2015 Nuru Kenya Healthcare Program Impact Assessment

Results of the 2015 Annual Healthcare Household Survey

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Executive Summary

With the intent of improving maternal and child health, the Nuru Kenya (NK) Healthcare Program (HC) works with Nuru farmer households to adopt ten healthy behaviors. Nuru Monitoring and Evaluation (M&E) supports this work by conducting annual reviews of progress toward the program's impact goal to address the following evaluation question: ***What is the impact of the Nuru Kenya Healthcare Program on Nuru farmer households?***

As part of a larger impact assessment strategy, NK M&E administered a 2015 follow-up survey to a representative sample of Nuru farmer households in various intervention divisions in Kuria West, Kenya and non-intervention households in the same area. Building off of similar surveys conducted in 2013 and 2014[1], the 2015 follow-up survey helped to assess whether Nuru farmer households improved the adoption of ten healthy behaviors related to maternal and child health, safe water, sanitation and malaria prevention. The World Health Organization has shown that improvements in these behaviors lead to a decrease in maternal and child morbidity and mortality.[2]

Overall, Nuru farmer households continue to demonstrate positive shifts in adoption of the ten healthy behaviors in comparison with non-intervention households. Since 2013, Nuru farmer households receiving three years of services increased the adoption of these behaviors by 14 percent versus the comparison group, whose adoption rates increased by 5 percent. Concurrently, Nuru farmer households receiving two years of services also exhibited a greater incorporation of these behaviors relative to the comparison group (11 percent versus 5 percent). These data demonstrate Nuru farmer households adopt more healthy behaviors the longer they receive NK HC services.

Out of the ten healthy behaviors, six focus on safe pregnancy and childbirth whereas four relate to safe water, sanitation and malaria prevention. Both Nuru farmer household cohorts demonstrated more growth in safe pregnancy and childbirth behaviors since 2013 versus the non-intervention group (three years of NK HC intervention: 14 percent; two years of NK HC intervention: 5 percent; non-Nuru: 1 percent). Similarly, all Nuru farmer households continue to show improvements in the adoption of the four healthy behaviors related to safe water, sanitation and malaria prevention in comparison with the non-intervention group (three years of NK HC intervention: 15 percent; two years of NK HC intervention: 19 percent; non-Nuru: 12 percent).

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[1] The 2013 reports are available upon request from the Nuru International M&E Program. A preliminary survey was also conducted in 2012 but not in all of the intervention areas and not for all indicators; this data are therefore not included in the following impact

[2] WHO. Children: reducing mortality. Updated September 2013. Retrieved 2013 January 14 from http://www.who.int/mediacentre/factsheets/fs178/en/index.html

When examining each of ten healthy behavior indicators, the drivers of the positive changes experienced on average by Nuru farmer households relative to non-Nuru households become clear: for households with two years of intervention, safe water, sanitation and malaria indicators show the greatest increases whereas Nuru households with three years of intervention continue to excel in all ten healthy behaviors. Specifically for the safe pregnancy and childbirth indicators, Nuru households with three years of services maintain a comparative advantage over the non-intervention group in five out of the six maternal and child health behaviors. The same holds true for one out of six behaviors in the cohort with two years of NK HC services. For Nuru farmer households only from 2014 to 2015, Nuru farmer households with two years of intervention saw the largest decreases in child immunization rates (a drop from 93 percent to 75 percent). Both Nuru farmer household cohorts also experienced lower adoption rates in antenatal visits and immediate breastfeeding and positive shifts in delivery in a health center, exclusive breastfeeding and appropriate complementary feeding relative to their 2014 incidence rates.

In the safe water, sanitation and malaria behaviors, all Nuru farmer households drink safe water and use soap statistically more than the comparison households. They also increased the use of appropriate latrines relative to 2014.

In conclusion, evidence suggests that more Nuru farmer households continue to adopt and maintain behaviors related to safe pregnancy and childbirth as well as safe water, sanitation, and malaria prevention in comparison with non-Nuru households. Recommendations for NK M&E and HC to consider as a result of these findings are as follows:

1. NK HC should continue to reinforce drinking safe water, washing hands with soap and appropriate latrine usage, as the emphasis on these behaviors in 2015 caused positive shifts in these indicators.
2. Since Nuru farmer households with two years of intervention have shown fewer improvements in the safe pregnancy and childbirth indicators relative to Nuru farmer households with three years of intervention and the comparison group, NK HC should consider programmatic shifts that can address the specific health challenges faced by this cohort in maternal and child health.
3. NK HC should also explore why Nuru farmer households with two years of intervention experienced the largest drops in immunization rates and, depending on the findings, consider ways to improve vaccination rates perhaps via more tailored interpersonal communication around vaccines or other activity shifts.
4. As less Nuru farmer households in both intervention cohorts attended ANC visits and practiced immediate breastfeeding in comparison with 2014, NK HC should also explore barriers to the adoption of these behaviors and adjust program implementation accordingly.

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Introduction

Nuru's Monitoring and Evaluation Program (M&E) produces useful and relevant information that can contribute to key decision-making about Nuru's programs (e.g., whether to continue, replicate and/or scale an intervention). With this focus on utilization at the center of Nuru's M&E strategy, the M&E team works to objectively monitor and evaluate the performance and impact of Nuru's four impact programs—Agriculture, Financial Inclusion, Healthcare and Education.

In service to this approach, Nuru Kenya (NK) M&E administered a survey in November 2015 that built on a similar annual data collection efforts since 2013[3] and aimed to answer the question: ***What is the impact of the Nuru Kenya Healthcare Program on Nuru farmer households?***[4] This paper addresses this question and presents the ten healthy behaviors that NK Healthcare targets as well as Nuru's approach to assessing the impact of the program through a scorecard methodology, and the results of the 2015 findings.

The Integrated Nuru Model

Nuru International is on a mission to end extreme poverty in remote, rural areas. Communities facing extreme poverty deal with fundamental challenges of hunger, an inability to cope with economic shocks, averting preventable disease and death and illiteracy. Nuru has proven its ability to deliver lasting impact in these four areas in Kenya and is currently positioning its model for global scale.

As a catalyst for sustainable development, Nuru's role is to identify nationals it can raise up as servant leaders and nation builders; remove barriers preventing them from realizing their full potential; equip them with skills, resources and attitudes to end extreme poverty in their region; and provide them with access to a reliable, market-based source of capital through Nuru Social Enterprises. By establishing locally led community development organizations funded through for-profit businesses, Nuru enables nationals to lift an entire region out of extreme poverty within seven years.

