FINAL TECHNICAL REPORT / RAPPORT TECHNIQUE FINAL

ANEXO IV-B) PROGRAM EVALUATION REPORT

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IDRC Grant / Subvention du CRDI: 108167-001-Scaling Up and Evaluating Salt Reduction Policies and Programs in Latin American Countries

Evaluation of a multi-national dietary sodium research program in Latin America

"Scaling up and Evaluating Salt Reduction Policies and Programs in Latin American Countries"
which a research program funded by the
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IDRC | CRDI
International Development Research Centre
Centre de recherches pour le développement international
INCIENSA
Instituto Costarricense de Investigación y Enseñanza en Nutrición y Salud
Canada
Nutritional Sciences
UNIVERSITY OF TORONTO
Pan American Health Organization

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List of Abbreviations

IDEC	Instituto Brasileiro de Defesa do Consumidor
IDRC	International Development Research Centre
LA	Latin America
LAC	Latin American countries
INCIENSA	Costa Rican Institute for Research and Teaching in Nutrition and Health
NCD	Non-communicable diseases
PAHO	Pan American Health Organization
PI	Principal Investigator
PRIME	Preventable Risk Integration Model
USF	University of South Florida

Acknowledgements

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Finally, we offer a special thanks to the IDRC for their ongoing support and funding to conduct this evaluation. In particular, we thank Dr. Roberto Bazzani for his ongoing collaboration, guidance and dedication to the success of this research.

Executive Summary

This report is a summative evaluation of the project “Scaling up and Evaluating Salt Reduction Policies and Programs in Latin American Countries” which was funded by the International Development Research Centre (IDRC Grant 108167, 09/2016 to 03/2020). The evaluation activities were conducted from December 2019 to February 2020.

The objective of this IDRC funding was to conduct research to support healthy food systems. This grant specifically aimed to scale up and generate knowledge and research innovations to drive policies and programs for dietary sodium reduction, with a goal of reducing population sodium intakes and improving cardiovascular health. The participating countries were Argentina, Brazil, Costa Rica, Paraguay and Peru.

This program evaluation examined short term Research and Consortium-level outcomes that occurred over the 3.5 year funding period, from September 2016 to March 2020, as defined by a logic model that was generated at program initiation (Figure 1). Specifically, the outcomes in this report include:

1. Research conducted, data generated and innovations scaled-up or created
2. Newly formed and/or strengthened, engaged and activated multi-sectoral and multi-disciplinary partnerships,
3. Equitable, diverse and inclusive partnerships and collaborations formed
4. Confidence, capacity, and scientific abilities to conduct research to address public health nutrition issues in Latin American countries (LAC) is increased

The logic model also defined Intermediate Outcomes that focused on policy and program changes at the national level that are related specifically to dietary sodium reduction. While it was unlikely these outcomes would occur over the funding period, they were captured and documented as part of this evaluation. Achieving these intermediate outcomes are critical to reaching the long-term goal of reduced morbidity and mortality from cardiovascular diseases.

The Consortium was coordinated by Adriana Blanco Metzler (Principal Investigator) and her team at Costa Rican Institute for Research and Teaching in Nutrition and Health (INCIENSA) in Costa Rica. Each member of the Costa Rican team coordinated regionally 1-2 objectives in coordination with the Principal Investigator. Each country had an assigned research lead and several researchers who had leadership roles in seeing the research projects through to completion. A core advisory group was established to provide guidance to the Costa Rican coordinating team in relation to project governance: PAHO, the University of Toronto, and Ontario Tech University. Scientific and technical support was provided by researchers at the University of Toronto, Ontario Tech University, Université Laval, the University of South Florida and the University of Liverpool. The researchers received support in knowledge dissemination from the InterAmerican Heart Foundation (policy brief and organization of webinars), and from the researchers and international organizations (PAHO) that assisted in providing scientific and technical support.

Overview of Findings

Research conducted, data generated and innovations scaled-up or created

Knowledge was generated and disseminated to ensure the research reached target audiences who could benefit from the data, and to inform dietary sodium policies and programs.

