

Nehnwaa Child Survival Project

October 2008 – September 2013



Final Knowledge, Practice and Coverage (KPC) Survey Report September 2013



Table of Contents

Table of Contents	2
Acronyms	3
Executive Summary	4
Introduction	7
Project implementation	9
Methods	10
Data Collection and Analysis	13
Results and Discussion	14
Integrated Management of Childhood Illnesses	14
Maternal and Newborn Care	18
HIV	21
Expanded Program on Immunizations	22
Limitations	23
Conclusion	23
Appendices	25

Acronyms

ANC	Ante-Natal Care
ARI	Acute Respiratory Infections
ART	Anti-Retroviral Therapy
BCC	Behavior Change Communication
BLSS	Basic Life Saving Skills
BPHS	Basic Package of Health Services
CBIO	Census Based Impact-Oriented
CDC	Community Development Committee
CGV	Care Group Volunteer
CHO	County Health Officer
CHT	County Health Team
CHW	Community Health Worker
CSHGP	Child Survival and Health Grants Program
CSSP	Child Survival Support Project
CSTS	Child Survival Technical Support
EPI	Expanded Program on Immunization
GUMH	Ganta United Methodist Hospital
HBLSS	Home Based Life Saving Skills
HIS	Health Information Systems
HIV	Human Immunodeficiency Virus
IMCI	Integrated Management of Childhood Illnesses
IPT	Intermittent Presumptive Treatment
ITN	Insecticide Treated Net
KPC	Knowledge Practice and Coverage
LDHS	Liberia Demographic and Health Survey
LOE	Level of Effort
MOHSW	Ministry of Health and Social Welfare
NCHT	Nimba County Health Team
NDS	National Drug Service
NGO	Non-Governmental Organization
NHP	National Health Plan
NMCP	National Malaria Control Program
ORS	Oral Rehydration Solution
PHC	Primary Health Care
PMTCT	Prevention of Mother to Child Transmission
POU	Point of Use
TBA	Traditional Birth Attendant
TTM	Trained Traditional Midwife
USAID	United States Agency for International Development
VCT	Voluntary Counseling and Testing
WATSAN	Water and Sanitation
WHO	World Health Organization

Executive Summary

Background

In 2008, Curamericas Global, Inc., in partnership with the Ganta United Methodist Hospital, was awarded a 5-year, \$1.25 million grant from the United States Agency for International Development (USAID) Child Survival and Health Grants Program (CSHGP) to reduce neonatal, infant, child, and maternal morbidity and mortality in three Clans, the sub-districts of Garr, Gbein, and Bain Clans, of northern Nimba County, Liberia. Titled the Nehnwaa Child Survival Project, the project is housed in Ganta, Nimba County.

Serving over 137,000 community members and over 71,000 project beneficiaries, the Nehnwaa project aims to reduce child and maternal mortality in Northwest Nimba County, Liberia. The outcome objectives seek to address the six major causes of child and maternal mortality, including neonatal conditions, obstetric complications, malaria, pneumonia, diarrhea, and HIV.

The KPC Survey was conducted in August of 2013. The objectives of the survey were to:

- To collect data on the project's intervention areas to compare to the Baseline survey conducted in 2009 and Midterm survey conducted in 2011;
- To collect final data to be utilized in the final evaluation and contribute to determining the project's impact;
- To provide refresher capacity building to project staff in planning, organizing and implementing KPC Surveys, as well as data entry and cleaning for the M&E staff; and
- To reaffirm community participation and conduct community feedback sessions on the accomplishments of the project.

Methodology

The Nehnwaa Child Survival Project KPC Survey questionnaire consisted of 97 questions and surveyed mothers of children between the ages 0 – 23 months. The questionnaire was an updated version of the 2011 KPC which had questions taken from the standardized generic questionnaire format originally developed by the PVO Child Survival Support Project (CSSP) and modified and expanded by the Child Survival Technical Support (CSTS). The questionnaire collected information on all of the Rapid CATCH and project indicators, with all of the KPC questions covering the following intervention areas:

- Breastfeeding and Child Nutrition
- Childhood Immunization and Supplementation
- Anthropometric
- Sick Child
- Diarrhea Case Management
- Acute Respiratory Infections
- Malaria Management and Prevention
- Water and Sanitation

- Maternal and Newborn Care
- HIV

300 mothers of children under 24 months of age were surveyed from 30 project communities. These communities were selected using the 30-cluster sampling methodology.

Key Findings

The Final KPC Survey overall had positive results. The key findings include:

- 52.9% of children under six months are exclusively breastfed (measured as only fed breastmilk in the 24 hours preceding the survey) (CI: 42.8% - 62.9%).
- 23.4% of children surveyed were underweight (CI: 18.5% - 28.8%).
- 61.9% of children between 6-23 months are fed according to feeding guidelines (diversity, quantity, and frequency of food) (CI: 54.3% - 69.3%).
- 82.7% of children with diarrhea in the two weeks prior to the survey were treated with ORS (CI: 72.7% - 90.2%) and 30.9% of children with diarrhea were treated with zinc (CI: 21.1% - 42.1%).
- 96.6% of children with coughing and fast breathing in the two weeks prior to the survey were taken to an appropriate skilled provider for treatment (CI: 90.4% - 99.3%).
- 86.1% of children with a fever in the two weeks prior to the survey were treated with ACT within 24 hours of the onset of fever (CI: 78.9% - 91.5%).
- 99% of households surveyed own at least one insecticide-treated net (ITN) (CI: 97.1% - 99.8%), and 98.9% of children surveyed slept under a net the night prior to the survey (CI: 97.1% - 99.8%). Similarly, 98.3% of mothers reporting sleeping under an ITN at least most of the time while they were pregnant (CI: 96.1% - 99.5%).
- 26% of households are currently treating their water effectively (CI: 21.1% - 31.4%) but 99.7% are using an improved drinking source for water, some of which are pre-treated (CI: 98.2% - 99.9%).
- 95.6% of households are using an improved toilet facility (CI: 92.6% - 97.7%), but only 24% of households are using an improved toilet facility that is also accessible and hygienic (CI: 19.2% - 29.4%).
- 82.7% of households reported appropriate handwashing behaviors at at least 2 critical times (CI: 77.9% - 86.9%).
- 61.4% of mothers surveyed are using a modern method of contraception to space or prevent births (CI: 55.5% - 66.9%).
- 73.9% of mothers received at least four antenatal care (ANC) visits from a skilled provider during their pregnancy with their youngest child (CI: 68.6% - 78.9%).
- 82.5% of mothers surveyed delivered their babies in the attendance of skilled personnel (CI: 77.7% - 86.6%).
- 99.2% of children received a visit from an appropriate health worker within two days of their birth (CI: 97.3% - 99.9%).
- 96.9% of mothers surveyed were offered an HIV test while pregnant, accepted the test, and received their results (CI: 94.13% - 98.6%).

- 97% of children ages 12-23 months had received their measles vaccination (CI: 91.48% - 99.4%).
- 100% of children aged 12-23 months who were surveyed had received the PENTA 1 vaccine; 97% of children received both PENTA 1 and 3 (CI: 94.7% - 99.6%).

Introduction

In 2008, Curamericas Global, Inc., in partnership with the Ganta United Methodist Hospital, was awarded a 5-year, \$1.25 million grant from the United States Agency for International Development (USAID) Child Survival and Health Grants Program (CSHGP) to reduce neonatal, infant, child, and maternal morbidity and mortality in three Clans, the sub-districts of Garr, Gbein, and Bain Clans, of northern Nimba County, Liberia. Titled the Nehnwaa Child Survival Project, the project is housed in Ganta, Nimba County. Figure 1 shows the project catchment area