[3] NK M&E administered a HC survey in 2012 as well but the survey did not capture all 10 healthy behaviors and excluded the Mabera intervention group. The decision was made this year to drop the 2012 from this impact report. For more information please reach out to Nuru International's M&E department.

[4] In the rest of the report, Nuru farmer households and Nuru households will be used interchangeably.

Nuru Kenya Healthcare Program

As one of Nuru's four impact programs, the goal of the Nuru Kenya (NK) Healthcare Program (HC) is to work with Nuru farmer households to increase the adoption and maintenance of healthy behaviors that have been identified to improve maternal and child health.

According to the World Health Organization, the greatest contributors to morbidity and mortality for children under five years of age in remote, rural areas of the developing world are:

- Pneumonia
- Diarrhea
- Malaria
- Undernutrition
- Newborn complications
- Pregnancy complications[5]

These diseases are preventable; but if not addressed, complications can lead to loss of life, suppressed development and a huge financial burden for those who are already suffering from extreme poverty. Of all populations, pregnant women and children under five years old are the most vulnerable to communicable diseases and health complications. Teaching households how to avert preventable disease and death protects the livelihood of farmers who spend long days working their fields; safeguards them from additional economic shocks caused by healthcare expenses and lost productivity; ensures their children are healthy enough to attend school; and ultimately secures a healthier future by cultivating preventative habits and norms that can be passed onto future generations.

Studies have found that certain behaviors, such as attending four antenatal (ANC) visits during pregnancy[6], washing hands with soap[7] and sleeping under a long-lasting insecticide treated bed net (LLIN)[8] can greatly reduce maternal and child health problems. However, the barriers to adopting and practicing these behaviors over time are many and include knowledge, access to preventive measures, financial constraints and cultural practices.

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[5] WHO. Children: reducing mortality. Updated September 2013. Retrieved 2013 January 14 from http://www.who.int/mediacentre/factsheets/fs178/en/index.html

[6] UNICEF. (2011, February). *Monitoring the situation of children and women.* Retrieved May 12, 2011 from ChildInfo: http://www.childinfo.org/antenatal_care.html

[7] Global Health Council. (2010-2011). *Causes of Child Death.* Retrieved April 20, 2011 from Global Health Council: http://www.globalhealth.org/child_health/child_mortality/causes_death/

[8] Johansson EW, N. H. (2007). *Malaria and children: progress in intervention coverage.* UNICEF, Roll Back Malaria Partnership.

In support of Nuru's goal to achieve sustainable and scalable poverty alleviation, NK HC aims to improve maternal and child health in remote, rural communities by providing tailored interpersonal communication at the household level. A monthly home visit from an NK HC field officer provides Nuru households with access to healthcare services through referrals and affordable commodities such as chlorine based water treatment and soap. Moreover, the tailored interpersonal communication approach involves employing observation and in-depth discussions to understand the specific needs of each household.

NK M&E measures the following indicators associated with the ten healthy behaviors to determine if the program is impacting Nuru households (Figure 1).

Figure 1: Ten Healthy Behaviors of the Nuru Kenya Healthcare Program

Healthy Behavior	Evaluation Question	Indicator
1. Sleep under LLIN	Are children sleeping under mosquito nets to prevent malaria?	Percent of children ages 0-59 months who slept under a long-lasting insecticide-treated net (LLIN) the previous night
2. Drink safe water	Are households treating their drinking water appropriately, if need be?	Percent of households who drink water from a safe source and store it appropriately or percent of households who treat their water effectively and store it safely
3. Wash hands with soap	Are caretakers washing hands at critical times to prevent illnesses?	Average percent of caretakers who wash their hands with soap and water after defecation and before cooking or eating
4. Use a latrine	Are individuals using a latrine to prevent illnesses?	Percent of individuals who always used an appropriate latrine in the last 24 hours for defecation
5. Provide appropriate complementary feeding	Are children eating a well-balanced, nutritious diet for their appropriate age group?	Percent of children 7-23 months whose mothers feed them a combination of grains, fruits/vegetables, dairy and legumes or meat
6. Immediate breastfeeding	Are mothers immediately breastfeeding their children after childbirth?	Percent of children 0-23 months whose mothers breastfed their child within one hour after birth
7. Exclusive breastfeeding	Are mothers continuing to exclusively breastfeed until children reach six months?	Percent of children 0-23 months whose mothers exclusively breastfed children from birth through 6 months of age
8. Attend four ANC visits	Are women attending ANC visits regularly for a healthy pregnancy?	Percent of children ages 0-23 months whose mothers had four or more antenatal care (ANC) visits when they were pregnant
9. Deliver in a health facility	Are mothers delivering in a health facility?	Percent of children ages 0-23 months whose mothers delivered their child in a health facility
10. Fully immunize children between 9-23 months	Are children fully immunized against preventable diseases?	Percent of children ages 9-23 months who received full immunization for polio, pneumococcal, Penta 5, BCG and measles

Methodology

The following section outlines Nuru's 2015 methodology for selecting the sample frame to assess the ten healthy behaviors as well as the 2015 Healthcare Household Survey data collection process and timeline.

