lecture	Introduction to nutrition and malnutrition Issues around food security What is BSFP? Other feeding programs. BSFP in Turkana
8:45-9:00	Evaluation	15 min Lecture	What is an Evaluation? - Why we are doing the evaluation - Rigor / detailed
9:00-9:40	Study design and sampling	40 min Lecture	Design of impact assessment for BSFP Daily distribution process Every nth
9:40-10:25	Recording data and numbers	45 min Lecture/Demo	How to record data and numbers
10:25-10:45	Break	20 min	
10:45-11:45	Day of Distribution Part 1	60 min Demo	Screening, Enrollment, and Consent (Study , photo)
11:45-12:45	Day of Distribution Part 2	60 min Demo	Questionnaire and Anthropometry (Page 1)
12:45-13:00	Recap of Study	15 min lecture	Review key points from morning
13:00-14:00	Lunch	1 hour	
14:00-15:30	Day of Distribution Part 3	90 min Demo / Group work	Questionnaire (Pages 2 and 3)
15:30-16:00	Data handling	30 minutes	Storage and handling of questionnaires, Data entry
16:00-16:30	Recap of Afternoon	15 minutes	Review key points from afternoon

Training Day 2 Agenda

Time	Topic	Duration & Method	Objectives / Details
8:00-8:20	Review of Day 1	20 minutes Lecture	Review from day 1 learning Q/A
8:20-9:20	Anthropometry	60 minute Lecture	What is anthropometry? Taking anthropometry measurements?
9:20-10:00	Break and travel to school	25 minutes	
10:00-11:00	Anthropometry	Hands on measurements	On site anthropometry measurements
11:00-11:30-	Travel back to St. Theresa	30 minutes	
11:30-12:00	Anthropometry Challenges	30 minutes	Discussion on challenges with anthropometry
12:00-12:30	Question and Answer	30 minutes Interactive	Question and answer session for participants
12:30-13:00	Conclude training	15 minutes	Recap and prepare for distribution
13:00-14:00	Lunch	60 minutes	
14:00	Human resources	60 min	Contracts

