

**COMMUNITY-BASED IMPACT-ORIENTED CHILD SURVIVAL
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**Assessing the Ability of CBIO+Care Groups to Increase Community Solidarity and
Align the Communities' Perception of Their Health Priorities with the Actual
Epidemiological Priorities**

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GLOSSARY

Asamblea - Open community meeting generally led by the *alcalde* (mayor) to discuss community issues.

Care Group - Group of mother peer educators (Care Group Volunteers) who meet to learn how to teach their peers about health and nutrition; also name given to the methodology utilizing Care Groups

Casa Materna – Community-owned and –managed maternal birthing center

CBIO – Community-Based Impact-Oriented Methodology (project service platform)

CBIO+CG – Combined methodologies of CBIO and Care Groups

Comunicadora – a Care Group Volunteer – a mother peer educator who provides health and nutrition lessons to her neighbor women

Community Facilitator – Community health worker who trains and supports *Comunicadoras*

Community Health Committee – Community leadership responsible for improving community health

KPC – Knowledge, Practice and Coverage (Survey)

MSPAS – Ministry of Public Health and Social Assistance (of Guatemala)

Mini-KPC - KPC Survey focused on a limited number of indicators administered to 100 interviewees selected with simple random sampling

OR- Operational Research

Self-Help Group - Group of neighborhood women who meet twice monthly to be taught by a *Comunicadora* about health and nutrition

Social Capital – Institutions and relationships which enhance community well-being

SRS – Simple random sampling

Vital Events – New pregnancies, births, and deaths

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1. Executive Summary

Background. Our Project seeks to reduce maternal and child mortality in three municipalities of Huehuetenango department, Guatemala, a remote mountainous region characterized by a marginalized, poor, rural Mayan population with very limited health facilities and resources. We utilize an implementation approach that combines our Community-Based Impact-Oriented (CBIO) methodology with Care Groups (CBIO+CG). This methodology mobilizes community social capital in the form of Community Health Committees, Community Health Plans, community emergency transportation plans for complications in pregnancy, childbirth and postpartum, and Care Groups and Self Help Groups in order to empower communities to improve their own health. In past projects we have seen this social capital building enhance community solidarity that manifests as collective action for community improvements. CBIO+CG is also characterized by community awareness of its health data and epidemiological priorities. Our Operational Research (OR) investigated the ability of CBIO+CG to create social capital and social solidarity, and to empower communities to recognize and respond to their actual epidemiological health priorities. Two questions the OR asked were: 1) What are the community health priorities and the epidemiological priorities? and 2) Does the CBIO+CG methodology produce significant increases in community involvement related to problem solving compared to a control/comparison area? For this comparison, the intervention area is the 91 communities of project Phase 1, who received the Project's interventions from October 2011 to May 2015. The comparison area is the 89 communities of Phase 2, who received the Project's interventions only from October 2013 to May 2015.

To answer these questions, the project utilized the following indicators of community social capital and solidarity: 1) Percentage of mothers of children 0-23 months old who report that their community has in place an emergency response system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period; and 2) percentage of mothers of 0-23 month old children who report that in the past 3 months their community has worked together to solve a community problem or make a community improvement. In addition, the OR sought to evaluate changes in community perception of their health priorities over the course of the Project to see the effect of the CBIO+CG methodology on aligning their perceived priorities with the actual epidemiological priorities as detected by vital events collection and analysis and household surveys.

Methods. A quantitative evaluation of these indicators was done comparing the results of three Knowledge, Practice and Coverage (KPC) Surveys:

1) A Baseline KPC Survey of 599 mothers of under-two children conducted in January 2012. The mothers were randomly selected from 30 Phase 1 communities (n=299) and 30 Phase 2 communities (n=300) randomly selected utilizing stratified cluster sampling.

2) In September 2013 a Mini-KPC Survey of 94 mothers of children age 0-23 months was conducted in the Phase 1 communities of all three municipalities. [A mini-KPC is a KPC Survey that focuses on a very limited number of indicators, and so is relatively brief and quick to administer, usually only 3 to 7 questions, plus a few demographic/locator questions]. Following its CBIO methodology, the project keeps vital events registers which record all detected new pregnancies, births, and maternal and under-five child deaths. The birth registers identify and locate the mother as well as the child. These birth registers were utilized to achieve simple random sampling (SRS), which permitted a sample size of 100 randomly selected mothers of children 0-23 months of age; this yielded sufficient power to detect statistically significant differences between the Baseline KPC Survey results

and the results of the Mini-KPC. Six randomly chosen mothers could not be located, so the final sample size for this survey was 94 women of under-two children

3) A Final KPC Survey of 600 mothers of under-two children conducted in June 2015. The mothers were randomly selected from 30 Phase 1 communities (n=300) and 30 Phase 2 communities (n=300) randomly selected utilizing stratified cluster sampling.