Sampling Frame

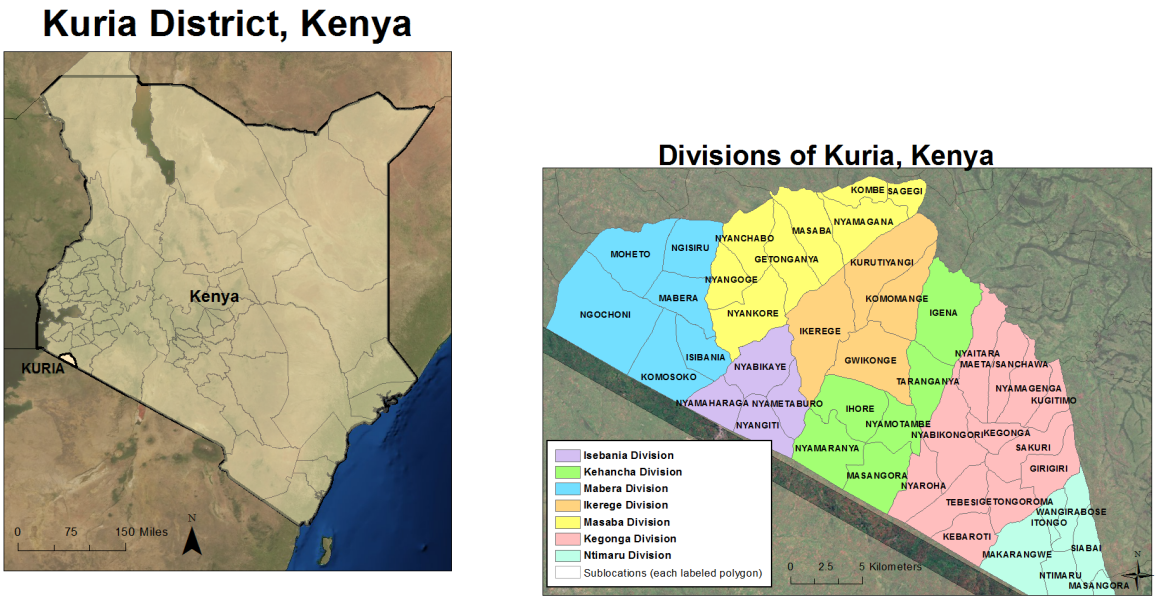
In 2015, NK HC provided services to 4,605 households. The survey sample incorporated a representative sample from two groups exposed to NK HC interventions at different times, as well as a third group of non-Nuru households (Figure 2):

1. Comparison group: non-Nuru households from Kehancha Division (no intervention)
2. Two years of NK HC intervention: Nuru farmer households from Mabera Division[9]
3. Three years of NK HC intervention: Nuru farmer households from Kehancha Division[10]

[9] It is important to note that in 2012 a baseline was conducted in the Kehancha division among Nuru and non-Nuru households; however, because of a change in outreach plans by NK Healthcare, the 2012 baseline was not representative of the safe pregnancy and childbirth behaviors. Therefore, M&E could not draw conclusions about these behaviors in 2013. However, the data collected regarding safe water, sanitation and malaria prevention behaviors were representative and thus, could be used to compare 2012, 2013 and 2014 data for these behaviors. Regardless, since data are missing for the other behaviors, the 2012 data have been dropped from this analysis.

[10] NK M&E also surveyed households in Isibania Division. For the purposes of this impact assessment Kehancha and Isibania are grouped together and referred to as Kehancha intervention.

Figure 2: Map of Kenya and Divisions of Kuria West, Kenya



In order to account for the six behaviors related directly to maternal and child health, a minimum sample size of 300 mothers with children 0-23 months was needed. The goal of 300 was set based on a 90 percent confidence level to detect a 10 percent difference between two sample proportions (intervention vs. comparison). Overall, NK M&E surveyed 1,868 households and collected data on 1,068 children 0-23 in these households.[11] Minimum sample sizes were achieved for the children's 0-23 month cohort in both the intervention and comparison groups (Table 1).

Table 1: Sample Size for the 2015 Survey

Cohort	Households Surveyed (n)	No. of Children 0-23 Months
Kehancha Intervention	458	308
Mabera Intervention	509	306
Kehancha Comparison	901	454
Totals	**1,868**	**1,068**

[11] In Mabera division specifically 24 households and 13 children 0-23 months were later dropped from the analysis as these households were found to be located in a different geographic area. Dropping these households from the analysis did not have a significant impact on the overall results.

For the comparison households specifically, census data[12] were used to develop a random sample in the Igena, Masangora and Taranganya sublocations of Kehancha division. Rather than implementing a geographically stratified sample, NK M&E employed a random 10x30 approach in each sublocation (i.e. 10 villages and 30 households per village multiplied by 3 sublocations = 900 households) to account for the wealth disparities in one particular comparison town relative to Nuru households. Kehancha town, the political seat of Kuria West, resides in Igena sublocation. In general, people living in this area have more access to hospitals and health clinics in comparison with the surrounding areas. To avoid a potential bias resulting from differences in socioeconomic status between Igena and the remaining two comparison sublocations (Masangora and Taranganya) as well as the Nuru households, NK M&E administered a similar amount of surveys in all three sublocations[13] (Table 2). Similar to data collection efforts in previous years, NK M&E surveyed households with no children, with children under 5 and with children 0-23 months.

Table 2: Comparison Group Sample Sizes for 2015

Comparison Sublocation	Households Surveyed (n)	No. of Children 0-23 Months
Igena	304	164
Masangora	300	179
Taranganya	297	111
Total (n)	**901**	**454**

Data Collection

In the intervention sublocations, both enumerators and supervisors worked with NK HC field officers to visit the households included in the sample. In the comparison area, enumerators and supervisors worked with village elders to randomly survey a predetermined number of households. In order to facilitate cooperation with village elders, NK M&E provided them with stipends equivalent to the amount paid to enumerators.

The survey collected the following information[14]:

[12] Population data are taken from 2009 Kenya Census data from the Kenya National Bureau of Statistics, Population and Housing Census. Retrieved 13 November 2013 from http://www.knbs.or.ke/population.php

[13] Due to logistical challenges such as households not be available to be surveyed or refusing to be surveyed, identical amounts of surveys could not be completed in each comparison sublocation.

[14] Please reference Appendix 1 for the 2015 Healthcare Survey

- Demographic data (gender, marital status, age of respondent, district, sublocation, village);
- Relevant questions related to the ten healthy behaviors taught by NK HC[15](Figure 1)

To ensure the quality of the data analyzed in this report, NK M&E built a system of checks and balances into the data entry process whereby each individual survey was reviewed three separate times before final entry. First, NK M&E closely supervised the data entry process by constantly checking for common mistakes. Throughout the process, data entry clerks highlighted systematic data collection errors so supervisors could correct any field mistakes in real time. Second, surveys were randomly selected for a question-by-question comparison of entry versus the raw data. As a final measure, NK M&E randomly called survey respondents from the list of households visited by each enumerator. Conversations with farmers helped NK M&E to understand if enumerators had accurately recorded the farmers' responses. Consistently poor data collection or data entry resulted in employee termination. Given the system implemented by NK M&E, the 2015 season resulted in a limited number of firings as well as exceptional data quality.