ANNEX 2: SAMPLING AID

Sampling aid for a distribution site in Turkana

BSFP Evaluation Sampling Aid

Distribution Date: 9/1/2011

Site Number: 14

Partner: IRC

District: West

Division: Lokochogio

Distribution Site: NATAMAKARIO

Estimated Normal U3's: 141

Target: 60

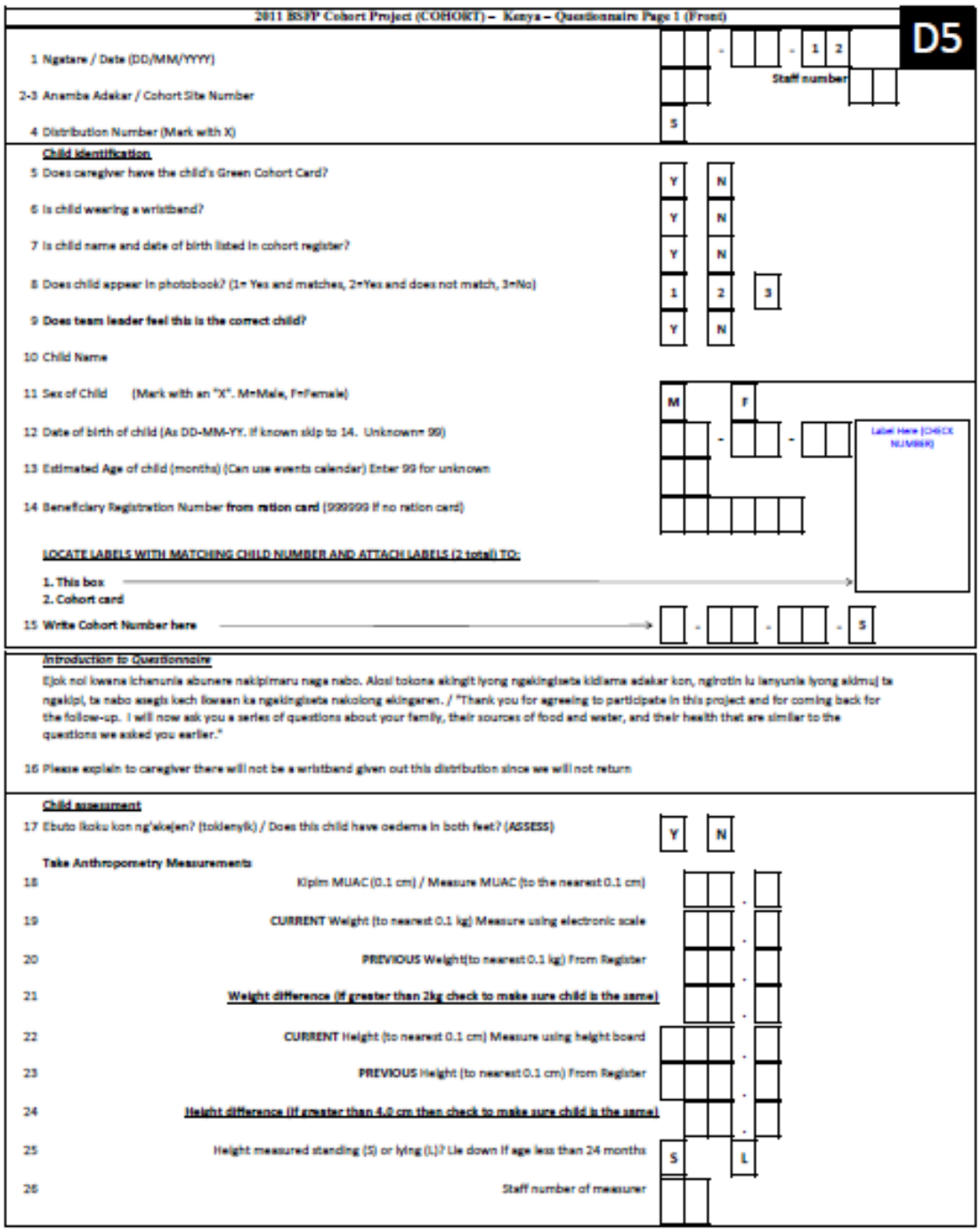
Sampling Interval*: 2

*The sampling interval above should be used if all of the BSFP lines are being covered by our teams. If the number of BSFP lines is not equal to the number of teams, use the following chart to pick your sampling interval. First find out how many average beneficiaries there are per line (e.g. 100 or less, 200 or less, etc...) Then use that information and the number of lines and teams to find the interval

SAMPLING INTERVAL CHART		Average number of beneficiaries per line covered by team							
Number of BSFP lines	Number of lines our teams are working	100 or less	200 or less	300 or less	400 or less	500 or less	600 or less	700 or less	800 or less
2	1	1	1	1	1	2	2	3	3
3	1	1	1	1	1	1	1	1	2
3	2	1	1	1	2	2	3	3	4
4	1	1	1	1	1	1	1	1	1
4	2	1	1	1	1	2	2	2	3
4	3	1	1	1	2	2	3	3	4
5	1	1	1	1	1	1	1	1	1
5	2	1	1	1	1	1	1	1	2
5	3	1	1	1	1	2	2	3	3
5	4	1	1	1	2	2	3	4	4
6	1	1	1	1	1	1	1	1	1
6	2	1	1	1	1	1	1	1	2
6	3	1	1	1	1	1	2	2	3
6	4	1	1	1	2	2	3	3	4

ANNEX 3: COHORT QUESTIONNAIRE

Sample questionnaire used for distribution 5 in Turkana



2011 BSFP Cohort Project (COHORT) – Kenya – Questionnaire Page 1 (Front)

D5

1 Ngatare / Date (DD/MM/YYYY) - - 1 2

Staff number

2-3 Anamba Adakar / Cohort Site Number

4 Distribution Number (Mark with X) 5

Child identification

5 Does caregiver have the child's Green Cohort Card? Y N

6 Is child wearing a wristband? Y N

7 Is child name and date of birth listed in cohort register? Y N

8 Does child appear in photobook? (1= Yes and matches, 2=Yes and does not match, 3=No) 1 2 3

9 **Does team leader feel this is the correct child?** Y N

10 Child Name

11 Sex of Child (Mark with an "X". M=Male, F=Female) M F

12 Date of birth of child (As DD-MM-YY. If known skip to 14. Unknownn 99) - -

13 Estimated Age of child (months) (Can use events calendar) Enter 99 for unknown

14 Beneficiary Registration Number **from ration card** (999999 if no ration card)

Label Here (CHECK NUMBER)

LOCATE LABELS WITH MATCHING CHILD NUMBER AND ATTACH LABELS (2 total) TO:

1. This box
2. Cohort card

15 Write Cohort Number here - - - 5

Introduction to Questionnaire

Ejok noi kwana ichanunia abunere nakipimaru naga nebo. Alosi tokona ekingit iyong ngakingiseta kidiama adakar kon, ngirotin lu lanyunia iyong akimuj ta ngakipi, ta nebo asegis kech ikwaan ka ngakingiseta nakolong ekingaren. / "Thank you for agreeing to participate in this project and for coming back for the follow-up. I will now ask you a series of questions about your family, their sources of food and water, and their health that are similar to the questions we asked you earlier."