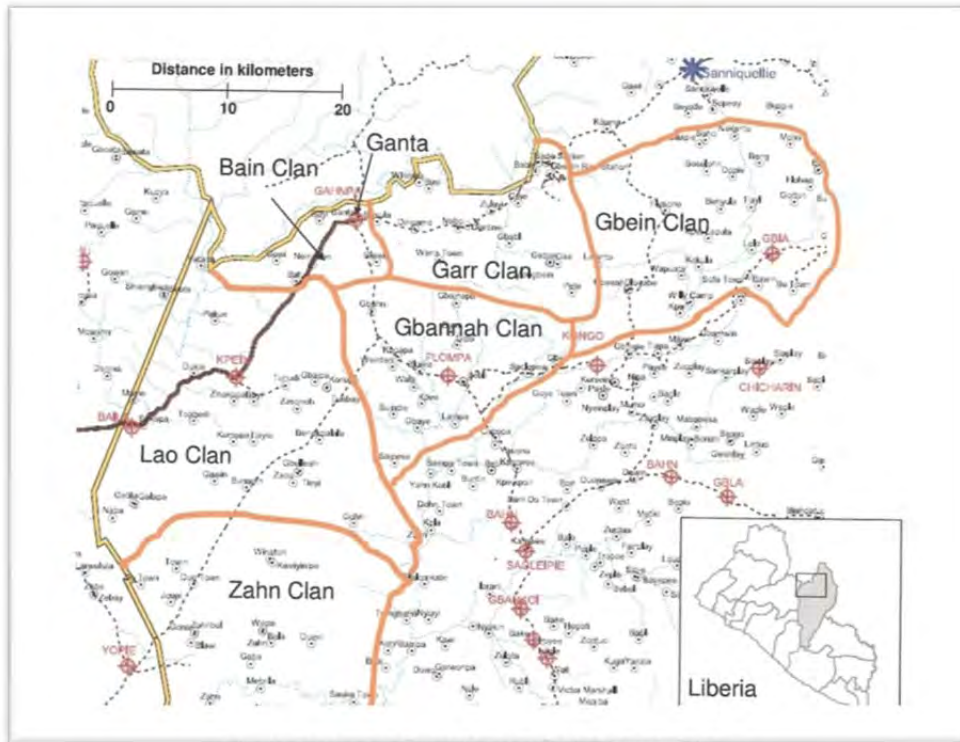


Figure 1: Map of project Area in Nimba County, Liberia

Project Overview

The project catchment area includes a total of approximately 130 communities of the Garr, Gbein, and Bain Clans and Ganta City . According to the Nehnwaa Project database, there are over 137,000 people in Nehnwaa communities, totaling over 71,000 beneficiaries (women of reproductive age (WRA), pregnant women, and children under-five). Table 1 summarizes the breakdown of the project’s population by clan.

Table1: Population Breakdown by Districts and Clans, September 2013

Clan	Total estimated population	Women 15-49 (23%)	Children 0-11 months (4%)	Children 12-23 months (3.7%)	Children 24-59 months (9.3%)	Children 0-59 months (17%)	Total beneficiaries
Bain	51,445	11,648	1,877	3,094	7,091	12,062	24,447

Gbein	99,232	26,720	3,164	1,149	7,413	11,726	40,199
Garr	47,920	10,806	1,801	3,004	6,625	11,430	22,948
Ganta	108,560	33,413	3,746	3,203	13,905	20,854	57,510
TOTAL	307,157	31,096	5,408	5,002	12,573	22,983	54,079

Project Goals & Objectives

The overarching goal of the project is to reduce child and maternal mortality in Northwest Nimba County, Liberia.

The outcome objectives seek to address the six major causes of child and maternal mortality, including neonatal conditions, obstetric complications, malaria, pneumonia, diarrhea, and HIV:

- Increase the demand for and use of antenatal care services, with 65% of women receiving at least 4 antenatal care visits
- Increase the demand for and use of skilled birth attendants who practice clean safe birthing techniques and proper newborn care, with 60% of births attended by a skilled attendant (at least Trained Traditional Midwife level)
- Increase access to emergency obstetric care, with 60% of obstetric emergencies treated in a health facility in a timely manner
- Increase demand for and use of postpartum care services, with 60% of mothers receiving postpartum care within 3 days
- Increase demand for and use of malaria prevention practices and detection and treatment services, with 85% children under-five with a malaria episode treated with antimalarials within 24 hrs; 85% of children sleeping under ITNs; and 85% of pregnant women receiving IPT
- Increase the demand for and use of diarrhea prevention and treatment practices and treatment services, with 85% of children with diarrheal disease episodes receiving ORT and 50% receiving zinc supplementation
- Increase access to potable water and proper sanitation, with 65% of households with children under-five treating water effectively and showing proper point of use (POU)
- Increase the demand for and use of pneumonia detection practices and treatment services, with 80% of children under-five with symptoms of ARI/pneumonia treated by a health professional
- Increase the demand for and use of HIV/STI prevention practices and treatment services by pregnant and postpartum women, with 75% of women getting ANC accepting VCT, and 75% of HIV-positive pregnant women receiving PMTCT

As a comprehensive health education and service delivery program, Nehnwaa is comprised of the following interventions (levels of effort in parentheses): Maternal/Newborn Health (30%); Malaria (20%); Control of Diarrheal Diseases (15%); Pneumonia Case Management (10%); Immunization (10%); and HIV/AIDS (15%). Calculations of the level of effort (LOE) were based on: 1) attributable mortality; 2) preventable mortality at 99% coverage; 3) planned level of coverage; and 4) financial and human resources and time required to attain those planned coverage levels.

Project Implementation

The Baseline KPC Survey for the Nehnwaa Project was completed in January 2009 and interviewed 300 mothers of children under-two from 30 communities in the proposed catchment area in Nimba County. The questionnaire collected information on all of the Rapid CATCH and selected project indicators, covering all of the proposed intervention areas. Specifically, the baseline survey found low levels of health-seeking behavior related to pregnancy, delivery, and childhood illnesses such as diarrhea, acute respiratory infections (ARI), and malaria. In addition, baseline levels of targeted health behaviors were low, including proper handwashing (14.0%), water treatment (13.0%) and storage (11.7%), birth spacing via contraception use (2.0%), and HIV testing during pregnancy (20.3%), to name a few. By the midterm KPC Survey conducted in 2011, many of the Rapid CATCH and project indicators had increased, some of which had already met their targets. Additional results found that some areas of intervention needed improvement. A table summarizing baseline, midterm, and final KPC survey results can be found in **Appendix X**.

Since its inception the Nehnwaa Child Survival Project has incrementally rolled-out into 120 of the 130 targeted communities. Given an underestimate of population size by 2012 in the catchment area, the target population was prematurely reached in 120 communities. In an effort to utilize resources effectively, the project did not continue to scale up to the remaining 10 communities. The Nehnwaa Project catchment area is currently comprised of communities in the Bain, Garr, and Gbein Clans and Ganta Town, and reached 71,186 beneficiaries by the end of the project. Key accomplishments include: 1) experienced field-savvy staff entirely of local Liberians; 2) staff training in Monitoring and Evaluation, adult learning principles methodology, group development, conflict resolution, supervision, the CBIO and Care Group Methodologies, Qualitative Research Methods, Designing for Behavior Change (DBC) Framework, KPC Surveying, Continuous Quality Improvement, and the Liberia MOHSW protocols for IMCI and PMTCT; 3) coordination with stakeholders who include MOHSW-Family Services Division, National AIDS Control Program (NACP), National Malaria Control Program (NMCP), the Nimba County Health Team (NCHT), and USAID Liberia Mission; 4) extensive formative research that included DBC Barrier Analysis; 5) establishment of a partnership conference to develop and implement Nehnwaa exit strategy work plan; and 6) rolling-out of the CBIO Methodology and the six project interventions in 120 communities.

Objectives of the Final KPC Survey

The KPC Survey was conducted in August of 2013. The objectives of the survey were to:

- To collect data on the project's intervention areas to compare to the Baseline survey conducted in 2009 and Midterm survey conducted in 2011;
- To collect final data to be utilized in the final evaluation and contribute to determining the project's impact;
- To provide refresher capacity building to project staff in planning, organizing and implementing KPC Surveys, as well as data entry and cleaning for the M&E staff; and
- To reaffirm community participation and conduct community feedback sessions on the accomplishments of the project.

Methods

Final KPC Questionnaire & Rapid CATCH 2011 Indicators

The Nehnwaa Child Survival Project KPC Survey questionnaire consisted of 97 questions and surveyed mothers of children between the ages 0 – 23 months. The questionnaire was an updated version of the 2011 KPC which had questions taken from the standardized generic questionnaire format originally developed by the PVO Child Survival Support Project (CSSP) and modified and expanded by the Child Survival Technical Support (CSTS). The questionnaire collected information on all of the Rapid CATCH and project indicators. A list of all project indicators can be found in **Appendix X**, with all of the KPC questions covering the following intervention areas:

- Breastfeeding and Child Nutrition
- Childhood Immunization and Supplementation
- Anthropometric
- Sick Child
- Diarrhea Case Management
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- Malaria Management and Prevention
- Water and Sanitation
- Maternal and Newborn Care
- HIV

A draft of the modified questionnaire was circulated throughout the project team for comments and edits, which were incorporated into the final version. The Final KPC questionnaire was similar to the mid-term KPC survey conducted in 2011 and can be found in **Appendix X**.

Sampling Design

Similar to the baseline and mid-term KPC surveys, the 30-cluster sampling design was used for the Final KPC survey. The sample size was calculated with the formula below:

$$n = Z^2(pq)/d^2$$

Where:

n = sample size

Z = statistical certainty chosen (95%) = 1.96

p = estimated prevalence/coverage rate/level to be investigated (0.5)

q = 1-p

d = precision, or margin of error, desired = 0.1.