Timeline

The survey implementation followed the timeline detailed below:

- Enumerator training: July 6-10, 2015
- Data collection: July 13- August 9, 2015
- Data entry: July 14-August 10, 2015

Analysis: Nuru Kenya Healthcare Scorecards

While each of NK HC's indicators can be reported separately, NK M&E and HC developed three scorecards to aggregate progress toward behavior changes resulting from the program. NK M&E's approach of counting the number of healthy behaviors a person engages in was modified from the Center for Disease Control and Prevention's methodology, which shows that people live longer as they engage in a greater number of healthy behaviors.[16]

With the exception of handwashing, each healthy behavior is scored on a binary scale. In other words, there is a total possible score of 1 for each behavior successfully adopted. For the

[15] For indicators where the target group is more restrictive age than the 0-23 months surveyed, the question was answered based on delayed recall. For example, this means that households with children 24-59 months were asked to recall their experiences when their children were 0-23 months old.

[16] See http://www.cdc.gov/features/livelonger/index.html#Reference for further detail.

handwashing indicator, calculations consider three critical times: washing hands after defecation, before cooking and before eating. Therefore, each critical handwashing time has a possible score of 0.33, for a total score of one (.33+.33+.33) if all three times are positively identified by a household.[17]

The three NK HC scorecards used to assess the intervention are:

- Aggregate scorecard: Healthy Behaviors Scorecard (based on all ten out of ten healthy behaviors)
- Scorecard 1: Safe Pregnancy and Childbirth Scorecard (based on six out of ten behaviors)
- Scorecard 2: Safe Water, Sanitation and Malaria Prevention Scorecard (based on four out of ten behaviors)

Firstly, the aggregated scorecard represents the summation of the two scorecards that are described below in more detail. Altogether, ten indicators and 10 possible points comprise Healthy Behaviors Scorecard as indicated in Figure 3.

For the Safe Pregnancy and Childbirth Scorecard, there are a total of six indicators representing the six healthy behaviors that are measured through a survey at the household level (each scored as 1 point). Mothers of children ages 0-23 months were asked to respond to questions related to antenatal care visits, childbirth, immunization and nutrition for each of their children in this age bracket (Appendix 3). At the individual behavior level, each child in the 0-23 month age group received a score of either 1 or 0 for indicators related to immediate and exclusive breastfeeding, antenatal visits, and childbirth. Full immunization status, however, only applied to children ages 9-23 months whereas appropriate complementary feeding scores could only be attributed to children between 7-23 months.

For the aggregated Safe Pregnancy and Childbirth Scorecard, each child was scored on a scale of 0-6 points based on the total number of related behaviors. In order to ensure that all children were evaluated by the maximum of 6 available points, children younger than nine months received a score of 1 for showing progress towards full immunization if they had been given the appropriate vaccines for their age; for otherwise, a score of 0. Concurrently, a score of 1 for appropriate complementary feeding was given to children who are six months and under and still exclusively breastfeeding; for otherwise, a score of 0. These adjustments allowed the scorecard to show the average of all individual scores for children on a 6 point scale.

For the Safe Water, Sanitation and Malaria Prevention Scorecard, 4 possible points can be achieved on the survey. The first two questions (regarding water source and treatment and latrine use) were

[17] See http://www.cdc.gov/features/livelonger/index.html#Reference for further detail.

asked of all households for a possible score of 2. These household scores were then averaged by each group surveyed. Next, the average percent adoption of handwashing (all households) and sleeping under long-lasting insecticide treated bed nets (LLIN) for all children under five were added to the scorecard for a total possible score of 4.

The analysis section that follows presents scorecard averages and incidence rates for the ten specific indicators. Where applicable, proportions tests for statistical significance were performed to denote statistical differences between the intervention and comparison groups.

Figure 3: Nuru Kenya Healthcare Program's Healthy Behaviors

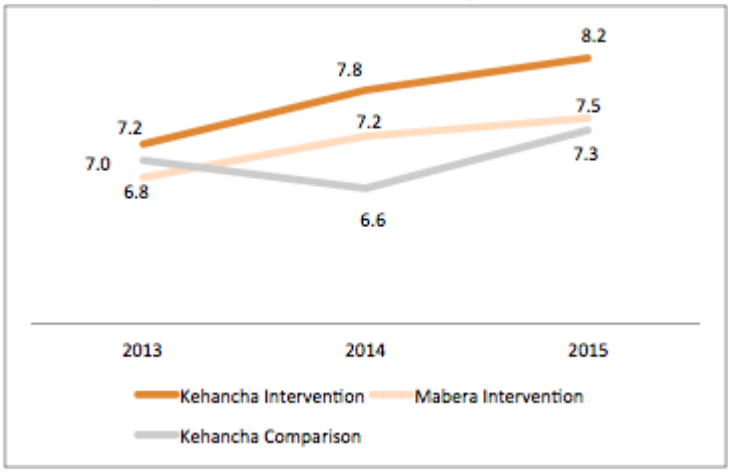
Behavior	Target Group during intervention period	Survey Age Group
Attend four ANC visits	Pregnant mothers	Mothers of children 0-23 months
Deliver in a health center	Pregnant mothers	Mothers of children 0-23 months
Immediate breastfeeding	Households with children 0-23 months	Mothers of children 0-23 months
Exclusive breastfeeding	Households with children 0-23 months	Mothers of children 0-23 months
Appropriate complementary feeding	Households with children 7-23 months	Mothers of children 0-23 months
Fully immunize children 9-23 months	Households with children 9-23 months	Mothers of children 0-23 months
Sleep under a long-lasting insecticide treated bed net (LLIN)	Households with children 0-59 months	Mothers of children 0-59 months
Use a latrine	All households	All households
Drink safe water	All households	All households
Wash hands with soap	All households	All households

Results: Ten Healthy Behaviors Scorecard

Since 2013, greater numbers of Nuru intervention households adopted the ten healthy behaviors relative to the non-intervention group (Figure 4). Overall, after three years of intervention, Kehancha Nuru households improved the adoption of these behaviors by 14 percent. Similarly, Nuru Mabera households, after receiving two years of Nuru Healthcare services, demonstrated an 11 percent increase in the adoption of the ten healthy behaviors. In comparison, the non-intervention group increased the rate of adoption of the ten healthy behaviors by 5 percent. This means that the net difference between Kehancha and Mabera Nuru households versus the comparison group is 9 and 5 percentage points respectively. As expected, the longer Nuru farmer households receive NK HC services, the more healthy behaviors they adopt over time.

In practical terms, the averages below mean that greater numbers of Nuru households drink safe water, wash their hands with soap at key times, and use safe latrines. Moreover, Nuru women with children from 0-23 months exclusively breastfeed more often in comparison with the Kehancha non-intervention group. These data suggest that NK HC has positively influenced Nuru households' practice and maintenance of the ten healthy behaviors.