Included in the surveys were questions that asked 1) if the community had worked together in the previous three months to solve a community problem or make a community improvement; 2) if the community had an emergency transport system in place that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period (asked only in the Baseline and Final KPC Surveys); and 3) what the interviewees believed to be their community's highest priority health problems. More than one priority problem could be cited. The results of the surveys were entered into and analyzed with EpiInfo 7. The results for the Baseline KPC for the informants from Phase 1 communities were compared with the Mini KPC and Final KPC results for the informants from Phase 1 communities. The results for the Baseline KPC for the informants from Phase 2 communities were compared with the Final KPC results for the informants from Phase 2 communities. The Final KPC results for the informants from the Phase 1 communities were compared with the Final KPC results for the informants from the Phase 2 communities. P-values were calculated with Epi-Info 7 and WinPepi to detect statistically significant differences for these comparisons.

Findings. For the respondents from Phase 1 communities, we see a statistically significant increase in the percentage of mothers who reported that their community had in place an emergency response system, increasing from 29.4% at baseline to 44.7% at end of project (p=0.00). From the Baseline KPC Survey to the September 2013 Mini-KPC, we see a dramatic and significant increase in the percentage of mothers who reported that in the past 90 days their community had worked together to solve a problem or make a community improvement, from 13.0% to 66.0% (p=0.00). But for the Final KPC Survey, only 11.0% of the mothers from Phase I indicated their community had worked together to resolve a problem, down significantly from the September 2013 Mini-KPC (p=0.00) and effectively unchanged from baseline. We see a statistically significant increase in the percentage of mothers interviewed from the Phase 2 communities who reported that their community had in place an emergency response system, increasing from 37.0% at baseline to 52.7% at end of project (p=0.00). From the Baseline KPC Survey to the Final KPC Survey, we see a significant increase in the percentage of mothers from Phase 2 communities who reported that in the past 90 days their community had worked together to solve a problem or make a community improvement, from 16.0% to 22.7% (p=0.049).

We see significantly more mothers from the Phase 2 communities reporting that their community has in place an emergency response system than those from Phase 1 communities, 52.7% of the mothers from Phase 2 Area communities vs. 44.7% of the mothers from Phase 1 Area communities (p=0.05). However, this finding is not corroborated by a comparison of the percentage changes from baseline to endline for this indicator in the two Phase Areas, as it increased 52.0% in Phase 1 vs. only 42.4% in Phase 2 (though this difference is not statistically significant). We also see significantly more mothers from the Phase 2 communities reporting that their community had worked together in the previous 90 days to resolve a problem than those from Phase 1, 22.7% of the mothers from Phase 2 communities vs. only 11.0% of the mothers from Phase 1 communities (p=0.00). This is corroborated by a comparison of the percentage increases from baseline to final for this indicator for the two Phases: the percentage increase for Phase 2 was 41.8% compared to a decrease of -15.4% in Phase 1 (p=0.00).

In both the Phase 1 and Phase 2 communities, we see a dramatic and significant increase in the percentage of mothers who cited diarrhea and pneumonia as community health priorities. Diarrhea, pneumonia, general lack of medical attention, fever, and measles were the priorities most frequently cited by the respondents from both Phases. An increase was also noted in both Phases in the percentage citing measles as a priority. On the other hand, few respondents from the communities of both Phases cited lack of family planning or malnutrition as health priorities. Comparing the Final KPC results for the respondents of both Phases, we see very similar

percentages citing each community health priority, with no significant differences between the respondents of the two Phases.

Discussion. The findings indicate that the project was successful in increasing community social capital and solidarity as defined by the indicators, with significant increases in mothers of under-two children in the communities of both Phases reporting that their community had an emergency response plan in place, and a significant increase in mothers from Phase 2 communities reporting that their community had worked together in the previous 90 days to resolve a problem or make a community improvement. However, our hypothesis that we would see higher coverage of emergency transport plans and higher community problem-solving in the Phase 1 communities compared to those of Phase 2 at the end of the project was not borne out, as the Phase 2 communities showed significantly higher end of project coverage of the two indicators than the Phase 1 communities, despite the shorter duration of the Project's interventions in those communities. The reason for this remains to be determined.