Given the above values, the calculated sample size (n) needed was:

$$n = (1.96)^2 \times 0.5^2 / 0.1^2$$

$$n = (3.84)(0.25)/(0.01)$$

$$n = 96$$

This survey used the 30-cluster sampling methodology and in order to compensate for the bias which enters the survey from interviewing persons in clusters, rather than as randomly selected individuals, the sample size used should be approximately double the number of that required for a simple random sample. Thus a minimum sample of 210 (i.e. 7 per cluster) participants should be used. In the case of cluster sampling for a KPC survey, a sample size of 300 (10 per cluster) is generally used so as to ensure that sub-samples are large enough to obtain useful management type information. Therefore, the final number of interviews conducted was 300.

Selection of Samples

The 30 clusters or communities for the survey were selected from the list of 120 communities that comprise the catchment area of the Nehnwaa Project. The population of each community was generated from a comprehensive mapping exercise, as a part of the CBIO methodology, held at the time intervention activities began in each community. Referring to the population of each community, the cluster selection process followed a similar process as described in the EPI Coverage Survey Training Manual (WHO, Geneva, 1991 Revised edition), and as summarized below:

Procedure for the Identification of Towns/Villages

1. A list was constructed of all Towns/Villages in the selected districted.
2. The individual population of each town/village was then list along side.
3. The cumulative populations as each town/village was calculated and written in the third column. The final cumulative population is the same as the total population in the county to be surveyed.
4. The Sampling Interval (SI) was determined using the formula:

Sampling Interval = Total population to be surveyed/designated number of towns

Round off to the nearest whole number

5. A random number was selected which was less than or equal to the sampling interval. The random number had the same number of digits as the sampling interval.
6. The 1st town/village selected was the one whose cumulative population equaled or exceeded the random number.

7. The 2nd town/village selected was the one whose cumulative population equaled or exceeded the figure arrived at by the formula:

$$\text{Random Number} + \text{Sampling Interval} =$$

8. In identifying towns/Villages 3-designated number of towns, the following formula was used:

$$\begin{array}{l} \text{Number which identified} \\ \text{Location of the previous} \\ \text{Town/Village} \end{array} + \begin{array}{l} \text{Sampling} \\ \text{Interval} \end{array} =$$

Household Selection

When the survey teams reach their designated towns each day, they selected their starting households and subsequent households as follow:

1. They located a central point (approximate geographic center) in the town.
2. They then spun a pencil/pen to point out or randomly select a direction.
3. They thereafter walked to the periphery of the town in the direction pointed out by the pencil, counting the number of households along the way.
4. They obtained a random number between 1 and the number of households in that line.
5. They sampled the household on that line which corresponds to that random number.
6. The next household to be sampled was the nearest household to the right whose front door was three houses away from the one they just visited.
7. They continued consistently in this way until the required number of households were sampled

Potential selection problems were handled in a consistent manner. If a selected household had more than one eligible mother, the interviewers selected one mother using a random procedure. If a mother had more than one child under the age of two years, the youngest child was the target for the interview. When in the identification of households the team encountered a structure that had more than one household, the same random process was used to select one of them.

Data Collection & Analysis

Training of Survey Staff

A one-day refresher training of all of the Nehnwaa Project staff, including the data collection teams (both supervisors and interviewers), was conducted on August 13, 2013. The supervisors, who also performed interviewing roles, were trained to serve as the frontline guide of the interviewers, as well as to ensure quality control among interviewers. They were orientated on the general objectives of the final KPC survey and its larger contribution to the Final Evaluation, good interview techniques, the sampling process, data quality control, and standardized collection strategies. Given that the staff had conducted many KPC surveys in the past (baseline and midterm for Nehnwaa, as well as mini-KPCs for supplementary projects), experience from their past survey administration was included for discussion. Staff reviewed the selection methods for eligible individuals and households. The training methods utilized included participatory discussions, demonstrations, group work, and practice. There was also a time for questions relating to specific items on the questionnaire.

Twenty interviewers were selected from a pool of Nehnwaa Project staff that have had prior survey experience and were available for the duration of the exercise. Four staff were placed on stand-by for replacement as necessary. Ten of the interviewers were females and 10 interviewers were males, with varied lengths of time as project staff. The breakdown of each interview team as well as communities visited by each can be found in [Appendix X](#).

Data Collection

The interviews were conducted over a three day period, spanning August 14th, 15th, and 16th, 2013. Two teams of six interviewers each and one team of eight interviewers were assembled and assigned clusters on a daily basis. The composition of each team also considered gender balance. Other considerations during the team formation were the inclusion of someone who spoke the local language of Mano and a mix of people from each intervention group on each team. Each team also had a scale to weigh each child of 0-23 months for anthropometrics. Salter® hanging scales were used, which were calibrated prior to each weighing to ensure accuracy. The measurements were taken in order to calculate the child's weight for age and corresponding Z-scores to determine being underweight. Team leaders were appointed who were tasked with working with the rest of the team members to determine eligibility of households, mothers, and children. Upon entering a community, the team met with the local leaders to introduce themselves, explain the purpose of their visit, and seek permission to work in the town. In order to ensure continuous quality improvement, supervisors of each team ensured quality control by completing KPC Quality Control Checklists, as provided by the KPC 2000+ Field Guide. This checklist can be found in [Appendix X](#).

Data Entry and Analysis

Each survey was checked by supervisors before being entered into Microsoft Excel. Data entry was conducted by one Data staff, one M&E officer, and the KPC Lead Coordinator. Using Microsoft Excel, data was entered and coded for positive (if the respondent answered correctly

based on indicator tabulation) or negative (the respondent did not meet indicator tabulation requirements) responses, using a binary yes or no system. The Indicator tabulation plan can be found in [Appendix X](#). The Microsoft Excel tables were then entered in Epi Info 7.1 to be analyzed for frequencies (percentages) of positive responses, as well as any scientific relationships between exposures and outcomes. A 95% confidence interval and a precision of 0.5 were used for each indicator, and 95% confidence limits were calculated for each.

Results and Discussion

General Information on Respondents and Children

Survey respondents included 300 mothers of children who are 0-23 months from 30 communities (See [Appendix X](#) for list of selected communities). The median age of 25 years, ranging from 15 to 49 years of age. The children of the survey respondents were fairly evenly distributed across under-six months, 6 – 11 months, and 12 to 23 months (N = 102, N = 96, and N = 102, respectively). 48.3% of the children were male, and 51.7% were female. Of the thirty communities selected, 18 were from the Ganta town (a peri-urban environment), 12 from the other three clans.

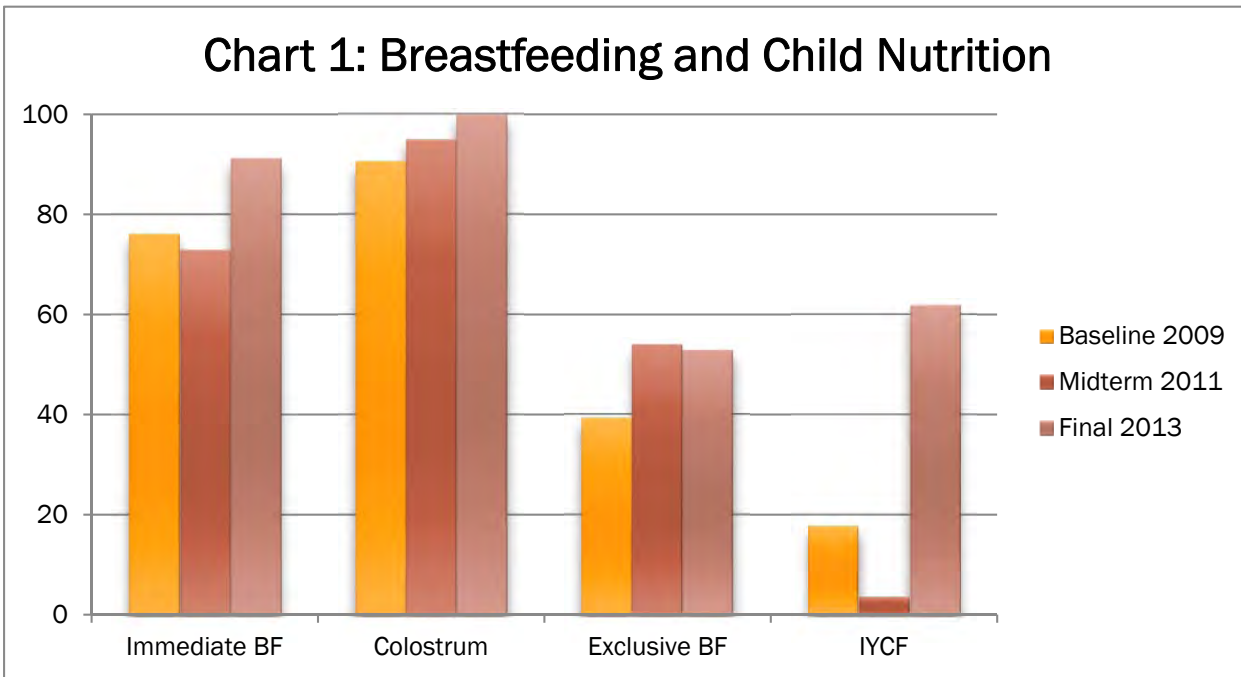
Summary of Findings

Survey results are categorized into the Nehnwaa Project intervention areas: Integrated Management of Childhood Illnesses (including breastfeeding and child nutrition, anthropometry, case management for ARI and malaria, and diarrhea prevention and case management, including water and sanitation indicators), Maternal and Newborn Care (antenatal, partum, and postpartum care), HIV, and Immunizations. Table format of the numerical results per indicator can be found in [Appendix X](#).