16 Please explain to caregiver there will not be a wristband given out this distribution since we will not return

Child assessment

17 Ebuto ikoku kon ng'akejen? (toklenyik) / Does this child have oedema in both feet? (ASSESS) Y N

Take Anthropometry Measurements

18 Kipim MUAC (0.1 cm) / Measure MUAC (to the nearest 0.1 cm) .

19 **CURRENT** Weight (to nearest 0.1 kg) Measure using electronic scale .

20 **PREVIOUS** Weight(to nearest 0.1 kg) From Register .

21 **Weight difference (if greater than 2kg check to make sure child is the same)** .

22 **CURRENT** Height (to nearest 0.1 cm) Measure using height board .

23 **PREVIOUS** Height (to nearest 0.1 cm) From Register .

24 **Height difference (if greater than 4.0 cm then check to make sure child is the same)** .

25 Height measured standing (S) or lying (L)? Lie down if age less than 24 months S L

26 Staff number of measurer

COHORT NUMBER T - [ ][ ] - [ ][ ] - 5

2011 BSFP Cohort Project (COHORT) – Kenya – Questionnaire Page 1 (Back)

Household (HH) Basic Demographics

27 Ng'itunga ng'ial elomito nadakar kon (iu inujete anamot apei)? / How many people eat from same cooking pot? (99=Don't know) [ ][ ]

28 Ng'ide ng'ial eya kop ngikaru ngikan alotomi awi na? / # of children (including this child) less than 5 years in the HH (99=Don't know) [ ][ ]

29 Ng'ide ng'ial eya kop ngikaru nguuni? / # of children (including this child) less than 3 years in HH (99=Don't know) [ ][ ]

30 Dyari itakang a ikoku kayen? / Is this child's mother alive? (Y=Yes, N=No, D=Don't know) [Y] [N] [D]

31 Ani Keyari, epoti itakang a ikoku tokona? / If yes, is she pregnant now? (Y=Yes, N=No, D=Don't know) [Y] [N] [D]

32 Iyanasi iyong ka ikoku een kwai? / What is your relationship to this child? [ ]

33 Ng'ae itwaan nidira iboyoto ikoku en? / Who is the primary caregiver of this child? [ ]

1=Mother 2=Father 3=Grandparent 4=Sibling 5=Uncle/Aunt 6= other relative 7=not related/Guardian 9=Don't know

34 Iutarttae? / What is the marital status of the primary caregiver?(1=never married 2=married 3=separated 4=divorced 5=widowed 9=unknown) [ ]

HH Employment

35 Dya ngibaren aanyunit adakar nakon elap lobeen alunyar a? / Did the HH acquire any animals in the past month? [Y] [N] [D]

36 If NO SKIP to 39; if yes, ask, How many total of each animal do they have now:

37 (999=Don't know) # of animals NOT the # of herds

38

# cattle	[ ][ ][ ]		
# sheep and goats	[ ][ ][ ]		
# camels	[ ][ ][ ]		

39 Ngibaren ngiai a adakar anakon atoka elap lobeen pei alunyar? / How many of the HH's animals died in past 1 month? (999=Don't know) [ ][ ][ ]

40 Ng'aropiae ng'ai lanyunete ei anadakar kus elap lobeen alunyar? / What is the HH income in past month? (99999=Don't know) [ ][ ][ ][ ][ ]

41 Ng'aropiae ng'aai agielere akimuj elap lobeen? / Amount spent on food in past month?(99999=Don't know) [ ][ ][ ][ ][ ]

42 Ng'aropiae ng'ai agelere ngiboro luche elap lobeen?/ Amount spent 'non-food' in past month? (99999=Don't know) [ ][ ][ ][ ][ ]

43 Itachi iyong abunere nege akwar na? / Did you pay to travel here today? [1] [2] [3] [9]
1= Yes with money 2= Yes with food 3= No 9=Don't know **(If 2, 3 or 9, skip to question 45)**