- Knowledge on the sodium content of over >8300 packaged foods and 100 street, artisanal and fast foods has been generated.
- Quantification of the number packaged foods that exceed regional and/or national sodium reduction target levels has been established.
- An understanding of barriers and facilitators to limiting discretionary salt use among target populations in each participating country has been established.
- In two countries, the health and economic impacts of population-wide dietary sodium reduction programs were determined.
- A comprehensive knowledge translation plan was developed in each country, to translate the research findings to knowledge users.
- To date, this work has generated 13 peer-reviewed journal articles are published, in press or under review. Several more manuscripts are planned or in progress.
- Overall, 490 knowledge translation activities occurred. Of these, 29% were to civil society, 24% were to other researchers, 16% were to health and education stakeholders, 12% were to government, 12% were to international partners, 6% were to the industry and food services sector.
- A regional policy brief with the most important results of the project and political recommendations was generated and launch in a political meeting in Costa Rica. This document will be used by other countries to update the government and propose policies.

Several innovations were created and/or scaled-up as part of this research. Many of these will be available for use in the future. Many of these innovations can now be scaled-up to other LAC and for use to address other public health issues.

- FLIP-LAC was adapted by the University of Toronto, with technical support from Dietitians of Canada, to enable the acquisition and storage of data from packaged foods. This will be made available to LAC countries in the future.
- A branded food database in each country has been developed. This can be used to explore other nutrients of public health concern, evaluate national food policies (sodium targets in Argentina and Costa Rica, new FOP law in Peru) and public health nutrition topics such as front-of-package labelling and marketing to children.
- A social marketing training program was developed. Countries throughout Latin America can now access this training program on the PAHO Virtual Campus.
- A regional social marketing and communication plan was developed. This will be available to other LAC countries to adapt to their national context.
- Knowledge translation workbooks were created to guide the development of knowledge translation plans to promote maximal reach of research products.

Newly formed and/or strengthened, engaged and activated multi-sectoral and multi-disciplinary partnerships

Forming partnerships and collaborations was critical to achieve success in conducting this work, as well as in translating the outputs to achieve policy impact. Many partnerships and collaborations were reported with the national governments (82%), educational institutions (82%), non-governmental organizations (73%), research institutions (64%), the scientific community (55%) and regional governments (55%). The partners and collaborators were engaged at various time points, which typically aligned with their role (i.e., conducting the research, disseminating the research to stakeholders, using the data to make decisions about national or regional policies, etc).

The researchers also worked together collaboratively and reported a high level of satisfaction in their experience as part of this grant. A number of factors were found to contribute to this high level of satisfaction, including social connections with fellow collaborators and other researchers, a supportive culture and loyalty and commitment to the project. The Consortium lead, Adriana Blanco Metzler, is a highly experienced public health nutrition researcher with over 36 years of experience. Her credibility, perseverance, dedication and productivity strongly influenced the successful collaborations within the consortium and overall engagement of researchers across 4 other countries.

Equitable, diverse and inclusive partnerships and collaborations formed

The consortium included researchers from multiple disciplines and at various stages of their research career. This allowed for both mentorship and interdisciplinary collaboration within the Consortium. Three out of 5 country leads were women, and there was a very high proportion of women who led research projects within the countries.

Confidence, capacity, and scientific abilities to conduct research to address public health nutrition issues in Latin American countries (LAC) is increased

The Consortium developed a number of training and education programs to build research capacity among its members. Overall, researchers reported that they had improved scientific abilities, social marketing skills, knowledge translation skills, language skills, and professional skills related to research leadership, networking and communication. Approximately 25 undergraduate, graduate and postdoctoral trainees used the Consortium research projects to fulfill the requirements of their training programs.

Intermediate outcomes achieved

It was not expected that research projects could achieve the intermediate outcomes, however there were several areas of success. Listed here are highlights of some of the successes. A full list of Intermediate outcomes achieved can be found in the report.

- The Costa Rican Ministry of Health and the CACIA, Cámara Costarricense de la Industria Alimentaria (Costa Rican Chamber of the Food Industry) renewed their alliance and shared commitment to sodium reduction in the food supply, which includes supporting updated sodium targets for the packaged food supply.