Figure 4: Average of the Ten Healthy Behaviors 2013-2015



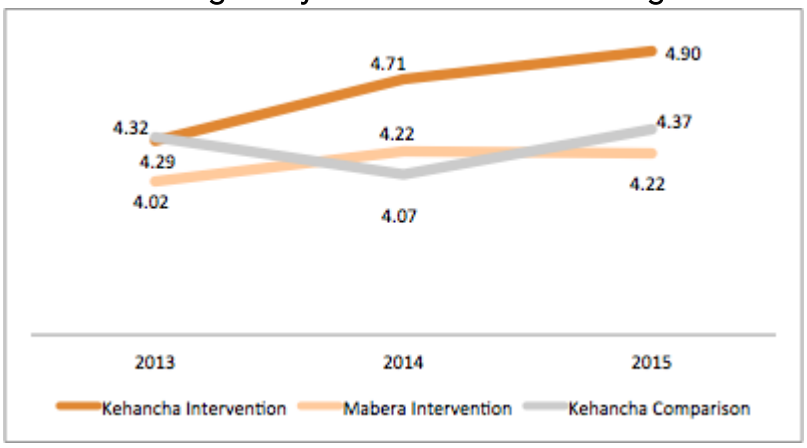
Results Scorecard 1: Safe Pregnancy and Childbirth

In general, Nuru intervention groups showed greater change over time in the safe pregnancy and childbirth indicators from Scorecard 1 (Figure 5) relative to the Kehancha comparison group. Since 2013, Kehancha Nuru households increased the adoption of the six maternal and child health behaviors by 14 percent whereas Mabera Nuru households displayed growth of 5 percent versus

the Kehancha non-intervention households whose scores changed by 1 percent. This means that net differences between the comparison and Kehancha and Mabera Nuru households are 13 and 4 percentage points respectively.

For 2015 specifically, Kehancha and Mabera intervention groups have averages of 4.90 and 4.22 while the Kehancha comparison cohort received an average score of 4.37 out of a total of 6 behaviors. In other words, since the 2014 NK Healthcare impact assessments, Mabera Nuru households sustained their Scorecard 1 average through 2015 while the comparison group surpassed the current Mabera scores in 2015.

Figure 5: Safe Pregnancy and Childbirth Averages 2013-2015



When examining adoption rates for the individual behaviors in Scorecard 1, the Kehancha intervention group demonstrates statistically higher incidences across five out of the six behaviors in comparison with the non-Nuru sample (Table 3). In contrast, households in the Mabera intervention group practice one healthy behavior (exclusive breastfeeding) statistically more than the comparison group. These data mean that more Kehancha Nuru households adopt and maintain the maternal and child health behaviors than the Mabera Nuru households from 2013-2015.

Table 3: 2015 Safe Pregnancy and Childbirth Indicator Incidence Rates[18]

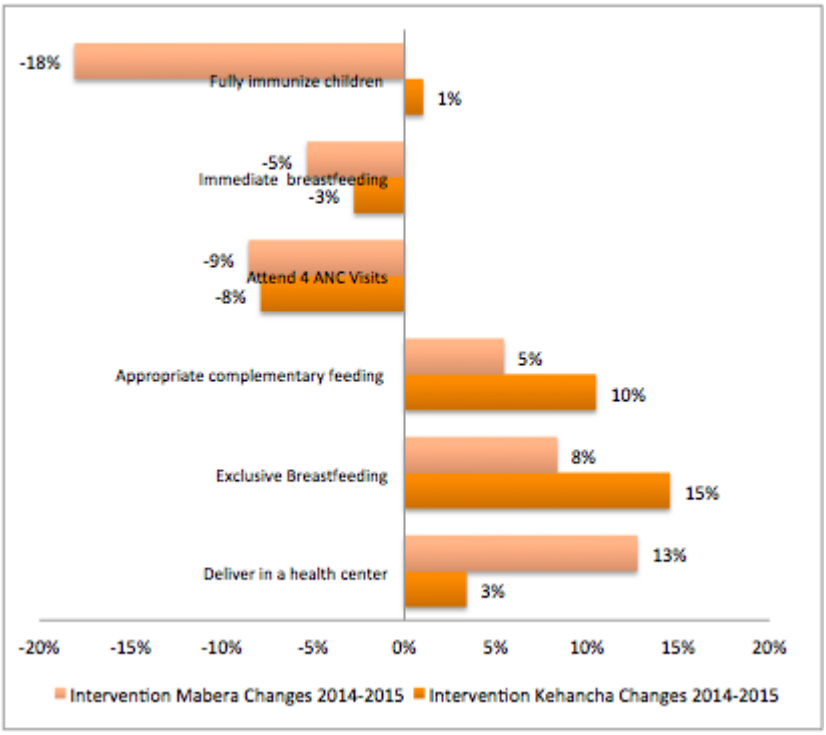
Behavior	Intervention Kehancha 2015	Intervention Mabera 2015	Comparison Kehancha 2015
Attend 4 ANC visits	77%**	63%	69%
Deliver in a health center	94%**	80%	84%
Immediate breastfeeding	88%*	83%	83%
Exclusive breastfeeding	79%**	69%*	63%
Appropriate complementary feeding	56%	45%	55%
Fully immunize children	91%**	75%	83%

Relative to only Nuru farmer household 2014 adoption rates, more 2015 Nuru women with children between 0-23 months delivered in health centers, breastfed exclusively and provided appropriate complementary feeding to children 7-23 months (Figure 6). The Kehancha intervention households also experienced a slight improvement in the vaccination coverage rates for children between the ages of 9-23 months. That said, both intervention groups practiced less immediate breastfeeding and went to fewer ANC visits in comparison with 2014. Nuru Mabera households in particular saw a stark drop in the immunization percentages of children 9-23 months (18 percentage points).[19]

[18] One asterisk denotes statistical significance at the 95% level and two asterisks mark statistical significance at the 99% level.

[19] A possible immunization shortage in Mabera specifically could have contributed to this drop. NK HC is still investigating this at the time of writing this report.