The significant increase detected in communities with emergency response plans in place is an important achievement and almost certainly contributed the Project's lowering of the maternal mortality ratio in the Phase 1 communities from 740 deaths/100,000 live births to 221. This drop in maternal mortality was accompanied by the emergency transport over the course of the project of 84 women with complications in pregnancy, delivery, or part-partum to the Casas Maternas and from the Casas Maternas to the MSPAS referral hospital in Huehuetenango, with 82 successful outcomes.

Another Project achievement is a partial success in aligning the communities' perception of their health priorities with the actual priorities revealed by the Project's vital events data. We see a dramatic and significant increase in the perception that pneumonia, diarrhea and fever are community health priorities, which aligns with the project's vital events data, which shows pneumonia as the number one cause of under-five child mortality, with 41% of all deaths, and diarrhea number three, with 13%, with the two combining for 54% of all under-five deaths. However, the Project was apparently not successful in increasing the perception that lack of family planning and malnutrition in children were community health priorities, which is severely at odds with the epidemiological evidence. Though the Project was very successful in lowering the prevalence of stunting, underweight, and wasting from very high baseline levels, the Final KPC indicates still-high prevalence of stunting (39% in Phase 1 communities, 52% in Phase 2 communities), underweight (20% in the communities of both Phases), and wasting (3.1% in Phase 1 communities and 4.4% in Phase 2 communities). In addition, the Final KPC Surveys indicate that the use of modern contraceptives remained low (34% in Phase 1 communities, 25% in Phase 2 communities) and did not change over the course of the Project. The birthrate remains high, particularly in adolescents, contributing to maternal mortality and morbidity as well as exacerbating poverty and food insecurity.

Limitations. Community problem-solving and improvement projects could have been affected by Christmas and Easter holiday preparations and celebrations, which fell into the 90-day recall period of the Baseline and Final KPC Surveys. The indicators were imperfectly defined, as the women interviewed may not have been aware of emergency transport plans or of community problem-solving/improvement projects. Community leaders could have been interviewed who were more knowledgeable, and the indicators defined with the number of communities – not of women interviewed – as numerator and denominator.

Recommendations. Conduct qualitative research (key informant interviews and focus group discussions) with community members to ascertain to what degree it was the CBIO+CG methodology that contributed to the increase in social capital and solidarity indicators and to the increase in community perception of health priorities that align with actual epidemiological priorities. Conduct qualitative research to determine why malnutrition and family planning remain low perceived priorities, and use the findings to strengthen efforts to increase awareness of malnutrition and family planning as urgent community health priorities.

2. Background/Rationale

Our project seeks to reduce maternal and child mortality in three municipalities of Huehuetenango department, Guatemala, a remote mountainous region characterized by a marginalized, poor, rural Mayan population with very limited health facilities and resources. We utilize an implementation approach that combines our Community-Based Impact-Oriented methodology with Care Groups (CBIO+CG).

Two vital aspects of the CBIO+CG methodology are:

- 1) Engaging communities to work as partners in improving community health, including a process of mobilization and education that helps communities recognize, prioritize, and respond to the challenges to their community's health.
- 2) Building community solidarity through the above process of mobilization and consciousness-raising, and through the creation of institutions of social capital, which include a) Community Health Committees to guide community health improvements; b) the selection and deployment of a Community Health Worker (called a Community Facilitator), c) the creation of Care Groups and Self Help Groups for women, through which mother peer educators trained by the Community Facilitator provide to their neighbors life-saving lessons on health and nutrition; and 4) mobilizing communities to establish emergency response transportation plans for transporting women and newborns with complications in pregnancy, delivery, or post-partum.

To accomplish these ends, the CBIO+CG methodology calls for the monthly sharing of the project's vital events data with the community at meetings of the Community Health Committee and at community assemblies (*asambleas*). This includes information on causes of maternal and child morbidity and mortality so the community may understand its actual epidemiological priorities. Another key aspect is the education of mothers by *Comunicadoras* (Care Group Volunteers) in the Self-Help Groups on the recognition of, and prevention and treatment of pneumonia and diarrhea, and the importance of antenatal care, health facility deliveries, post-partum care, recognizing and responding promptly to obstetric emergencies, and immunization of young children. The *asambleas* and the Self-Help Groups both serve to align the community's perception of its health priorities with its actual epidemiological priorities as detected by vital events collection and analysis and by household surveys.