- The Pan American Health Organization Technical Advisory Group on Cardiovascular Disease Prevention through Population-wide Dietary Sodium Reduction committed to revising the regional sodium reduction targets.
- Using the skills developed from the Consortium research, similar principles were applied to other nutrients of public health concern and nutrition labelling issues (as part of an extension funded by the IDRC). This data can provide the basis for future research projects.
- In Peru, a new law on front-of-package labelling informed using the data generated from this research.
- Costa Rica formed collaborations with the University of Costa Rica and with Dr. Simón Barquera, at the Center for Research in Nutrition and Health of the National Institute of Public Health in Mexico to use the packaged food database to inform policies on marketing and food environments.
- In Paraguay, municipal governments have used the qualitative research data, generated to inform the social marketing plan, as a basis for banning saltshakers in restaurant and food service establishments.
- In several countries, advances have been made in adapting the regional social marketing plan and communication plan to national contexts. Advocacy efforts are underway to promote national implementation.

Recommendations

This multi-national research Consortium successfully achieved the intended objectives. It produced high quality and impactful data related to outcomes that are highly relevant to improving political innovations and food systems. Despite the high level of success, the program evaluation identified areas of improvement related to 1) project logistics, 2) training and education, 3) contract negotiations and agreements, 4) budget considerations 5) partnership time commitments 6) knowledge translation 7) time zone etiquette. These areas of consideration will support the success of future multi-national research consortiums.

Conclusions

This project illustrates the benefits of collaborative work in research carried out by a consortium of countries with the support of international technical assistance. The dedicated efforts of the team generated local and regional scientific evidence for decision-making in sodium reduction policies and programs, innovations in systems food, as well as innovative approaches from the technological, political to the methodological. It is a model for other public health interventions that require new techniques for food policy analysis and consumer behavior.

Context

Excess dietary sodium is a public health priority

Poor diet quality is a significant risk factor for non-communicable diseases (NCDs), estimated to account for 11 million deaths globally each year.[2] Excess sodium intake is the leading dietary risk factor, accounting for 27% of diet-related mortality from cardiovascular diseases.[3,4] Approximately one third of hypertension cases are attributable to excess dietary sodium. The majority of Latin American countries (LAC) have hypertension prevalence rates exceeding 30%, which is estimated to be responsible for 1 in 5 deaths.[5] Thus, dietary sodium is a highly relevant risk factor for LA and Caribbean countries.

The World Health Organization (WHO) recommends reducing dietary sodium to less than 2000 mg/day (equivalent to 5 g of salt/day).[6] Decreasing sodium intake reduces risk of hypertension, cardiovascular disease, stroke and related deaths.[3] However, in LAC population sodium intakes are more than double the WHO recommendation. For example, sodium consumption is estimated to be 4407 mg/day in Argentina,[7] 4700 mg/day in Brazil,[8-10] and 4600 mg/day in Costa Rica.[11]

To address high sodium consumption, the WHO set global targets to reduce sodium intake by 30% by 2025.[12] Intersectoral population-level sodium reduction policies and programs that target multiple segments of food systems are recommended and are predicted to be highly effective in addressing the health and economic burden associated with excess dietary sodium.[13] Sodium reduction strategies commonly target the food supply, such as the sodium content of packaged and prepared foods (via mandatory or voluntary targets), food labelling regulations, and policies aimed at public institutions. Increasingly consumer education and social marketing is being used to change the behaviour of consumers, which may be particularly effective for countries where a significant amount of sodium is derived from salt added during cooking and eating, a common occurrence in many LAC.[14] While globally, many countries have implemented such population level sodium reduction strategies, only approximately 20 LAC have done so.[15]

Development of a LAC Dietary Sodium Research Consortium

In 2016, a multi-country LAC research consortium was established with a goal of collaborating and scaling-up existing research methodologies across 5 countries to inform public health policy innovations to reduce dietary sodium. The Consortium was formed in response to a call for research proposals by IDRC. The Consortium submitted the proposal "*Scaling up and Evaluating Salt Reduction Policies and Programs in Latin American Countries*" which was successfully funded by the IDRC ($1,199,946, IDRC Grant 108167, 2016-2020).