44 Anikitachit, ng'ai? / If yes, how much in shillings? (Estimated one-way travel cost in KSH) [ ][ ][ ][ ]

COHORT NUMBER T - ☐☐ - ☐☐ - 5

D5

2011 BSFP Cohort Project (COHORT) – Kenya – Questionnaire Page 2 (Front)

#	Question	Answer
	Water and Sanitation	
45	Aluwae nidira eanyunia adakar na ng'akipi namatan? / What is the households main source of drinking water? 1=River/stream/lake/dam/dug hole; 2=Unprotected well; 3=Protected well; 4=Borehole 5=Handpump 6=Piped to tap 7=Tanker 8=Other 9=Don't know	☐
46	Aluwae nidira emaase ngibaren adakar kana? / What is the household animal's main source of drinking water? 1=River/stream/lake/dam/dug hole; 2=Unprotected well; 3=Protected well; 4=Borehole 5=Handpump 6=Piped to tap 7=Tanker 8=Other 9=No animals 99=Don't know	☐
47	Alongisat na etiai elemanari adakar na, awokun ngakipi namatan? / How long does it take the HH to collect drinking water? Enter travel time (round trip) in minutes, enter 999 if don't know	☐☐☐
	Health of Other children	
48	Eya ngide anadakar kana lultani narogo? / *Are any other HH children treated for malnutrition now ?* Y=Yes, N=No, D=Don't know **(Skip to 50 if N/D)**	Y ☐ N ☐ D ☐
49	*If yes, how many?* (99=Don't know)	☐☐
50	Elap lobeen alunyar eyei akimuj a narogoi abu ikoku en toriam? / *Was this child treated for malnutrition in past month ?* (Not including BSFP) Y=Yes, N=No, D=Don't know **(Skip to 52 if N/D)**	Y ☐ N ☐ D ☐
51	Anikeyei akimuj anarogoi ariemunit ikoku en elap lobeen alunyar ,aluwae ariamunia? / *If this child was treated for malnutrition in past month, where was s/he last treated?* 1=Family/Mother with herbs 2=Healer 3=Community health worker 4=Mobile clinic 5=Private Hospital/clinic/ dispensary 6=Government clinic 7=NGO clinic 8=Pharmacy or shop 9=None 10=Other 99=Don't know	☐☐
52	Eyei akimuj a narogoi eriamuni ikoku en tokona? / *Is this child being treated for malnutrition now ?* (Y=Yes, N=No, D=Don't know)	Y ☐ N ☐ D ☐
53	Enaki ikoku en tokona? / *Is this child breastfed right now?* Y=Yes N=No D=Don't know	Y ☐ N ☐ D ☐
54	Etedek kolong ikoku en epuru? / *Has this child been vaccinated for measles?* 1=Yes by card 2=Yes by recall 3=No by card 4=No by recall 9=Don't know	☐
55	Akisiekin elap loa lopiak, aanyunit ikoku en edawa loa pitamen Aa? / *Since August did the child get Vitamin A?* 1=Yes by card 2=Yes by recall 3=No by card 4=No by recall 9=Don't know	☐
56	Adeka ikoku en ng'iukio luarei lobeen alunyar? / *Was this child sick in past 2 weeks?* (Y=Yes, N=No,D=Don't know) **(If N/D skip to 65)**	Y ☐ N ☐ D ☐
57	*If yes, s/he was sick with.....* — *Aremor? / diarrhea?*	☐
58	*Ariae? / fever?*	☐
59	Mark all that apply with an "X" — *Awalaa? / cough?*	☐
60	*Awalaa? / difficulty breathing?*	☐
61	*Puru? / measles?*	☐
62	*Eche? / other?*	☐
63	Kerai kongina, aponi kitedekae? / *If yes, was treatment sought?* (Y=Yes, N=No, D=Don't know) **(If N/D skip to 65)**	Y ☐ N ☐ D ☐
64	Kerai kongina, aluwae etedekere? / *If yes, where did you seek treatment last?* 1=Family/Mother with herbs 2=Healer 3=Community health worker 4=Mobile clinic 5=Private Hospital/clinic/dispensary 6=Government clinic 7=NGO clinic 8=Pharmacy or shop 9=Other 99=Don't know	☐☐

2011 BSFP Cohort Project (COHORT) – Kenya – Questionnaire Page 2 (Back)

#	Question	Answer

Food (Household)

65 Aluwae nidira eanyunia tokona adakar naga akimu(?) / *What is the HH's main source of food right now?* 1=Own production 2=Livestock 3=By exchange 4=Market purchase 5=Provided by government/agency 6=Other 9=Don't Know

66 *Did anyone in your HH get food from any other new program/s in last 1 month ?* Y=Yes, N=No, D=Don't know **(Skip to 76 if N/D)** — Y / N / D

If Yes above, ANSWER LINES 67-75 for each program separately. — Prog 1 / Prog 2 / Prog 3