a. Integrated Management of Childhood Illnesses

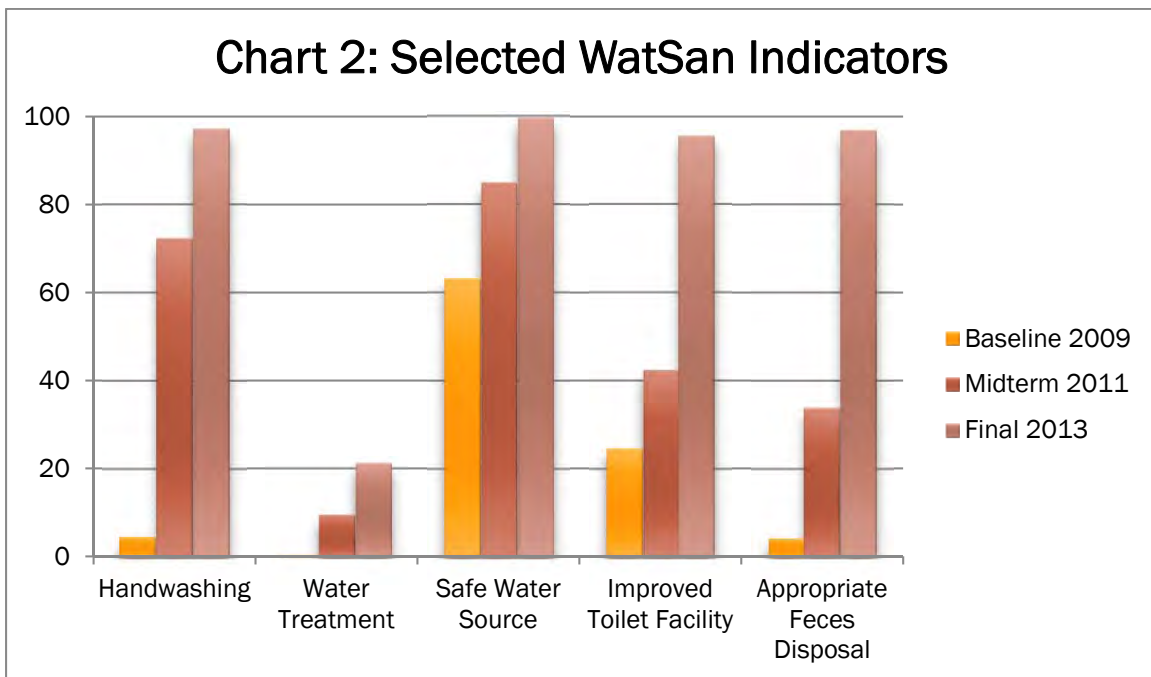
While the Nehnwaa Project did not have a specific nutrition intervention, many of the behavior change communication (BCC) messages directly related to care for newborns or children included education on feeding practices as means to decrease rates of diarrheal disease and improve overall child wellbeing. Namely, the promotion of immediate and exclusive breastfeeding through six months of age and continued complementary feeding after, were direct project indicators. By the end of the project, 91% of children under two were immediately breastfed (95% confidence interval: 87.6% - 94.3%), with 53% of children exclusively breastfed to six months (CI: 42.8% - 62.9%). There are many factors that contribute to why 38% of mothers immediately breastfed but do not continue to exclusively breastfeed to six months; these women may be more likely to work during the day and unable to bring children with them, or there can be physical factors related to the mother's inability to continue. All of the children surveyed were fed colostrum, a mother's first milk, after birth, but this indicator was already high, at 91% at baseline. For children over six months of age, 62% (CI: 54.3% - 69.3%) met the minimum feeding practices, which include diversity of food groups and eating three or more times a day, dependent on whether the child is still breastfed or not. This was a significant improvement over the baseline percentage of 18% despite the fact that Nehnwaa does not

provide food to their communities. Chart 1 summarizes these results. Additionally, as a measure of feeding practices, the KPC surveys collected data on child’s weight-for-age. Children were defined as underweight if their weight-for-age was less than 2 standard deviations lower than the median age, according to the World Health Organization (WHO). By the final KPC, 23.4% were identified as underweight. This is comparable to the last measured national average, again encouraging a focus on nutrition interventions in the future.



In relation to prevention of diarrheal disease, the Nehnwaa Project also had a Water and Sanitation (WatSan) intervention team that provided BCC on proper hygiene and handling of water. With supplementary funds acquired by Curamericas from Ronald McDonald House Charities, the WatSan intervention expanded to the building of wells, hand pumps, and latrines in select communities. The BCC messages coupled with building the capacity of communities to maintain equipment led to a general increase in the practices of handwashing, feces disposal, and safe water treatment and storage. Sixty-three percent (CI: 57.4% - 68.7%) of mothers surveyed live in households with a designated place for handwashing with soap and 83% (CI: 77.9% - 86.9%) reported handwashing at at least two critical times on a regular basis; these figures represent significant increases from the baseline values of 14% and less than 1%, respectively. Similarly, 97% (CI: 94.8% - 98.8%) of mothers reported usually washing their hands with soap at all four critical times (before food preparation, before feeding children, after toileting, and after cleaning a child who has toileted). Over 95% (CI: 92.6% - 97.7%) of mothers surveyed have access to a improve toilet facility, such as a latrine or manual flush toilet, but only 24% (CI: 19.2% - 29.4%) have access to a facility that is accessible (within 30 minutes walking distance) and hygienic (not shared with another household). In Nehnwaa communities, the vast majority of community members use a public toilet facility, based on limited resources for building a private facility. As a result of increased access to facilities, more women are reporting safely disposing their child’s feces (89%, CI: 84.5% - 92%). Even those women with limited access to facilities

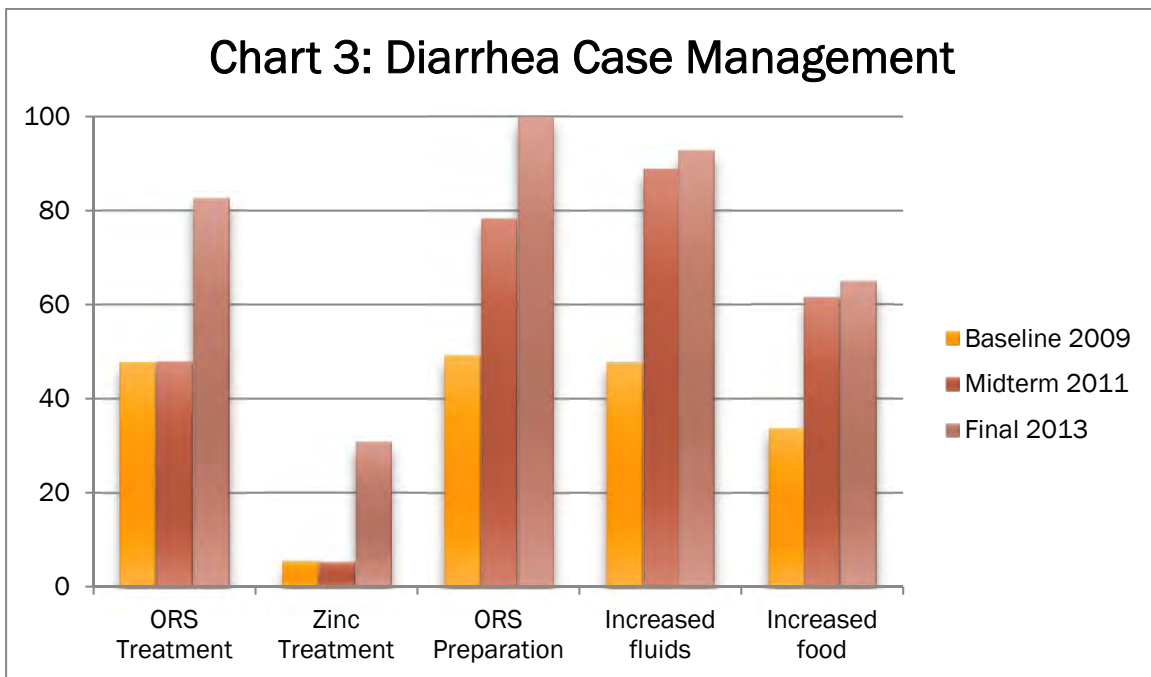
are still practicing appropriate methods of feces disposal, including safe disposal as well as burying of feces, at 97% (CI: 94.4% - 98.6%). Over 99% of mothers surveyed get their drinking water from a safe source, such as a hand pump, covered well, piped water, or a protected spring, and 90% of all drinking water sources reported are accessible and available daily (within 30 minutes walking distance). As a result, only 26% (CI: 21.1% - 31.4%) of mothers reported effective water treatment, most likely due to a perceived protection from illnesses because of safe drinking water sources. All these indicators represent an increase over their respective baseline values, as seen in Chart 2, except for safe feces disposal, which was a report 91% at baseline. There is likely an error in this value, as appropriate feces disposal includes safe disposal, but was only 4.3%.