The Consortium consists of researchers from Argentina, Brazil, Costa Rica, Paraguay and Peru (herein referred to as the **"IDRC countries"**). Scientific and technical support was provided by researchers at the University of Toronto, Ontario Tech University, Université Laval, the University of South Florida and the University of Liverpool. Adriana Blanco-Metzler as Principal Investigator and her team at the Costa Rican Institute for Research and Teaching in Nutrition and Health (INCIENSA) as the lead Consortium coordinating site. The Consortium research was an extension and "scaling up" of a successfully implemented IDRC-funded sodium reduction project in Costa Rica "*Implementation of a population-wide program to reduce salt/sodium consumption in Costa Rica"* (IDRC Grant 106888, 09/2013 to 06/2016).

Each Consortium country consisted of:

1. a country lead, and
2. researchers to drive the objectives of the project.

The country leads (n=5) are individuals who oversaw the development and direction of the project, provided oversight of the research activities taking place in their countries, often led some research activities and were the primary point of contact for the project. The researchers led the research activities in their countries but were not the country leads themselves. Collectively, they are known as the Consortium members.

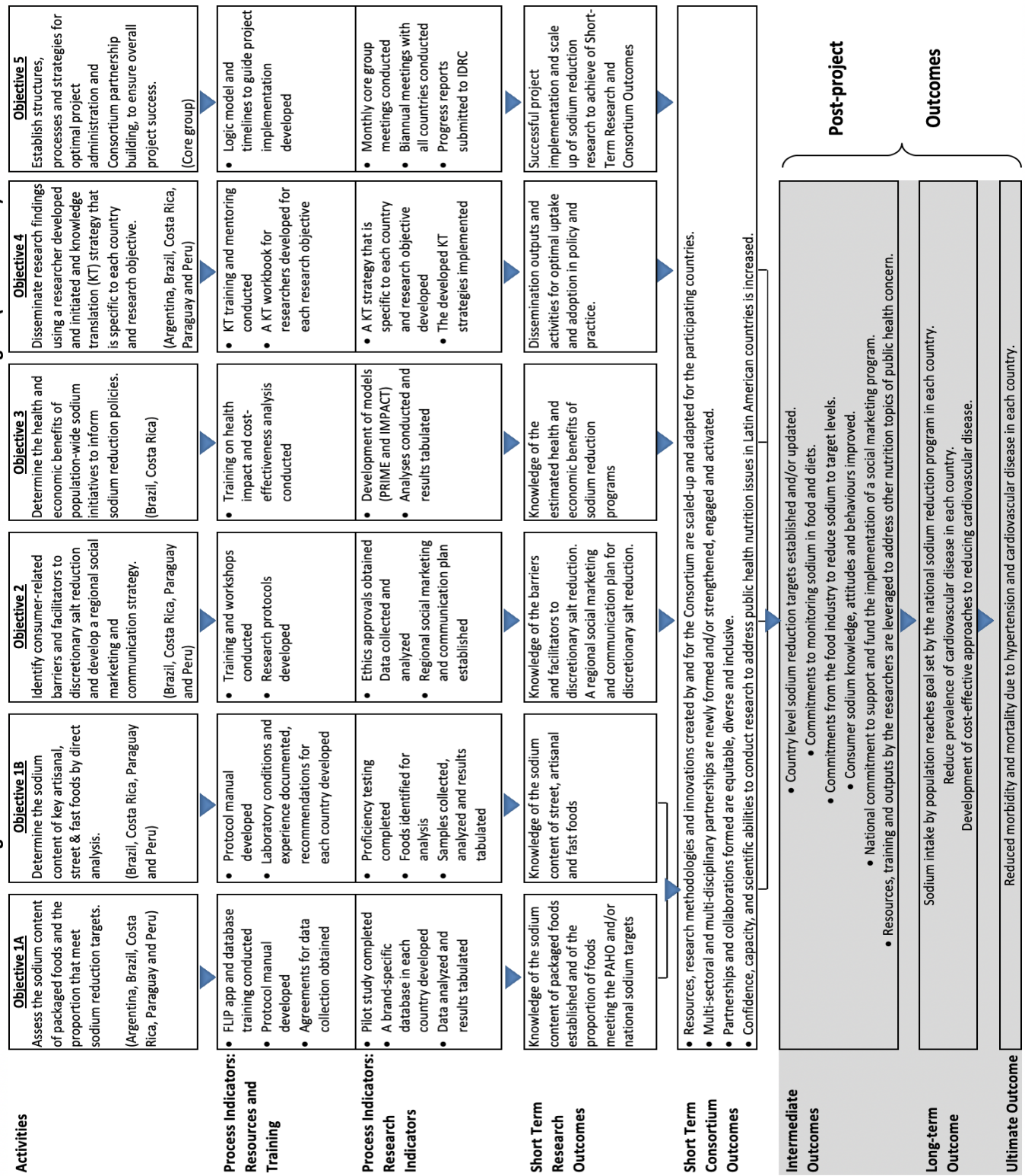
Objectives of the Research Program Implemented by the Consortium