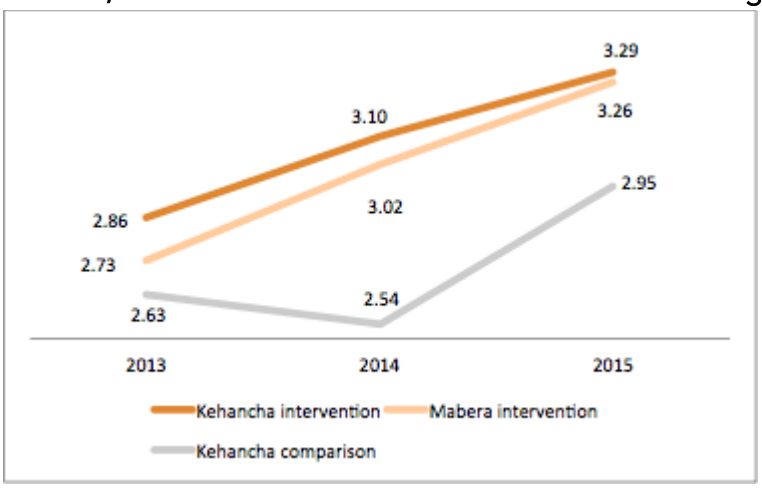
Figure 6: 2014-2015 Nuru Household Changes in Safe Pregnancy and Childbirth Indicators



Results Scorecard 2: Safe Water, Sanitation and Malaria Prevention

Scorecard 2 outlines indicators related to safe water, sanitation, and malaria prevention at the household level. In contrast to the Kehancha non-intervention group Scorecard 2 averages, both Kehancha and Mabera Nuru households showed greater increases of 3 and 7 percentage points respectively from 2013-2015 (Figure 7). For 2015, Kehancha Nuru households practice on average 3.29 behaviors out of 4, whereas Mabera households follow closely behind, implementing 3.26 out of 4. In comparison, the Non-Nuru Kehancha cohort engages in an average of 2.95 behaviors out of 4 for 2015. These data mean that more Nuru intervention households practice and maintain behaviors related to safe water, sanitation and malaria prevention versus the comparison group.

Figure 7: Safe Water, Sanitation and Malaria Prevention Averages 2013-2015



The 2015 Scorecard 2 averages achieved by the Nuru intervention households are most influenced by their statistically higher rates of soap use and drinking safe water (Table 4).[20] More Nuru households also use an appropriate latrine in comparison with the non-intervention group but the differences observed below are not statistically significant (Kehancha intervention: 4 percentage points greater; Mabera intervention: 3 percentage points greater).

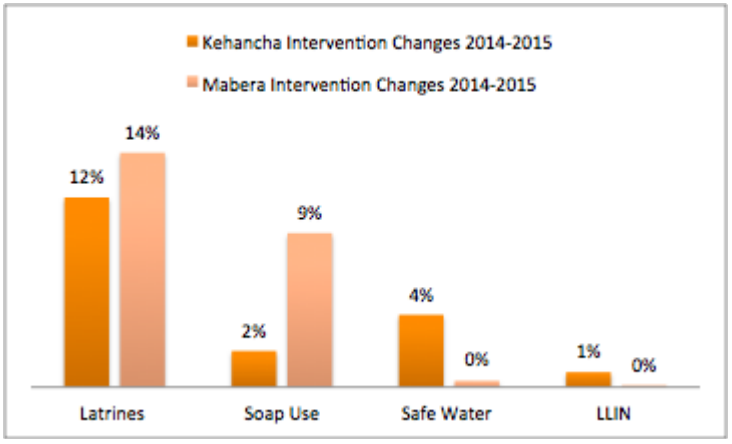
Table 4: 2015 Safe Water, Sanitation and Malaria Indicator Incidence Rates

Behavior	Kehancha Intervention 2015	Mabera Intervention 2015	Kehancha Comparison 2015
Latrines	69%	68%	65%
Soap Use	71%**	70%**	63%
Safe Water	90%**	88%**	69%
LLIN	100%*	99%	99%

In comparison with Nuru Scorecard 2 incidence rates for 2014, Nuru Kehancha households improved their adoption of all four safe water, sanitation and malaria prevention behaviors. Simultaneously, greater percentages of Mabera households use appropriate latrines and wash their hands with soap (14 and 9 percentage points respectively).

[20] One asterisk denotes statistical significance at the 95% level and two asterisks mark statistical significance at the 99% level.

Figure 8: 2014-2015 Nuru Household Changes in Safe Water, Sanitation and Malaria Prevention



Limitations

Firstly, potential comparability challenges exist in the Kehancha non-intervention cohort. NK M&E and HC originally selected this region because it was similar to the Nuru intervention group region in Kehancha. The idea was that the comparison region was far enough away to reduce spillover, but also close enough to remain similar to the intervention group. However, the comparison group sublocation, Igena, is closer in distance to the town of Kehancha, the political seat of Kuria West, where there is a greater presence of health centers and hospitals than in the intervention group sublocations. This threat to external validity may have resulted in elevated scores within the comparison group for indicators specific to safe pregnancy and childbirth behaviors. As described earlier in this report, NK M&E attempted to mitigate this threat by surveying equal numbers of households and children 0-23 months in all three comparison sublocations in 2015.

Secondly, 2015 resulted in logistical challenges due to the misrepresentation of Nuru households' sublocations in NK's Salesforce database. Normally, NK M&E derives the Nuru geographically stratified sample from the Salesforce location records, which are managed by NK Agriculture; however, this was not possible in 2015 because of inaccurate record keeping. Not only did NK M&E have trouble reaching the targeted number of households in each sublocation but the team also spent additional resources on trying to locate farmers whose records were incorrect in Salesforce. Moreover, these challenges were not communicated in a timely fashion to Nuru International. Ultimately, some 2015 households needed to be dropped from the sample because of their geographic locations. Excluding these households from the data set also meant that the final number of children 0-23 months for Mabera division just missed the minimum sample threshold of 300.

Moving forward, it will be important for NK to implement more precise record keeping in Salesforce. Essentially, the distribution of Nuru households surveyed for 2015 calls into question the frequency with which NK HC field officers visited families that were particularly far away from their assigned Salesforce sublocation. Furthermore, during actual survey implementation, NK M&E should communicate more frequently with Nuru International about sampling challenges in order to reach the desired sample size.

Finally, due to operational constraints, NK M&E surveyed the HC farmer households earlier in 2015 in comparison with the 2014 and 2013 surveys. Concretely, data for 2013 and 2014 were collected in October and November for each year, meaning that one year lagged between surveys; however, as NK M&E administered the 2015 survey in July, only seven months (versus one year) elapsed between the 2014 and 2015 surveys. While logistically the 2015 survey schedule works to NK M&E's advantage, the shortened time between surveys may have negatively influenced the Mabera results in particular. Practically speaking, Mabera Nuru households might have demonstrated more change in the maternal and child health indicators if survey had been conducted in October of 2015 instead of July. For the 2016 NK HC follow-up survey, the timing will not be a problem as it is scheduled for one year after the 2015 survey (July 2016).