Interestingly, despite an increase in rates of exclusive breastfeeding and protective WatSan behaviors, the prevalence rate of diarrhea in the surveyed communities did not decrease over the last five years. The baseline diarrhea prevalence rate was 23.7% (reported episode of diarrhea in the two weeks preceding the survey), but should be noted that the survey was conducted in January, at the height of the dry season, where rates of diarrheal disease are generally lower. The midterm diarrhea prevalence rate was xxx% and was conducted in June, at the end of the dry season. The final survey was conducted in August at the height of the rainy season, and diarrhea prevalence was estimated at 28%. Therefore, we unfortunately cannot compare rates over the three time points, but we can infer that there may be other factors at play in addition to feeding, drinking water, and sanitation practices that greatly affect the occurrence of diarrhea.

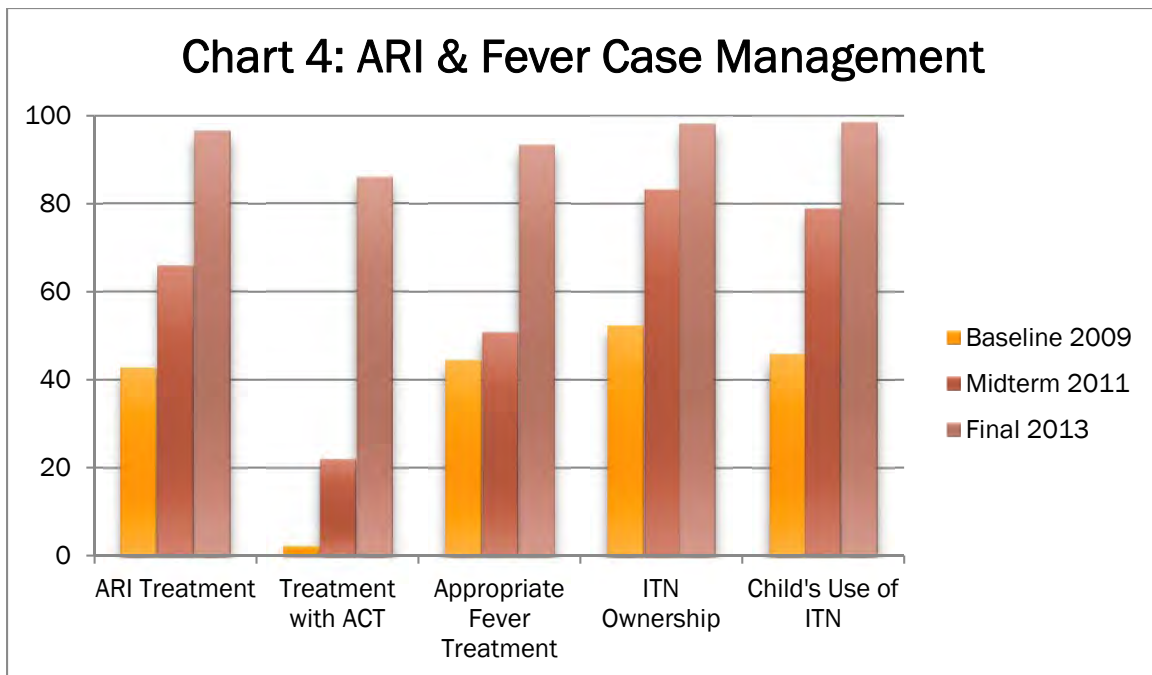
Importantly, case management and treatment of diarrhea has greatly improved over the last five years of the Nehnwa Project. Compared to the baseline and midterm values of 5 – 6% (values not significantly different), 31% (CI: 21.1% - 42.1%) of children with diarrhea were treated with zinc supplements. Similarly, compared to the baseline and midterm values of 48% (values not significantly different), 83% (CI: 72.7% - 90.2%) of children with diarrhea in the last two weeks

prior to the survey received Oral Rehydration Solution (ORS) and/or the recommended home fluids as treatment. While both treatment indicators did not meet their targets, there were significant improvements over time that are notable. For drug- or commodity-based indicators, such as proper treatment, the Nehnwaa Project is not responsible for Liberia's or Nimba County's supply chain; if zinc or ORS are not available in the catchment area, then Nehnwaa's direct impact is limited. Because 100% of mothers surveyed can correctly prepare ORS (as indicated by a correct explanation of the procedure to the interviewer), it is likely that the discrepancy between knowledge and behavior is largely due to availability and access to ORS. In addition to medication, increased fluid and food intake during diarrheal disease improves the child's wellbeing and chances of recovery. Ninety-three percent (CI: 85.3% - 97.4%) of children with diarrhea were offered more fluids while sick, including water and breastmilk. This is a significant increase over the baseline value of 48%. Sixty-five percent (CI: 54.1% - 75.1%) of children were offered the same amount or more food during the illness; this value does not include young children who were not yet eating solid foods. Again, this is a significant improvement over the baseline value of 34%. These results are summarized in Chart 3.



Upon further analysis, our survey results indicate relationships between certain exposures and an outcome of an episode of diarrhea. Foremost, if a child was breastfed in the last 24 hours, they were 90% less likely to have an episode of diarrhea (OR = , CI:). While this is not statistically significant because of the small sample size, it does contribute to programming in this catchment area as well as support previous hypotheses of breastfeeding as a protective factor from diarrhea. Similarly, diarrhea was more prevalent among children ages 12-23 months, at 41%, and children aged 6 to 11 months, at 36%, than among children under 6 months (7.8%). This suggests that because the younger children are more likely to be exclusively breastfed, they may be more protected from diarrheal disease.

In addition to diarrhea prevention and treatment, mothers were surveyed about treatment of ARI and fever. For children with a chest-related cough and difficulty breathing in the two weeks preceding the survey, 97% (CI: 90.4% - 99.3%) were taken to an appropriate health provider for treatment, defined as a doctor, physician’s assistant, nurse, or certified midwife. The final KPC survey also asked mothers about episodes of fever in their children in the last two weeks. It is very common in Liberian communities to assume a fever is automatically malaria and for this reason, Nehnwaa staff encourage taking Rapid Diagnostic Tests (RDTs) at the onset of fever to confirm malaria or refer for other testing or treatment. Of the 129 children with fever in the last two weeks, 86% (CI: 78.9% - 91.5%) were treated with ACTs within 24 hours of onset of the fever, an increase from the baseline value of 2% and midterm value of 22%. More work is needed to educate caregivers on recognizing other malaria symptoms to confirm that the fever is not a sign of another illness. In terms of prevention of malaria, rates of owning insecticide-treated nets (ITNs) and use by children are high; 98.9% of households surveyed own a net, and 98.9% of children surveyed use a net. These results are summarized in Chart 4.



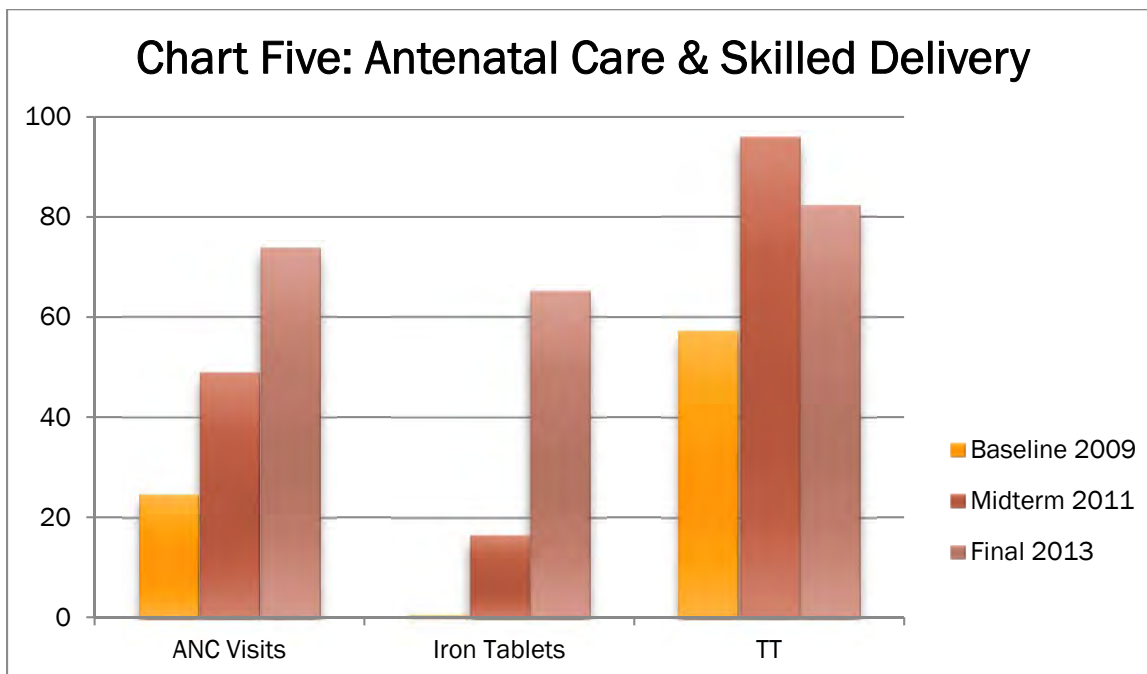
Overall, the Nehnwaa Project found significant improvements in the management of childhood illnesses over the last five years. With its comprehensive approach, Nehnwaa interventions represent a truly integrated management of childhood illnesses, including diarrhea, malaria, and ARI.