67 Anikeyal, anikang'aa? *If yes, from whom?* 1=Government 2=Relief agency 3= Mosques/Churches 4=Schools 5=Food for work 6=Other 9=Don't know

68 Anikdanyunito,worl kolong iriamunetx (ngiwikio)? / *If yes, when did they last receive it* (weeks)? Number of weeks ago. 99= Don't know

69	Anikdanyunito, anikumu(?) / *If yes, what kinds of food or food aid?*		CSB
69a	(Show pictures here) and mark all that apply	Akimet; *Oil*	Oil
70		Nareto/Narogol; *Plumpy Nut*	Plumpy'Nut
71		Ngilupei/Emahindi/Ngakanol; *Cereals*	Cereals
72		Emoroga/Elenzil or Ebinzi; *Pulses (beans, etc.)*	Pulses/Beans
73		Ng'awarngae/Ng'avochae; *Vouchers*	Vouchers
74		Ngaropia / *Money*	Money
75		Ngache / *Other*	Other

76 Eyei akimuj elokonyitae anadakar kana elap lobeen alunyar? / *Has the household bartered any of their food in past month?* (Y=Yes, N=No, D=Don't know) — Y / N / D

77 Eyei akimuj agelartae anadakar kana elap lobeen alunyar? / *Has the household sold any of their food in past month?* (Y=Yes, N=No, D=Don't know) — Y / N / D

78 Ng'ial ngimujen emujlo been anadakar kana? / *How many meals did the HH eat yesterday?* (9=Don't know)

79 Emoranarete adakar na ng'amuja kang'awiyal nache? / *Does the household share food with others outside the household ?* Y=Yes, N=No, D=Don't know — Y / N / D

80 Ng'ial ngimujen emujl ikoku en akiakian been tanang tokona? / *How many times did this child eat yesterday including meals and snacks?* (9=Don't know)

Akisekinet been tinen ne emuj ikoku en..... / *Since this time yesterday did this child eat any...*

81	.....ngilupei/emahindi/ngakanol? / .....*cereals (grains, ugali)*?	Y	N	D
82	.....elenzi/ebinzi/emaraga? / .....*pulses (beans)*?	Y	N	D
83	.....ngakile/ngokibuk/akidedet? / .....*dairy products (milk, butter, ghee, cheese, yogurt)*?	Y	N	D
84	.....akiring/ekolia? / .....*meat or fish*?	Y	N	D
85	.....ngabeyei? / .....*eggs*?	Y	N	D
86	.....ngaraito na vitamin A Ka ngakuul (e.g. ekarot, ekunde, namukoya, mrere, nyamunye etc) / .....*Vitamin A rich fruits and vegetables (e.g carrots, cowpea leaves, amaranth, mwenda, pumpkin, sweet potato)*?	Y	N	D
87	.....ngaraito ng'ache ka ngakul / .....*other fruits and vegetables*?	Y	N	D

88 Did the household receive a ration in the previous distribution (check ration card)? **(If N skip to 90)** — Y / N / D

89 If yes, who ate the ration? (1=The cohort child 2 = All children less than 5 3 = Everyone in the household 4 =Don't know) — 1 / 2 / 3 / 4

90 Is there any other cohort child (has a green card) in this household? **(If N or D you stop here)** — Y / N / D

91 If yes, how many? (MARK NUMBER WITH AN "X") — 1 / 2 / 3 / 4

92 If yes, what is the cohort number and sex of the other child? T - [ ][ ] - [ ][ ] - S — M / F

93 If yes, what is the cohort number and sex of the other child (if more than one) T - [ ][ ] - [ ][ ] - S — M / F

94 Who in your household eats the BSFP ration you receive? 1= Child only 2=All children 3=Adults and children

95 How long did the BSFP ration you received last distribution last in days?

END OF QUESTIONNAIRE
Check the following

1. REVIEW QUESTIONNAIRE for completeness (missing answers, labels attache

3. Did TEAM LEADER check the form?
4. Place completed Questionnaire in correct folder
5. Obtain NEW QUESTIONNAIRE and NEW LABEL for next child

ANNEX 5: COHORT CARD

Blanket Supplementary Feeding Program Cohort Card (printed 19 June 2012)

LOCATION			Cohort Label
District:	Division:	Village:	
BSFP Site Number:	BSFP Site Name:	Household Number:	
BENEFICIARY INFORMATION			
Beneficiary Registration No:	Child's Full Name:		
Informed Consent?	Mother's Name:	Father's Name:	
Sex: M F	Date of birth (dd/mm/yy) _____/_____/_____	OR Age in months _____	