A third key aspect of social capital creation addresses the very high local maternal mortality: helping communities establish emergency transport plans to facilitate access to health facilities for complications in pregnancy, delivery, and post-partum. In Guatemala, this has usually been accomplished through arrangements with on-call local operators of mini-buses and vans; some communities implement an insurance scheme the families pay into to offset the cost of emergency transport. In Liberia, traditional midwives have pooled a portion of their fees to create an emergency transportation fund.

Thus, the thrust of the CBIO+CG methodology is to align the community's perceived health priorities with their actual priorities, and to create social capital that enables the community to respond to their health priorities and to extend this solidarity to improving overall community welfare. We have seen in past CBIO+CG projects that this community solidarity can extend to other arenas of community life, such as improving water and sanitation, building or improving local schools, and improving roads and bridges.

Therefore, our Operational Research investigated the ability of CBIO+CG to empower communities to recognize and respond to their actual epidemiological health priorities and to generate community solidarity related to problem-solving. Our Formative Research arm seeks to answer the following questions:

- 1) What are the community health priorities and the epidemiological priorities? How can these be combined to create program priorities for the project area?
- 2) Does the CBIO+CG methodology produce significant increases in community involvement related

to problem solving compared to a control/comparison area? (For this comparison, the intervention area is the 91 communities of project Phase 1, who received the Project's interventions from October 2011 to May 2015. The comparison area is the 89 communities of Phase 2, who received the Project's interventions only from October 2013 to May 2015).

To answer these questions, the project utilized the following indicators of community solidarity:

- 1) Percentage of mothers of children 0-23 months old who report that their community has in place an emergency response system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period
- 2) Percentage of mothers of 0-23 month old children who report that their community has worked together to solve a community problem or make a community improvement in the past 3 months.

In addition, the OR plan seeks to evaluate changes in community perception of their health priorities over the course of the project to see the effect of the CBIO+CG methodology on these community perceptions, and to what extent these perceived priorities align with the actual epidemiological priorities identified by the project's analysis of its vital events data.

The OR plan calls for 1) establishing baselines for these indicators for both Phase 1 and Phase 2 communities at the beginning of the project; 2) evaluating these indicators in Phase 1 communities at the end of Phase 1; and 3) evaluating the indicators in both Phase 1 and Phase 2 communities at end of project to compare the results in Phase 1 and Phase 2 to assess the impact of CBIO+CG on these indicators. The indicators were evaluated quantitatively via Knowledge Practice and Coverage (KPC) Surveys of randomly selected mothers of children 0-23 months of age.

3. Methodology

To analyze the changes in the community solidarity indicators and in the community perception of its health priorities, the following sources of data were reviewed:

1) A Baseline KPC Survey of 599 mothers of under-two children conducted in January 2012, with 299 randomly selected from 30 Phase 1 communities and 300 from 30 Phase 2 communities, with the communities randomly selected from all three municipalities utilizing stratified cluster sampling. Included in the survey were questions that asked 1) if the community had worked together in the previous three months to solve a community problem or make a community improvement; and 2) if the community had an emergency transport system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period. It also asked the women to state what they believed to be their community's highest priority health problems. More than one priority could be stated.

2) In September 2013 a Mini-KPC Survey of 94 mothers of children age 0-23 months was conducted in the Phase 1 communities of all three municipalities. [A mini-KPC is a KPC Survey that focuses on a very limited number of indicators, and so is relatively brief and quick to administer, usually only 3 to 7 questions, plus a few demographic/locator questions]. The questions were drawn from the baseline KPC. The survey asked if the community had worked together in the previous three months to solve a community problem or make a community improvement. It also asked the women to state what they believed to be their community's highest priority health problems. More than one priority problems could be stated. There was no question asking if the community had an emergency transport system.

Following its CBIO methodology, the project keeps vital events registers which record new pregnancies, births, and maternal and deaths in under-five children. For every birth, the registers identify and locate the mother as well as the child. These birth registers were utilized to achieve simple random sampling (SRS), which permitted a sample size of 100 randomly selected mothers of children 0-23 months of age; this yielded sufficient power to detect statistically significant differences between baseline results and the results of the mini-CPCs. Six randomly

chosen mothers could not be located, so the final sample size for this survey was 94 women of under-two children.

3) A Final KPC Survey of 600 mothers of under-two children conducted in June 2015, with 300 randomly selected from 30 Phase 1 communities and 300 from 30 Phase 2 communities, the communities randomly selected from all three municipalities utilizing stratified cluster sampling. Included in the survey were the same questions asked in both the Baseline KPC Survey that asked if the community had worked together in the previous three months to solve a community problem or make a community improvement, and if the community had an emergency transport system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period. It also asked the women to state what they believed to be their community’s highest priority health problems. More than one priority problem could be stated.