b. Maternal and Newborn Care

In an attempt to lower Liberia’s high maternal mortality rates, 30% of Nehnwaa’s LOE is maternal and newborn care (MNC). This intervention includes indicators about birth spacing, antenatal care (ANC), postpartum care (PPC), skilled delivery, and recognition of and response to obstetric emergencies. While family planning was not a direct component of Nehnwaa, the contraception prevalence rate was calculated for the catchment area; by the end of the project,

61% (CI: 55.5% - 66.9%) of women were using a modern method, compared to 2% at the baseline. This is largely due to supplementary funding acquired by Curamericas from USAID and World Learning to train a family planning unit and provide community-based service delivery. After the end of that specific funding, the family planning staff were absorbed as Nehnwaa staff and commodity supply continued with support from UNFPA and the MOH.

A large component of the MNC intervention focused on providing care to the pregnant women in Nehnwaa communities. At the beginning of the project, only 24.7% of pregnant women were attending at least four ANC visits with a skilled provider; by the midterm, this has significantly increased to 49%. At the time of the final survey, 74% of pregnant women had at least four ANC quality visits (CI: 68.6% - 78.9%). A skilled provider is anyone with formal clinical training, particularly a doctor, physician’s assistant, certified midwife, or registered nurse. Because many of the women in Nehnwaa communities experience physical barriers to accessing ANC, they seek healthcare services in their communities from their Traditional Trained Midwives (TTMs). Although TTMs are not skilled providers, they have been trained in many components of ANC, such as birth planning or recognizing danger signs. If this indicator were to include TTMs, the percentage of women receiving four ANC visits may increase. Similarly, because more women are attending ANC, more pregnant women are taking iron tablets (65.3%; CI: 59.6% - 70.7%) and receiving a tetanus toxoid (TT) vaccination (82.4%; CI: 77.6% - 86.6%). There were significant improvements in all of these indicators when compared to the baseline values. The percentage of pregnant women receiving the TT vaccine slightly decreased from the midterm to the final survey and may be due to a lack of available vaccinations to give. Chart 5 shows the improvements in ANC over the last five years.



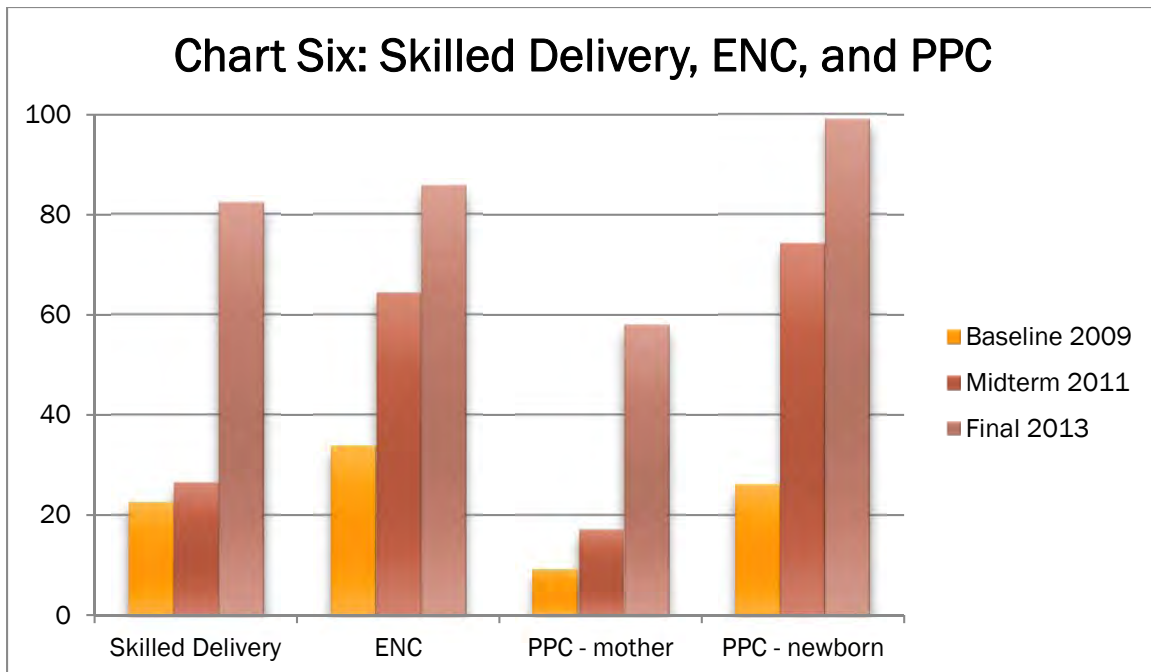
With an increase in health-seeking behavior by pregnant women through ANC visits, education and awareness of the health statuses of themselves and their children also increased. Indicators related to knowledge of dangers signs throughout pregnancy, labor, delivery, and the postpartum

period and into childhood all significantly increased, each exceeding 98%. Table X shows the percentages and confidence intervals for each knowledge indicator related to MNC.

Table X: Comparison of MNC Knowledge Indicators (Final Results, 2013)

Indicator	Percentage	Confidence Interval
Knowledge of Danger Signs during Pregnancy: Percentage of mothers of children 0-23 months who knew at least two danger signs during pregnancy. (<i>Project Indicator</i>)	98.9%	97.1% - 99.8%
Knowledge of Maternal Danger Signs During Delivery: Percentage of mothers of children 0-23 months who know at least two danger signs during delivery. (<i>Project Indicator</i>)	98.6%	96.6% - 99.6%
Knowledge of Post-partum Danger Signs: Percentage of mothers of children age 0-23 months who knew at least two post-partum danger signs. (<i>Project Indicator</i>)	98.3%	96.1% - 99.5%
Knowledge of Neonatal Danger Signs: Percentage of mothers of children age 0-23 who know at least two neonatal danger signs. (<i>Project Indicator</i>)	100%	--
Maternal Knowledge of Child Danger Signs: Percent of mothers of children aged 0-23 months who know at least two signs of childhood illness that indicate the need for treatment. (<i>Project Indicator</i>)	99.7%	98.2% - 99.9%

Most importantly, more pregnant women were giving birth in the presence of a skilled provider, i.e. a doctor, physician’s assistant, registered nurse, or certified midwife, than at the baseline (82.5% at final; CI: 77.7% - 86.6%, compared to 22.7% at baseline). If more women are delivering their babies at a health facility, then it is more likely that their newborns will also be receiving essential newborn care (ENC). ENC is a set of practices performed at the birth of a child to ensure survival through the first few days of life and includes clean cord care, thermal protection of the newborn, and immediate and exclusive breastfeeding. Of these practices, clean cord care tends to be the most difficult to complete because it requires a new, unused blade or knife to cut the umbilical cord and prevent infection. In many settings, supplies are limited and blades are often boiled for sterilization and reused. In order for the survey response to be a positive answer for the ENC indicator, the blade had to be brand-new and unused. Even then, 86% of mothers (CI: 81.3% - 89.6%) reported their children receiving all three elements of ENC, compared to 34% of children at baseline. Lastly, timely postpartum care (PPC) for the mother and newborn can lead to a significant reduction in maternal and infant mortality. PPC was very low at baseline and at the midterm for mothers and relatively low for newborns at baseline. By the time of the final survey, 58.1% (CI: 51.9% - 64.02%) of mothers were visited by a health worker within two days of delivery. Importantly, 99.2% of newborns (CI: 97.3% - 99.9%) were checked by a health worker within two days of birth. Chart 6 represents the changes in skilled delivery, ENC, and PCC over the life of the project.