Blanket Supplementary Feeding Program Cohort Card (printed 19 June 2012)

DISTRIBUTION DETAILS									
	Date (dd/mm/yy)	CSB	Oil	MUAC (cm)	Weight (kg)	Height (cm)	Oedema? (y/n)	Form complete? (y/n)	Referred for Tx? (y/n)
1									
2									
3									
4									
5									
Comments:									

ANNEX 6: PLAUSIBILITY REPORTS

Data quality and plausibility check for BSFP data from Turkana – distribution 1

Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.3 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.960)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square) (IGNORE)			0	2	4	10	**10** (p=0.000)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (2)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (7)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.76)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.95)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.79)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.464)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**12** %

At the moment the overall score of this survey is 2 %, this is Excellent.

Digit preference Weight:

```
Digit .0  : ##################################################
Digit .1  : ##########################################################
Digit .2  : ########################################################
Digit .3  : ##########################################################
Digit .4  : ########################################################
Digit .5  : ##########################################################
Digit .6  : ########################################################
Digit .7  : ########################################################
Digit .8  : ########################################################
Digit .9  : ##########################################################
```

Digit Preference Score: **2** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Digit preference Height:

```
Digit .0  : ##########################################################
Digit .1  : ########################################
Digit .2  : ##################################################
Digit .3  : ########################################
Digit .4  : ################################
Digit .5  : ##################################################
Digit .6  : ###################################
Digit .7  : ####################################
Digit .8  : ########################
Digit .9  : ################################
```

Digit Preference Score: **7** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Data quality and plausibility check for BSFP data from Turkana – distribution 2

Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.3 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.695)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square) (IGNORE)			0	2	4	10	**10** (p=0.000)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (3)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (6)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.81)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.30)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.21)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**5** (p=0.000)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**17** %

At the moment the overall score of this survey is 7 %, this is Good.

Digit preference Weight:

```
Digit .0  : ##############################################
Digit .1  : ##########################################################
Digit .2  : ####################################################
Digit .3  : ######################################################
Digit .4  : ##########################################
Digit .5  : ###################################################
Digit .6  : ####################################################
Digit .7  : ########################################################
Digit .8  : ##############################################
Digit .9  : ###################################################
```

Digit Preference Score: **3** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Digit preference Height:

```
Digit .0  : ##############################################
Digit .1  : ###################################
Digit .2  : ####################################
Digit .3  : ##################################
Digit .4  : ###################################
Digit .5  : ################################################
Digit .6  : ###################################
Digit .7  : ################################
Digit .8  : ########################
Digit .9  : ################################
```

Digit Preference Score: **6** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Data quality and plausibility check for BSFP data from Turkana – distribution 3

Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data (% of in-range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-10 10	>10 20	**0** (0.4 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<0.000 10	**0** (p=0.870)
Overall Age distrib (Significant chi square) (p=0.000) (IGNORE)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<0.000 10	**10**
Dig pref score - weight	Incl	#	0-5 0	5-10 2	10-20 4	> 20 10	**0** (2)
Dig pref score - height	Incl	#	0-5 0	5-10 2	10-20 4	> 20 10	**2** (10)
Standard Dev WHZ	Excl	SD	<1.1 0	<1.15 2	<1.20 6	>1.20 20	**0** (0.84)
Skewness WHZ	Excl	#	<±1.0 0	<±2.0 1	<±3.0 3	>±3.0 5	**0** (0.25)
Kurtosis WHZ	Excl	#	<±1.0 0	<±2.0 1	<±3.0 3	>±3.0 5	**0** (0.13)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<0.000 5	**0** (p=0.430)
Timing	Excl	Not determined yet 0		1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**12** %

At the moment the overall score of this survey is 2 %, this is Excellent.

Digit preference Weight:

```
Digit .0  : ##########################################
Digit .1  : ########################################
Digit .2  : ######################################################
Digit .3  : ##############################################
Digit .4  : ##############################################
Digit .5  : ###############################################
Digit .6  : ############################################
Digit .7  : ############################################
Digit .8  : ###############################################
Digit .9  : ############################################
```

Digit Preference Score: **2** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Digit preference Height:

```
Digit .0  : ######################################################
Digit .1  : ########################
Digit .2  : ########################################
Digit .3  : ############################
Digit .4  : ################################
Digit .5  : ##################################################
Digit .6  : ############################
Digit .7  : ############################
Digit .8  : ########################
Digit .9  : ########################
```

Digit Preference Score: **10** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Data quality and plausibility check for BSFP data from Turkana – distribution 4

Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**

Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.4 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.605)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000) (IGNORE)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (2)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (6)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.84)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.32)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.35)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.524)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**12** %

At the moment the overall score of this survey is 2 %, this is Excellent.