Conclusions and Recommendations

To date, more NK HC intervention households engage in and sustain the ten healthy behaviors aimed at preventing maternal and child death versus the non-intervention group. This means that greater percentages of Nuru households relative to the comparison group wash hands at critical times and drink safe water. Mothers of children 0-23 months from these Nuru households are also more likely to undertake exclusive breastfeeding. From the two Nuru intervention groups, Kehancha Nuru households outperform the comparison group in both scorecards while Mabera Nuru households exceed averages from the comparison group in Scorecard 2 only. Given these results, recommendations for NK HC and M&E to consider are as follows:

1. NK HC should continue to reinforce drinking safe water, washing hands with soap and appropriate latrine usage, as the emphasis on these behaviors in 2015 caused positive shifts in these indicators.
2. Since Mabera Nuru farmer households have shown fewer improvements in Scorecard 1 relative Kehancha Nuru farmer households and the comparison group, NK HC should consider programmatic shifts that can address the specific health challenges faced by this division in maternal and child health.
3. NK HC should also explore why Mabera households experienced the largest drops in immunization rates in Scorecard 1 and, depending on the findings, consider ways to

improve vaccination rates perhaps via more tailored interpersonal communication around vaccines or other activity shifts.

4. As less Kehancha and Mabera Nuru households attended ANC visits and practiced immediate breastfeeding in comparison with 2014, NK HC should also explore barriers to the adoption of these behaviors and adjust program implementation accordingly.
5. NK HC should perform routine field checks of households' locations relative to Salesforce records to ensure that the correct Nuru households are receiving NK Healthcare services.
6. Given the logistical challenges with the 2015 survey, NK M&E should continue to provide rapid and frequent feedback to Nuru International in order to achieve the minimal thresholds for representative samples.

Appendix A: 2015 NK Healthcare Survey

Nuru Healthcare Survey 2014	Enumerator Name
	Consent
	Division
	Sublocation
	Village
	Respondent's Age
	Respondent's Name
	Respondent's gender = M / F
	Respondent's Nearest Landmark
	Head of Household Name
	Head of Household Gender = M / F
	Head of Household Marital Status

1		[Enumerator fill in Nuru ID for Nuru household]			
		Nuru ID(1):	Non-Nuru (2) (Skip to Qn 3)		
2		Does a Nuru healthcare FO visit your house?			
		Yes (1)	No (2)	Don't know (-1)	
3		How many children (0-23 months) usually live and sleep in your household (9 or more months/year)? [Refer the ages of children on the Antenatal Card if available]			
		Female children		Male children	
4		How many children (24-59 months) usually live and sleep in your household (9 or more months/year)? [Refer the ages of children on the Antenatal Card if available]			
		Female children		Male children	
5		What is the main source (meaning, the source water comes from immediately before being used) of the water your household uses for drinking?			
		During most of the year		Don't know (-1)	

	1. Private borehole (< 20m deep)				2. Piped from water treatment plant
	3. Communal borehole (< 20m deep)			4. Spring	5. Private borehole (> 20m deep)
	6. River	7. Communal borehole (> 20m deep)		8. Stream	9. Private well (< 20m deep)
	10. Pond		11. Communal well (< 20m deep)		12. Water vender
	13. Private well (> 20m deep)		14. Rainwater harvesting container (open)		
	15. Communal well (> 20m deep)				16. Rainwater harvesting container (closed)
	17. Large dam (built & managed by government, company or collective)				18. Small dam (built & managed by 1-15 households)
	19. Irrigation canal				20. Other (specify):

6

In the past week, has your household treated its water before drinking it? (If answers Yes, ask) What do you usually do to the water to make it safer to drink? (Circle one option) (if answers heats water to a boils(4), probe for # of minutes boiling)

Does not treat drinking water (1) Skip to Q8	Liquid chlorine – WaterGuard (2)
Liquid chlorine – other (not WaterGuard) (3)	Heats water to a boil for 3 or more minutes (4) (if answers boils, probe for # of minutes boiling)
PUR sachets (5)	Water filter (ceramic, sand, composite) (6)
Solar disinfection (7):	Aquatab (8)

		Filter/straining with a cloth (not folded, or folded 1x) (9)	Filter/straining with a cloth (folded ≥ 2x) (10)
		Lets water stand, so sediment can settle (11)	Heats water, but not to a boil (12)
		Other, specify (13):	
7		After treating your water for drinking, what do you normally do with the treated water you don't drink immediately? (Circle one option)	
		Store water in an uncovered clay pot (1)	Store water in a clay pot, and then cover it (2)
		Store water in an uncovered metal pot/sufuria (3)	Store water in a metal pot/sufuria, and then cover it (4)
		Store water in an uncovered container, bucket or jerry-can made of plastic (5)	Store water in a container, bucket or jerry-can made of plastic, and then cover it (6)
		Store water in an uncovered container with a spigot or tap (7)	Store water in a covered container with a spigot or tap (8)
		Pour water into plastic bottles (9)	Other, specify (10):
		Don't know (-1)	
8			

Now I'm going to ask you a question about your latrine habits. In the last 24 hours (day), if you had to take a long call, where did you go? (Circle one option)

Don't know (-1)	Did not have to take a long call (-2)
None (open defecation) (1)	Communal, open pit (2)
Communal, enclosed pit (3)	Communal, enclosed improved-ventilation pit (4)
Communal, enclosed pour-flush (5)	Communal, enclosed flush (6)
Communal, compost or biogas (7)	Private, open pit (8)
Private, enclosed pit (9)	Private, enclosed improved-ventilation pit (10)
Private, enclosed pour-flush (11)	Private, enclosed flush (12)
Private, compost or biogas (13)	Simple pit with a concrete slab (14):
Other, specify (15):	

"Open" means there is no structure, or a structure with no roof. "Enclosed" means there is a structure with any sort of roof. "Communal" means the facility is shared by more than 3 households. "Private" means the facility is used by 1-2 households.

9

Do you use soap when you clean your hands? If yes, when do you usually use soap to clean your hands? [circle all that apply & probe for multiple times for cleaning hands] Ask: Before what events in the day, do you clean your hands? Ask: After what events in the day, do you clean your hands?]