Prior all the survey interviews, a Declaration of Informed Consent was read to the interviewees in their native Maya language and written consent was obtained (signature or thumb-print of the interviewee). Interviewers were all native speakers of the local Maya language and so the interviews were conducted in that language – Chuj in San Sebastián Coatán, Akateko in San Miguel Acatán, and Q’anjolab in Santa Eulalia – with the interviewers translating the Spanish survey questions into the local language. The survey results were entered into and analyzed with EpiInfo 7. Frequencies and confidence intervals were calculated for the indicators and for the cited health priorities. The results for the Baseline KPC for the informants from Phase 1 communities were compared with the Mini KPC and Final KPC results for the informants from Phase 1 communities. The results for the Baseline KPC for the informants from Phase 2 communities were compared with the Final KPC results for the informants from Phase 2 communities. The Final KPC results for the informants from the Phase 1 communities were compared with the Final KPC results for the informants from the Phase 2 communities. P-values were calculated with Epi-Info 7 and WinPepi to detect statistically significant differences for these comparisons.

4. Findings

In Table 1 we see a statistically significant increase from Baseline KPC to Final KPC in the percentage of mothers interviewed from the Phase 1 communities who reported that their community had in place an emergency response system, increasing from 29.4% at baseline to 44.7% at end of project (p=0.00). From the Baseline KPC Survey to the September 2013 mini-KPC, we see a dramatic and significant increase in the percentage of mothers who reported that in the past 90 days their community had worked together to solve a problem or make a community improvement, from 13.0% to 66.0% (p=0.00). But for the Final KPC Survey, only 11.0% of the mothers from Phase I communities indicated that their community had worked together to resolve a problem or make an improvement, down significantly from the September 2013 Mini-KPC (p=0.00) and effectively unchanged from baseline.

Table 1. Percentage of mothers of children 0-23 months of age from Phase 1 communities who reported that their community has an emergency response system in place and who reported that their community worked together to solve a problem in the past 90 days.

Indicator and Data Source	Respondents from Phase 1 Communities				p-value
	Num.	Denom.	Pctg.	95% Confidence Interval	
Percentage of mothers of children 0-23 months old who reported that their community has in place an emergency response system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period.					0.00
Jan 2012 Baseline KPC Survey	88	299	29.4%	(23.1, 35.7)	
June 2015 Final KPC Survey	134	300	44.7%	(39.0, 50.4)	

Percentage of mothers of 0-23 month old children who reported that their community has worked together to solve a community problem or make a community improvement in the past 90 days.					
Jan 2012 Baseline KPC Survey	39	299	13.0%	(8.3, 17.7)	
Sept 2013 Mini-KPC Survey	62	94	66.0%	(54.2, 77.7)	0.00
June 2015 Final KPC Survey	33	300	11.0%	(7.5, 14.5)	0.26

Among the of mothers interviewed from the Phase 2 communities (Table 2), we also see a statistically significant increase in the percentage who reported that their community had in place an emergency response system, increasing from 37.0% at baseline to 52.7% at end of project (p=0.00). From the Baseline KPC Survey to the Final KPC Survey, we see a significant increase in the percentage of mothers from Phase 2 communities who reported that in the past 90 days their community had worked together to solve a problem or make a community improvement, from 16.0% to 22.7% (p=0.049).

Table 2. Percentage of mothers of children 0-23 months of age from Phase 2 communities who reported that their community has an emergency response system in place and who reported that their community worked together to solve a problem in the past 90 days.

Indicator and Data Source	Respondents from Phase 2 Communities				p-value
	Num.	Denom.	Pctg.	95% Confidence Interval	
Percentage of mothers of children 0-23 months old who reported that their community has in place an emergency response system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period.					0.00
Jan 2012 Baseline KPC Survey	111	300	37.0%	(30.3, 43.7)	
June 2015 Final KPC Survey	158	300	52.7%	(46.0, 59.4)	
Percentage of mothers of 0-23 month old children who reported that their community has worked together to solve a community problem or make a community improvement in the past 30 days.					0.049
Jan 2012 Baseline KPC Survey	48	300	16.0%	(12.2, 20.5)	
June 2015 Final KPC Survey	68	300	22.7%	(18.2, 27.7)	

Table 3 looks at data from the Final KPC Survey, comparing the responses of the women from Phase 1 communities with the responses of the women from Phase 2 communities. We see significantly more mothers from the Phase 2 communities reporting that their community has in place an emergency response system than those from Phase 1 communities, 52.7% of the mothers from Phase 2 communities vs. 44.7% of the mothers from Phase 1 communities (p=0.05). However, this finding is not corroborated by a comparison of the percentage changes from baseline to endline for this indicator in the two Phase Areas, as it increased 52.0% in Phase 1 vs. only 42.4% in Phase 2 (though this difference is not statistically significant).