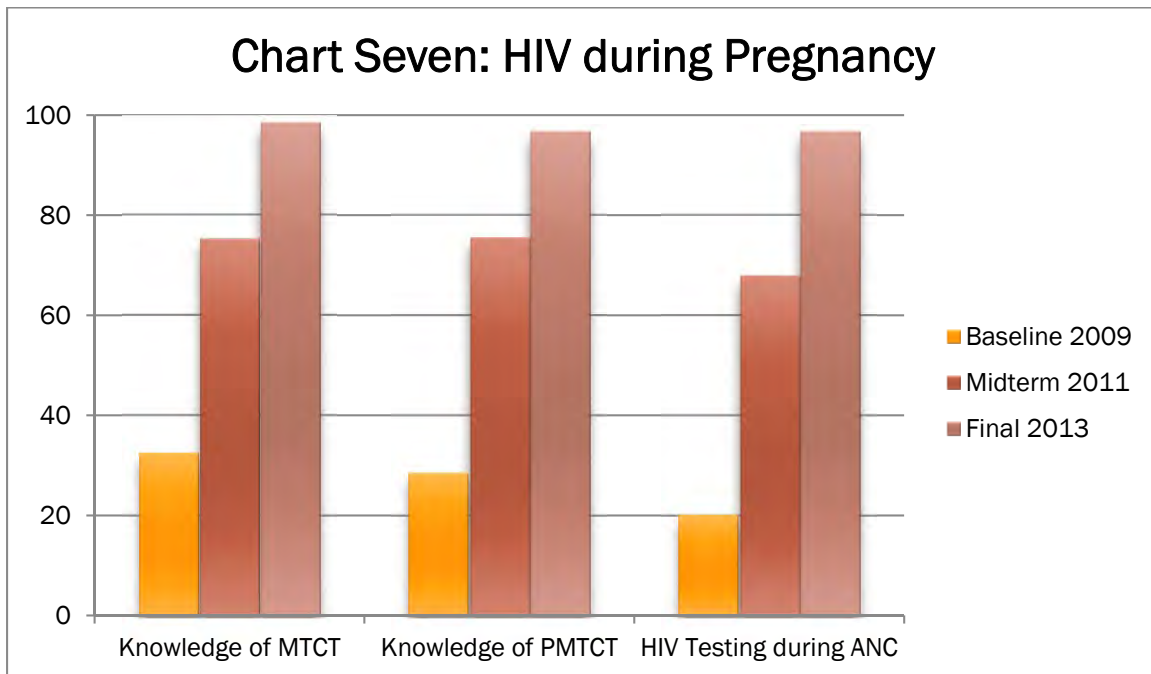


c. HIV/AIDS

While HIV prevalence in Liberia is relatively lower than other sub-Saharan African countries at 1.0%, more women are estimated to have HIV than men (60% v. 40%; UNAIDS). This disparity can put more children at risk of acquiring HIV through mother-to-child transmission (MTCT) during pregnancy, delivery, and/or breastfeeding. In order to reduce the risk of MTCT in its communities, the Nehnwaa Project HIV team tests pregnant women and their partners for HIV, as well as providing awareness and education of prevention and transmission methods to adolescents, WRA, and men. HIV officers also have a supply of condoms they distribute in the community to interested community members. The Nehnwaa Project was Liberia's first community-based HIV-testing program, with continuously high achievements. Pregnant women in Nehnwaa communities who test positive for HIV are also enrolled in PMTCT, or prevention of mother-to-child transmission, where they gain access to counseling and antiretrovirals (ARVs) for their own health and their unborn child's.

Nehnwaa's HIV indicators at the time of the final survey had exceeded all targets. Knowledge among mothers of HIV transmission methods had significantly increased; by the final survey, 98.6% of mothers (CI: 96.5% - 99.6%) knew that HIV can be transmitted from a mother to her child during pregnancy, delivery, and when breastfeeding, compared to 32.7% at baseline. Similarly, 96.9% of mother (CI: 94.1% - 98.6%) knew that there are medications that can be given to reduce the risk of transmission, or knew about PMTCT, compared to 28.7% at the baseline. Most importantly, more pregnant women were offered and given a HIV test and its results during pregnancy than at baseline; 96.9% of mothers had been counseled and tested during pregnancy, compared to 20.3% at baseline. Because HIV status cannot be ethically asked in a KPC survey, the results of each HIV test for each survey respondent are unknown. There is process data however, that measures the number of pregnant women testing positive for HIV and being enrolled in PMTCT services (98% enrollment rate over the life of the project, see

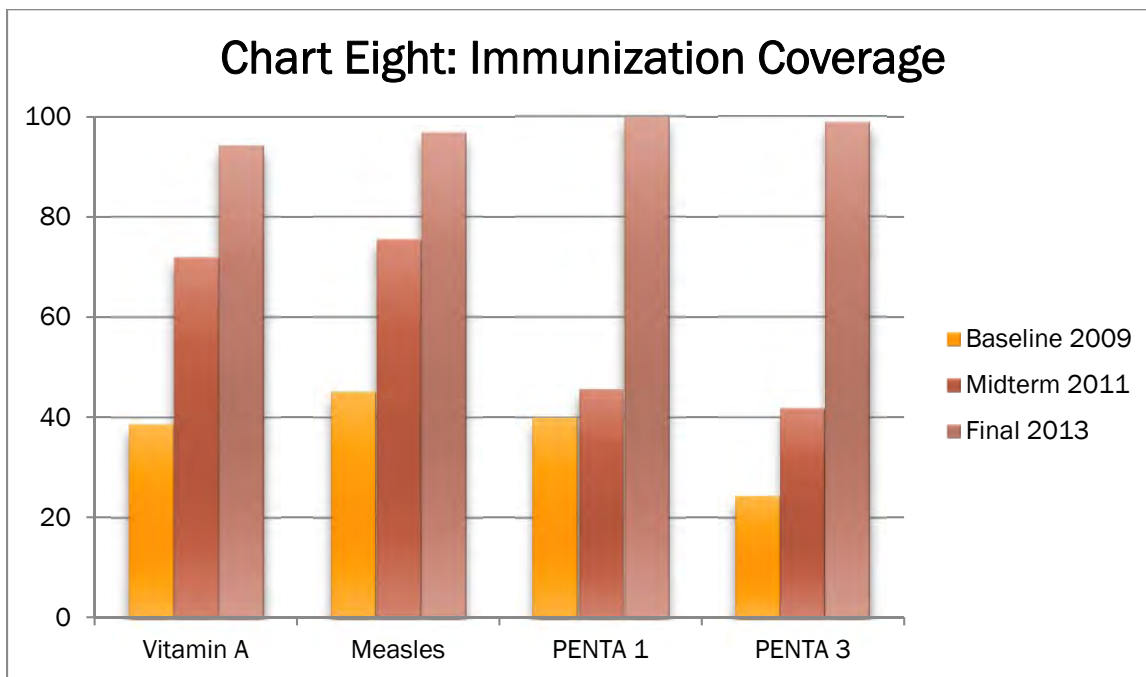
Appendix X for details). These improvements are all significant contributors to keeping HIV prevalence low in Liberia. Chart 7 summarizes these results over time.



d. Expanded Program on Immunizations (EPI)

The Nehnwaa Project’s EPI intervention increases access to disease prevention by bringing a wide variety of vaccinations to communities. While the project indicators only focus on Vitamin A, PENTA 1 and 3, and Measles, Nehnwaa provides vaccinations for BCG (Tuberculosis), Polio, and Yellow Fever, as well. Overall, reported coverage of Vitamin A supplementation, PENTA 1 and 3, and Measles in the survey was exceptionally high. Coverage was measured by the mother’s self-report of vaccination or each vaccine was verified by the child’s Road to Health card. Of the mothers surveyed with children over six months, 94.4% (CI: 90.3% - 97.19%) had received a Vitamin A dose in the six months prior to the survey, compared to only 39% at baseline. Similarly, 97% (CI: 91.48% - 99.4%) of children ages 12-23 months whose mothers were surveyed had received their measles vaccine; this exceeds the target of 75% and is a significant improvement over the baseline value of 45.3%. PENTA coverage rates were also very high at the time of the final survey; 100% of mothers of children 12-23 months surveyed could report or verify with documentation their child had received the PENTA 1 vaccine, compared to 40% at baseline. While it is unlikely that every single child aged 12-23 months in Nehnwaa communities had received a PENTA 1 vaccine, it is likely that the number is high and exceeds the target of 75%. One factor contributing to a high PENTA 1 coverage rate is that within the year prior to the survey, there was a county-wide PENTA vaccination campaign (including other immunizations, as well), which is not attributable to Nehnwaa activities but does positively affect members of Nehnwaa communities. Similarly, the coverage rate of PENTA 3 for families surveyed was 99% (CI: 94.7% - 99.6%). Not only is this an improvement over the baseline value of 24.5% but is also an improvement on decreasing the number of children who receive PENTA

1 but not PENTA 3 (i.e. the gap between PENTA 1 and 3 coverage rates is much lower at the final survey than the baseline).