	Don't know (-1)	Doesn't use soap (-2)	After defecating (1)	Before meals (2)
	When guests visit (3)	Before food preparation (4)	After coming back from the shamba (5)	After meals (6)
	Before feeding children (7)	After attending to a child who has defecated (8)	Other, specify (9):	

10	NB: This section is meant for children's between the age of 0 – 59 Months [For HH with children 0-59 Months] How can a person prevent pregnancy complications? (Circle all that apply)

Attend 4 ANC visits (1)	Deliver at a clinic/health Centre (2)	Good nutrition (3)
Sleep under LLIN (4)	Deliver with a skilled attendant at home/residence (5)	Other, specify (6):
Don't know (-1)		

11	[For HH with children0-59 Months] How can a person prevent their child from getting pneumonia? (Circle all that apply)

Wash hands with soap (1)	Exclusive breastfeeding (2)	Fully immunize (3)
Wash hands (4)	Wear warm clothing (5)	Stay out of the rain (6)
Other, specify (7)	Don't know (-1)	

12	[For HH with children 0-59 Months] How can a person prevent their child from getting diarrhea? (Circle all that apply)

Wash hands with soap (1)	Use latrine (2)	Drink clean water (3)
Wash hands (4)	Safe water usage (5)	Proper feces disposal

			(6)
	Exclusive breastfeeding (7)	Other, specify (8)	Don't know (-1)

13	[For HH with children 0-59 Months] How can a person prevent their child from getting malaria? (Circle all that apply)		
	Have them sleep under a LLIN net (1)	Indoor residual spraying (IRS) (2)	Repellents (3)
	Antimalarial medication (4)	Clear the bushes (5)	No standing water (6)
	Wear long sleeves/long trousers (7)	Other, specify (8)	Don't know (-1)

14	Child's Name	Age (in months)	Gender (M or F)
	1)		

15	[For child 0-23 months] During the mother's/your pregnancy with (NAME), did she/you receive antenatal care? If yes, how many times? [Refer to Antenatal Card if available. Write "0" if attended no visits]		
	Times		Don't know (-1)

16	[For child, 0-23 months, ask:] Where was (NAME) born? (Circle one option.)	
	Clinic (1)	Health Center - levels 1, 2 & 3 (2)
	Sub-district Hospital (3)	District Hospital (4)
	Home (5)	Other, specify (6)

17

[For child 0-23 months] Which vaccines did (NAME) receive? (Refer to the immunization card if available. Tick box for each vaccination received. If the child did not receive an immunization, write "None". If the respondent doesn't know,

Write, -1.)

	Card No card	Received vaccination?
0.1	BCG Vaccine (At Birth)	
0.2	(Penta)Diphtheria/Pertussis/Tetanus/ Hep B/ Haemophilus Influenza Type b Dose 1 (6 weeks)	
0.3	(Penta)Diphtheria/Pertussis/Tetanus/ Hep B/ Haemophilus Influenza Type b Dose 2 (10 weeks)	
0.4	(Penta)Diphtheria/Pertussis/Tetanus/ Hep B/ Haemophilus Influenza Type b Dose 3 (14 weeks)	
0.5	Oral Polio Vaccine (OPV) Dose 0 (At Birth)	
0.6	Oral Polio Vaccine (OPV) Dose 1 (6 weeks)	
0.7	Oral Polio Vaccine (OPV) Dose 2 (10 weeks)	
0.8	Oral Polio Vaccine (OPV) Dose 3 (14 weeks)	
0.9	Pneumococcal Dose 1	
0.1	Pneumococcal Dose 2	
0.11	Pneumococcal Dose 3	
0.12	Measles Vaccine (9 months)	

18	[For child 0-23 months] Was (NAME) ever breastfed?

Yes (1)	No (2) Skip to 22	Don't know (-1)

19	[For child 0-23 months] How long after birth was (NAME) put to the breast? (If less than 1 hour, record 00 hours. If less than 24 hours, record hours. Otherwise, record days.)

Hours		Days		Don't know (-1)

20	[For child 0-23 months] For how long did you breastfeed (NAME) after he/she was born? (If response not in months, write other time period in the margin & convert).

Months		Don't know (-1)

21	[For child 0-23 months] In the first six months after delivery, was (NAME) given anything to drink or eat other than breast milk?

Yes (1)	No (2)	Don't know (-1)

22	Did (NAME) sleep under a bed net last night? If so, what is the brand of the net?

No (1)		Yes, Government net (2)		Yes, Olyset net (3)
Yes, Nuru net (4)	Yes, clinic net (5)		Yes, other net (6)	Don't know (-1)

23	Did (NAME) receive a Vitamin A supplement in the last 6 months? Refer to immunization card if available.

Yes (1)	No (2)	Don't know (-1)

	5

24

[For youngest child 0-23 months] Now I would like to ask you what (NAME) ate yesterday during the day or at night. I am interested in whether your child had the item even if it was combined with other foods. [Use probing questions to help the respondent remember every time the child ate yesterday] In question 23 use the codes below.

Yes (1)	No (2)	Don't know (-1)
1	Breast milk	
2	Plain water	
3	Staple grains: like ugali, chapati, mandazi, busara, uji rice, bread?	
4	Any vegetables or fruits like: sukuma wiki, mgagani, passion, ndizi, nyanya , carrots, butternuts?	
5	Meat or eggs: Like nyama, eggs, chicken, goat, beef, fish?	
6	Legumes or nuts: Any food made from beans, lentils, or nuts like maharagwe, karanga or soya?	
7	Dairy: Like milk in chai, mazao ya ng'ombe	

25

[For youngest child 0-23 months] How many times did (NAME) eat yesterday during the day or at night? (If caregiver answers 7 or more times, record "7") [For "Don't Know, mark "-1"]

	Child 1
# of times	

26

Did (NAME) sleep under a bed net last night? If so, what is the brand of the net? (Circle one option.)

No (1)	Yes, Government net (2)	Yes, Olyset net (3)	
Yes, Nuru net (4)	Yes, clinic net (5)	Yes, other net (6)	Don't know (-1)

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27		Child's Name	Age (in years)	Age (in months: years x 12)	Gender (M or F)
		1)			
28		Did (NAME) sleep under a bed net last night? If so, what is the brand of the net? (Circle one option)			
		No (1)	Yes, Government net (2)		Yes, Olyset net (3)
		Yes, Nuru net (4)	Yes, clinic net (5)	Yes, other net (6)	Don't know (-1)