Table 3. Percentage of mothers of children 0-23 months of age from Phase 1 communities and from Phase 2 communities who reported in the Final KPC Survey that their community has an emergency response system in place and who reported that their community worked together to solve a problem or make an improvement in the past 90 days.

Indicator and Data Source	Final June 2015 KPC Survey				p-value
	Num.	Denom.	Pctg.	95% Confidence Interval	
Percentage of mothers of children 0-23 months old who reported that their community has in place an emergency response system that would provide transport for them and/or their newborn child to the nearest health facility in the event of a difficult delivery or danger signs in pregnancy or during the post-partum period					

Respondents from Phase 1 communities	134	300	44.7%	(39.0, 50.4)	0.05
Respondents from Phase 2 communities	158	300	52.7%	(46.0, 59.4)	
Percentage of mothers of 0-23 month old children who reported that their community has worked together to solve a community problem or make a community improvement in the past 30 days.					
Respondents from Phase 1 communities	33	300	11.0%	(7.5, 14.5)	0.00
Respondents from Phase 2 communities	68	300	22.7%	(17.9, 27.5)	

We also see significantly more mothers from the Phase 2 communities reporting that their community had worked together in the previous 90 days to resolve a problem than those from Phase 1, 22.7% of the mothers from Phase 2 communities vs. only 11.0% of the mothers from Phase 1 communities (p=0.00). This is corroborated by a comparison of the percentage increases from baseline to final for this indicator for the two Phases: the percentage increase for Phase 2 was 41.8% compared to a decrease of -15.4% in Phase 1 (p=0.00).

Table 4 shows the percentage of mothers of under-2 children from communities of both Phases who cited specific community health priorities, comparing the Baseline KPC Survey results with the Final KPC Survey results for the respondents from the communities of each Phase, and comparing the Final KPC Survey results of the respondents from Phase 1 communities with those from Phase 2 communities.

Table 4. Percentage of mothers of under-2 children from communities of both Phases from Baseline and Final KPC Surveys who cited specific community health priorities,

Community health priorities cited by the interviewees- more than one priority could be cited	Percentage of mothers of under-2 children who cited the community health priority		p value - Baseline KPC vs. Final KPC - Phase 1	Percentage of mothers of under-2 children who cited the community health priority		p value - Baseline KPC vs. Final KPC - Phase 2	p value -Final KPC Phase 1 respondents vs. Final KPC Phase 2 respondents
	Baseline KPC- Communities of Phase 1	Final KPC - Communities of Phase 1		Baseline KPC- Communities of Phase 2	Final KPC - Communities of Phase 2		
Diarrhea	35.8%	59.3%	0.00	37.0%	53.3%	0.00	p>.05
Pneumonia	26.1%	49.0%	0.00	19.7%	43.0%	0.00	p>.05
General Lack of Medical Attention	21.7%	27.0%	0.07	17.7%	21.3%	0.30	p>.05
Fever	11.7%	17.0%	0.04	8.3%	12.0%	0.18	p>.05
Measles	2.0%	9.0%	0.00	3.0%	6.3%	0.06	p>.05
Lack of Prenatal and Postnatal Care	8.7%	7.7%	0.66	10.7%	4.3%	0.01	p>.05
Lack of transportation to health facilities	6.7%	4.7%	0.19	10.0%	3.7%	0.00	p>.05
Lack of Clean, Safe Deliveries	6.0%	4.3%	0.36	8.7%	3.7%	0.02	p>.05
Diabetes	1.0%	4.3%	0.02	1.3%	2.7%	0.38	p>.05
Lack of Family Planning	1.7%	2.3%	0.77	0.7%	1.3%	0.69	p>.05
Obstetric Emergencies	2.0%	2.0%	1.00	1.7%	0.6%	0.45	p>.05
Malnutrition	5.4%	1.7%	0.02	3.7%	4.3%	0.84	p>.05
Accidents	4.3%	1.7%	0.06	3.3%	2.3%	0.62	p>.05
Strokes	1.3%	1.0%	0.73	0.7%	3.7%	0.02	p>.05
Heart Disease	1.7%	0.3%	0.12	0.7%	1.0%	1.00	p>.05