Limitations

There were many limitations to this survey. For one, only 300 mothers out of over 71,000 beneficiaries were surveyed. Many of the questions asked relied on accurate recall, as well, potentially increasing the level of recall bias. Since Nehnwaa staff members have become very respected over the life of the project, there may also be some bias linked to the respondent's desire to please the interviewer and provide inaccurate responses.

Largely, there is also suggestion of an urban bias; due to the 30-cluster sampling methodology, more communities with larger populations were chosen, many of which were located in or near Ganta Town. Mothers in the communities near Ganta may receive more BCC messaging from billboards and/or radio messages, as well as support from local health facilities, such as Ganta United Methodist Hospital. Other NGOs also work in the area and governmental campaigns for vaccinations or insecticide-treated nets are more frequent in these areas. This limits the validity of those results related to commodities that may be more available in the urban areas.

Conclusion

Information Dissemination

The findings from the Final KPC survey were foremost shared with project staff and management, as well as stakeholders of the implementing partner, GUMH. The findings from the survey were also shared with communities visited for the project's final evaluation, held later in

the month. Additionally, a national stakeholder's meeting will be held to invite partners, external stakeholders, and other interested parties to share the findings of the final KPC, as quantitative data for the final evaluation.

The members of the partnership (NCHT, GUMH, MOHSW, Curamericas Global, Inc, etc) will have access to the document for analyzing trends in data over the life of the project and also to be potentially used for future program designs and implementation. Lastly, the document will also be circulated by Curamericas Global, Inc to USAID Mission in Liberia and USAID-Washington, as an annex of the Final Evaluation Report.

Appendices

KPC Questionnaire

Indicator chart with targets, baseline, final

Indicator, numerator, denominator, result, CI

Tabulation plan

Sample clusters communities

Team assignments

Rapid CATCH Indicators

Maternal and Newborn Care

1. Percentage of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child
2. Percentage of mothers with children age 0-23 months who received at least two Tetanus toxoid before the birth of the youngest child
3. Percentage of children age 0-23 months whose births were attended by skilled personnel
4. Percentage of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within two days after birth
5. Percentage of mothers of children age 0-23 months who are using a modern contraceptive method

Breastfeeding and Infant and Young Child Feeding

6. Percentage of children age 0-5 months who were exclusively given breastmilk the day prior to the interview
7. Percent of children age 6-23 months fed according to a minimum of appropriate feeding practices

Vitamin A Supplementation

8. Percentage of children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall

Immunization

9. Percent of children aged 12-23 months who received measles vaccine according to the vaccination card or mother's recall by the time of the survey
10. Percent of children aged 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey
11. Percent of children age 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey

Malaria

12. Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began
13. Percentage of children age 0-23 months who slept under an insecticide-treated bed net the previous night

Control of Diarrhea

14. Percentage of children age 0-23 months with diarrhea in the last two weeks who received oral rehydration solution (ORS) and/or recommended home fluids

Acute Respiratory Infections

15. Percentage of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider

Water and Sanitation

16. Percentage of households of children age 0-23 months that treat water effectively

17. Percentage of mothers of children age 0-23 months who live in a household with soap at the place for hand washing

Anthropometrics

18. Percentage of children age 0-23 months who are underweight (-2SD for the median weight for age, according to WHO/NCHS reference population)

Other Indicators

WATSAN

1. Percent of households with an improved source for drinking water
2. Percent of households with an improved source for drinking water within acceptable reach and available daily
3. Percent of households using an improved toilet facility
4. Percent of households using an improved, accessible and hygienic toilet facility
5. Proportion of households where the caretaker of the youngest child 0-23 months reported appropriate handwashing behavior, which is defined as using soap for washing hands during 24 hours recall at 2 critical times or more (after defecation and one of the following 4: after cleaning a young child, before preparing food, before eating, before feeding a child)
6. Percent of households that treat water effectively
7. Percent of households that apply effective water treatment regularly
8. Percent of households storing drinking water that store water safely
9. Proportion of households that disposed of the youngest child's feces safely the last time s/he passed stool
10. Proportion of households that disposed of the youngest child's feces appropriately the last time s/he passed stool

Sick Child

1. Percent of mothers of children aged 0-23 months who know at least two signs of childhood illness that indicate the need for treatment

Malaria

1. Percentage of households of children age 0-23 months that own at least one insecticide-treated bed net
2. Percentage of children age 0-23 month with a febrile episode during the last two weeks who were taken to a appropriate place for treatment
3. Percentage of mothers of children age 0-23 months who took effective antimalarials during the pregnancy with the youngest child
4. Percentage of mothers of children age 0-23 months who reported that they slept under a mosquito nets of the time or most of the time during their most recent pregnancy

Diarrhea

1. Percent of children 0-23 months with diarrhea in the last two weeks who were offered more fluids during the illness
2. Percent of children 0-23 months with diarrhea in the last two weeks who were offered the same amount or more food during the illness
3. Percent of children 0-23 months with diarrhea in the last two weeks who were treated with zinc supplements
4. Percent of mother who can correctly prepare ORS
5. Percent of mothers who usually wash their hands with soap before food preparation, before feeding children, after defecation, and after attending to a child who has defecated

Maternal and Newborn Care

1. Percentage of mothers of children 0-23 months who knew at least two danger signs during pregnancy
2. Percentage of mothers of children age 0-23 months who took iron tablets before the birth of their youngest child
3. Percentage of mothers of children 0-23 months who know at least two danger signs during delivery
4. Percentage of children age 0-23 months who were put to the breast within one hour of delivery
5. Percentage of children age 0-23 months, who were fed colostrum after birth
6. Percentage of children age 0-23 who received all three elements of essential newborn care: thermal protection immediately after birth, clean cord care, and immediate and exclusive breastfeeding
7. Percentage of mothers of children age 0-23 months who knew at least two post-partum danger signs
8. Percentage of children age 0-23 months who received a post-natal visit from an appropriate trained health worker within two days after birth
9. Percentage of mothers of children age 0-23 who know at least two neonatal danger signs

HIV

1. Percentage of mothers of children age 0-23 months who know that HIV can be transmitted from an HIV-positive mother to her unborn child during pregnancy, during delivery, and through breastfeeding
2. Percentage mothers of children age 0-23 months who know that there are special medications that can be given to a pregnant woman infected with HIV to reduce the risk of mother-to-child transmission
3. Percentage of mothers of children 0-23 months who were counseled about HIV during the pregnancy, accepted an offer of testing, and received their test results when they were pregnant with their youngest child

Project Area	Type of CHW	Official Government CHW or Grantee Developed Cadre	Paid or Volunteer	Number Trained Over Life of Project	Focus of Training
Gbein, Bain, Ganta, and Garr Districts	General Community Health Volunteer	Grantee Developed Cadre	Volunteer	120	Malaria, Pneumonia, Nutrition and Exclusive Breastfeeding, Diarrhea (Handwashing, Safe Drinking Water Storage, Simple Water Treatment, WatSan Facilities), HIV, Antenatal Care, Obstetric Emergencies, Immunization Basics, Family Planning (Importance and Commodity Use and Distribution), Referral of Pregnant Women, Care Group Model, Role and Responsibilities of Trained Traditional Midwives; 60 gCHVs received additional training in Community Case Management of Diarrhea, ARI, and malaria with supplemental funding from Ronald McDonald House Charities
Gbein, Bain, Ganta, and Garr Districts	Trained Traditional Midwife	Grantee Developed Cadre	Volunteer	128	Home Based Life- Saving Skills, Proper Handwashing Techniques and Timeline, Transmission Routes of Disease and Personal Hygiene, Roles and Responsibilities, Working with Stakeholders
Gbein, Bain, Ganta, and Garr Districts	Care Group Volunteer	Grantee Developed Cadre	Volunteer	1173	Malaria, Pneumonia, Nutrition and Exclusive Breastfeeding, Diarrhea (Handwashing, Safe Drinking Water Storage, Simple Water Treatment, WatSan Facilities), HIV, Antenatal Care, Obstetric Emergencies, Immunization Basics, Family Planning (Importance and Commodity Use and Distribution), Referral of Pregnant Women, Care Group Model

Gbein, Bain, Ganta, and Garr Districts	Pump Mechanics	Grantee Developed Cadre	Volunteer	88	Maintenance, care, and minor repair of community wells and pumps; recognition and diagnosis of larger repairs if needed, and coordination with Nehnwaa WatSan team for rehabilitation
Gbein, Bain, Ganta, and Garr Districts	WASH Committee members	Grantee Developed Cadre	Volunteer	220	General pump maintenance and repair, proper storage and handling of water, home treatment, managing community assert, sexual exploitation and abuse, roles and responsibilities of WAsH committees members, diseases associated with water, types water sources, diarrhea transmission blocking route