Digit preference Weight:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ######################################
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##
Digit .9 : ##

Digit Preference Score: **2** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Digit preference Height:

Digit .0 : ##
Digit .1 : ##################################
Digit .2 : ##############################
Digit .3 : ##############################
Digit .4 : ##################################
Digit .5 : ######################################
Digit .6 : ##############################
Digit .7 : ##############################
Digit .8 : ##############################
Digit .9 : ##############################

Digit Preference Score: **6** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Data quality and plausibility check for BSFP data from Turkana – distribution 5

Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.5 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.978)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (3)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.81)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.19)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.14)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.057)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**10** %

At the moment the overall score of this survey is 10 %, this is good.

Digit preference Weight:

```
Digit .0  : ##################################################
Digit .1  : ##########################################
Digit .2  : ##################################################
Digit .3  : ##########################################
Digit .4  : ###################################
Digit .5  : ##########################################
Digit .6  : ###################################
Digit .7  : ##########################################
Digit .8  : ##########################################
Digit .9  : ##########################################
```

Digit Preference Score: **4** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Digit preference Height:

```
Digit .0  : ################################################
Digit .1  : ########################################
Digit .2  : ########################################
Digit .3  : ################################################
Digit .4  : ########################################
Digit .5  : ################################################
Digit .6  : ################################################
Digit .7  : ################################################
Digit .8  : ###################################
Digit .9  : ########################################
```

Digit Preference Score: **3** (0-5 Excellent, 5-10 Good, 10-20 Acceptable and > 20 Problematic)

Plausibility check for nutritional data from distribution 1 in Wajir:
Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.6 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.276)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000) (IGNORE)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (2)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**4** (14)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.80)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.50)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.33)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**4** %

At the moment the overall score of this survey is **4 %, this is Excellent**.

Digit preference Weight:

```
Digit .0  : ############################################################
Digit .1  : ########################################################
Digit .2  : ########################################################
Digit .3  : ########################################################
Digit .4  : ########################################################
Digit .5  : ########################################################
Digit .6  : ########################################################
Digit .7  : ########################################################
Digit .8  : ########################################################
Digit .9  : ############################################################
```

Digit Preference Score: **2** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Digit preference Height:

```
Digit .0  : ############################################################
Digit .1  : ##########################
Digit .2  : ###################################
Digit .3  : ###############################
Digit .4  : ######################
Digit .5  : ############################################
Digit .6  : ########################
Digit .7  : ####################
Digit .8  : ##################
Digit .9  : ####################
```

Digit Preference Score: **14** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Plausibility check for nutritional data from distribution 2 in Wajir:
Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.9 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**2** (p=0.057)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000) (IGNORE)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (3)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**4** (12)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.88)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.18)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.25)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**6** %

At the moment the overall score of this survey is **6 %, this is Good**.

Digit preference Weight:

```
Digit .0  : ##################################################
Digit .1  : ##############################################
Digit .2  : ##############################################
Digit .3  : ########################################
Digit .4  : ########################################
Digit .5  : ##############################################
Digit .6  : ########################################
Digit .7  : ##################################################
Digit .8  : ##################################################
Digit .9  : ############################################################
```

Digit Preference Score: **3** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Digit preference Height:

```
Digit .0  : ##########################################################
Digit .1  : ########################
Digit .2  : ###################################
Digit .3  : ########################
Digit .4  : ########################
Digit .5  : ##############################
Digit .6  : ########################
Digit .7  : ##################
Digit .8  : ##################
Digit .9  : ########################
```

Digit Preference Score: **12** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Plausibility check for nutritional data from distribution 3 in Wajir:
Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.2 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.233)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000) (IGNORE)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (7)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (10)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.92)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.17)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.13)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**4** %

At the moment the overall score of this survey is **4 %, this is Excellent**.

Digit preference Weight:

```
Digit .0  : ##################################################
Digit .1  : ##################################
Digit .2  : ##############################
Digit .3  : ##############################
Digit .4  : ##################################
Digit .5  : ############################
Digit .6  : ############################
Digit .7  : ##################################
Digit .8  : ##################################
Digit .9  : ##################################
```

Digit Preference Score: **7** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Digit preference Height:

```
Digit .0  : ############################################################
Digit .1  : ##########################################
Digit .2  : ##################################
Digit .3  : ##################################
Digit .4  : ############################
Digit .5  : ##################################
Digit .6  : ########################
Digit .7  : ######################
Digit .8  : ########################
Digit .9  : ##################################
```

Digit Preference Score: **10** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Plausibility check for nutritional data from distribution 4 in Wajir:
Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.6 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.478)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000) (IGNORE)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (9)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.96)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.18)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.15)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**2** %

At the moment the overall score of this survey is **2 %, this is Excellent**.