In both the Phase 1 and Phase 2 communities, we see a significant increase in the percentage of mothers who cited diarrhea and pneumonia as community health priorities. For the respondents from Phase 1 communities, the percentage citing diarrhea as a priority increased from 35.8% at Baseline KPC to 59.3% at Final KPC ($p=0.00$) and the percentage reporting pneumonia as a priority increased from 26.1% at Baseline KPC to 49.0% at Final KPC ($p=0.00$). For the respondents from Phase 2 communities, the percentage citing diarrhea as a priority increased from 37.0% at Baseline KPC to 53.3% at Final KPC ($p=0.00$) and the percentage reporting pneumonia as a priority increased from 19.7% at Baseline KPC to 49.0% at Final KPC ($p=0.00$). In addition, the number of Phase 1 respondents who cited “fever” as a priority increased significantly from 11.7% to 17.0% ($p=0.04$); those who cited measles increased significantly from 2.0% to 9.0% ($p=0.00$); and the number who cited diabetes increased significantly from 1.0% to 4.3% ($p=0.02$). For the respondents of Phase 1, we see a significant drop from Baseline KPC to Final KPC for the percentage who cited malnutrition. For the respondents from Phase 2 communities, we see significant drops from Baseline KPC to Final KPC in the percentage who cited lack of prenatal/postnatal care, lack of transportation to health facilities, and lack of clean safe deliveries.

Diarrhea, pneumonia, general lack of medical attention, fever, and measles were the most frequently cited by the respondents from both Phases. On the other hand, few respondents in the communities of both Phases cited lack of family planning, obstetric emergencies, or malnutrition/food insecurity as health priorities in either survey. Comparing the Final KPC results for the respondent of both Phases, we see very similar percentages citing each community health priority, with no significant differences between the respondents of the two Phases.

5. Discussion

The findings indicate that the project was successful in increasing community social capital and solidarity as defined by the indicators, with significant increases in mothers of under-two children in the communities of both Phases reporting that their community had an emergency response plan in place, and a significant increase in mothers from Phase 2 communities reporting that their community had worked together in the previous 90 days to resolve a problem or make a community improvement.

However, our hypothesis that we would see higher coverage of emergency transport plans and higher community problem-solving in the Phase 1 communities compared to those of Phase 2 at the end of the project was not borne out, as the Phase 2 communities showed significantly higher end of project coverage of the two indicators than the Phase 1 communities. While the Baseline KPC percentages for both indicators were higher for the respondents from Phase 2 communities than for those from Phase 1 communities, neither of these differences at baseline was statistically significant, supporting the finding that superior improvements in the indicators were achieved in the Phase 2 communities despite the shorter duration of the Project’s interventions in those communities. The reason for this remains to be determined.

The significant increase detected in communities with emergency response plans in place is an important achievement and almost certainly contributed the Project’s lowering of the maternal mortality ratio in the Phase 1 communities from 740 deaths/100,000 live births between October 2012 and September 2013 to 221 between October 2014 and May 2015. This drop in maternal mortality was accompanied by an increase in the use of the Casas Maternas, and in the use of emergency transport: over the course of the last three years of the Project of 84 women with complications in pregnancy, delivery, or part-partum were transported to the Casas Maternas and, if necessary, from the Casas Maternas to the referral hospital in Huehuetenango, with 82 successful outcomes.

What is puzzling is the significant discrepancy between the September 2013 Mini-KPC results and Final KPC results for the percentage of women from Phase 1 communities who reported that their community had resolved a problem or make an improvement in the previous 90 days. The Baseline and Final KPC surveys were conducted in January and June, respectively, and in both cases the previous 90 days would have included either the Christmas/New Years’ season (Baseline KPC) or the “Semana Santa”/Easter season (Final KPC), the two biggest holidays of the year in Guatemala, when community improvement projects would generally be put on hold during the preparations for and during the festivities themselves. It is possible this explains this discrepancy.

Another Project achievement is a partial success in aligning the communities' perception of their health priorities with the actual priorities revealed by the Project's vital events data. We see a dramatic and significant increase in the perception that pneumonia, diarrhea and fever are community health priorities, which aligns with the project's vital events data, which shows that over the course of the Project pneumonia was the number one cause of under-five child mortality, with 41% of all under-five deaths, and diarrhea number three, with 13%, with the two combining for 54% of all under-five deaths.