Digit preference Weight:

```
Digit .0  : ############################################################
Digit .1  : ################################################
Digit .2  : ############################################################
Digit .3  : ##########################################
Digit .4  : ##################################################
Digit .5  : ################################################
Digit .6  : ##########################################
Digit .7  : ##########################################
Digit .8  : ################################################
Digit .9  : ############################################################
```

Digit Preference Score: **4** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Digit preference Height:

```
Digit .0  : ##########################################################
Digit .1  : ##########################################################
Digit .2  : #####################################
Digit .3  : ###############################
Digit .4  : ############################
Digit .5  : ################################
Digit .6  : ############################
Digit .7  : ############################
Digit .8  : ############################
Digit .9  : ################################
```

Digit Preference Score: **9** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Plausibility check for nutritional data from distribution 5 in Wajir:
Standard/Reference used for z-score calculation: WHO standards 2006

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.4 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.271)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000) (IGNORE)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (8)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (1.02)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.12)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.10)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**2** %

At the moment the overall score of this survey is 2 %, this is Excellent.

Digit preference Weight:

```
Digit .0  : ##########################################################
Digit .1  : ########################################################
Digit .2  : ######################################################
Digit .3  : ###################################################
Digit .4  : ################################################
Digit .5  : ############################################
Digit .6  : ##################################################
Digit .7  : ##########################################
Digit .8  : ####################################################
Digit .9  : ###################################################################
```

Digit Preference Score: **4** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

Digit preference Height:

```
Digit .0  : ##########################################
Digit .1  : ##########################################################
Digit .2  : ###################################
Digit .3  : ########################################
Digit .4  : ############################
Digit .5  : ##################################
Digit .6  : ##############################
Digit .7  : ############################
Digit .8  : ######################
Digit .9  : ############################################
```

Digit Preference Score: **8** (0-5 Excellent, 5-10 Good, 10-20 acceptable and > 20 problematic)

ANNEX 7: CONSENT FORMS

Verbal Consent form for BSFP Evaluation, Kenya – 2011

Title: Evaluation of a blanket supplementary feeding program in two Districts in Kenya, August – December, 2011

To be read to caregiver: Your child is invited to be in a programme evaluation. This is being done by the World Food Programme (WFP) and the Centers for Disease Control and Prevention. After my explanation, you can ask questions. You can talk further with a member of the team if you want.

The goal of the evaluation is to understand child nutrition and whether the programme is working. The evaluation staff is different from the programme staff providing the food. You are free to agree or decline allowing your child to take part in this evaluation. If your child joins the evaluation, you can decide to stop at any time. If you decline participation now or in the future, your child will still receive the same care and food as everyone else. You and your child will not receive any additional benefits from participating in the evaluation. Like any child here today, if we find your child to be malnourished, they will be referred for treatment.

Agreeing to take part in this evaluation, means you are willing to:

1. Meet with evaluation staff monthly over the next 5 months during the same day you receive this ration. We estimate your visit with staff will be less than 1 hour.
2. Allow evaluation staff to measure your child's height, weight and arm size.
3. Provide evaluation staff information about your child's health, household and nutrition habits. We will not share your child's name and identifying information with anyone outside the evaluation staff.

There is going to be minimal to no discomfort to you or your child. This may take 30-60 minutes more than the time needed for you to receive the food.

It will not cost you anything to participate, except the added time meeting with evaluation staff.

At the conclusion of the evaluation we will share with you the results of your child's nutritional assessment.

Given the above information, do you have any questions for me? Would you like to speak to another member of staff?

Again, participation is fully voluntary, you are welcome to join or decline.

If no further questions, do you agree to all that I have discussed and wish to participate in the evaluation?

Photograph consent form

Title: Evaluation of a blanket supplementary feeding program in two Districts in Kenya, August – December, 2011

To be read to caregiver: We would like to take a photograph of your child for this evaluation. This is to help identify your child to evaluation staff over the next five months. The photograph will be destroyed at the end of the evaluation. By taking a photograph, there are no additional benefits to you or your child provided, either now or in the future. It is fully voluntary. You are welcome to accept or decline. May we take a photograph of your child?