Also worth noting is that among the respondents of both Phases the perception of measles as a priority increased, significantly in Phase 1 respondents and almost so for the Phase 2 respondents. This could be in response to health education provided in the Care Groups about the dangers of measles and importance of childhood immunizations. But in the Project's final year, MSPAS shut down the Extension of Coverage Program (PEC) through which ambulatory nurses immunized children at health posts in the communities. The effects of this loss of access to vaccinations is revealed by the Final KPC Survey, which indicates that coverage of 12-23 month old children with the measles vaccine dropped significantly in the communities of both Phases from Baseline to Final KPC (from 79% coverage to 60% for the communities of both Phases combined). This lack of access to measles vaccination may have influenced the mother's responses. That said, while the Project's vital events data show no under-5 mortality from measles over the course of the Project, there is no data on the number of episodes of measles in under-5 children, which may have increased noticeably with the drop in immunization coverage.

However, the Project was apparently not successful in increasing the perception that lack of family planning and malnutrition in children were community health priorities, which is severely at odds with the epidemiological evidence. Though the Project was very successful in lowering the prevalence of stunting, underweight, and wasting from very high baseline levels, the Final KPC Survey indicates still-high prevalence of stunting (39% in Phase 1 communities, 52% in Phase 2 communities), underweight (20% in the communities of both Phases), and wasting (3.1% in Phase 1 communities and 4.4% in Phase 2 communities). In addition, despite the education in the Self-Help Groups and Casa Maternas, the Baseline and Final KPC Surveys indicate that the use of modern contraceptives did not change over the course of the Project and remains low (34% in Phase 1 communities, 25% in Phase 2 communities). The birthrate remains high, particularly in adolescents, contributing to maternal mortality and morbidity as well as exacerbating poverty and food insecurity. This would seem to indicate that 1) the project's efforts to raise awareness of the need for and benefits of family planning is not resulting in its perception as a health priority; and/or 2) the demand for family planning has not increased and what demand there is is currently being met, hence it is not felt as a priority. This would suggest the need to augment the demand for family planning and the awareness of its importance.

It is also worth noting that generally few respondents cited maternal/newborn health issues as priorities. While the Project was successful in significantly increasing health facility deliveries, particularly in the communities of the Casa Materna catchments, the large majority of women still are delivering at home and home delivery remains a strong preference. This indicates the need to increase the perception of the dangers of home delivery and the higher prioritization by reproductive age women of clean safe health facility deliveries, as well as antenatal and post-natal care. The low number of women citing lack of transportation and obstetric emergencies as priorities could be because of these needs now being filled, or because of a persisting lack of awareness of these issues and low valorization of women's lives.

6. Limitations

As mentioned above, the baseline and final data for the community problem-solving/improvement projects may be suspect because of the timing of the Baseline and Final KPC surveys, whose 90-day recall period included the lengthy Christmas/New Year's season and Semana Santa, when community projects are generally put on hold.

The two social capital/solidarity indicators may have been imperfectly defined, affecting the accuracy of the data collection. The mothers interviewed may not have had knowledge of the emergency plan in place, or of community projects that may have been executed. These indicators were probably better measured by interviews

with community leaders better positioned to respond. As such, the indicator denominator would be the total number of communities in the KPC sample (30 from each Phase) and the numerator the number of communities verified to have emergency response plans or have achieved community improvement projects in the previous 90 days.

7. Recommendations

The following suggestions are offered in response to these findings:

- Conduct qualitative research (key informant interviews and focus group discussions) with community members to ascertain to what degree it was the CBIO+CG methodology that contributed to the increases in women reporting that community improvement projects that occurred in the 3 months prior to their interview, in community emergency transport plans, and in community perceptions of health priorities that align with the actual epidemiological priorities.
- Conduct qualitative research to determine why child malnutrition and family planning remain low perceived community priorities. In response to the findings, strengthen consciousness-raising and education efforts to raise community and family awareness of malnutrition and family planning as urgent community health priorities.
- Conduct qualitative research to determine why maternal/newborn health issues remain low perceived community health priorities despite the progress being made in increasing health facility deliveries (particularly in the Casasa Maternas) and in reducing maternal mortality
- Conduct qualitative research to understand what are the barriers to the communities' implementation of emergency transport plans and execution of community problem-solving and improvement projects. In response to these findings, provide knowledge, skills, and technical assistance to the communities as needed.