The Consortium research efforts aimed to promote new or improved public policy innovations for sodium reduction in the food systems of the LAC region. This was achieved through research across the following **grant objectives**:

	Topic	County Participants
Objective 1A	Assess the sodium content of packaged foods and the proportion that meet sodium reduction targets.	All countries
Objective 1B	Determine the sodium content of key artisanal, street & fast foods by direct analysis.	Argentina, Brazil, Costa Rica, Paraguay and Peru
Objective 2	Identify consumer-related barriers and facilitators to discretionary salt reduction and develop a regional social marketing and communication strategy.	Brazil, Costa Rica, Paraguay and Peru
Objective 3	Determine the health and economic benefits of population-wide sodium initiatives to inform sodium reduction policies.	Brazil and Costa Rica
Objective 4	Disseminate research findings using a researcher developed and initiated and knowledge translation (KT) strategy that is specific to each country and research objective.	All countries
Objective 5	Establish structures, processes and strategies for optimal project administration and Consortium partnership building, to ensure overall project success.	Core advisory group with representatives from Costa Rica, Canada and PAHO

A logic model outlines process indicators, short term research and consortium outcomes, intermediate outcomes and long-term outcomes (Figure 1) which formed the basis of this evaluation.

Figure 1. Research Program Logic Model



Purpose of this Evaluation

This purpose of this evaluation was to determine if the intended objectives and impacts have been achieved since the Consortium formed in 2016. The report explores the impacts of a funded research program on generating and communicating scientific knowledge, on enhancing scientific capacity, on partnership building, engagement and social change; all to influence the implementation of dietary sodium reduction policies and programs to reduce the burden of hypertension in participating LAC. The IDRC provided the Consortium with a six-month extension to explore novel research related to other nutrients of public health concern. This report does not evaluate outcomes related to the extension research. **Specifically, this report emphasizes the evaluation of Short term Research and Consortium outcomes that are defined in the Logic Model.** Intermediate and long-term outcomes are included but are not expected to occur given the short follow-up period. The findings of this evaluation can be applied to the development of future Consortium research partnerships and activities designed to address the burden of NCDs in the region.

Evaluation Design and Methods

A summative evaluation occurred in the final months of the funding period from December 2019 to February 2020. Short term research and consortium outcomes were evaluated using both quantitative and qualitative data. A mixed-method data collection approach ensured validation, credibility and added to the breadth of findings. A thematic deductive analysis was conducted once data collection concluded. The grant outcomes were assessed in this evaluation using multiple data sources and are described below and in Table 1.

Document Review

Program evaluators reviewed several documents to support this program evaluation including the submitted grant application, interim progress reports that were submitted to the IDRC over the funding period, a compendium of knowledge translation activities conducted, meeting notes and memos, and country-level data on existing programs and policies from the Pan American Health Organization (PAHO). A list of documents reviewed is in Appendix 1.

Program Evaluation Survey

In January 2020, a web-based survey was administered to the Consortium members consisting of 5 country leads and 13 researchers. The objective of the survey was to evaluate Consortium-level outcomes related to partnerships, capacity, and the overall experiences as a Consortium member. The ESSENCE framework and Larkan's et al (2016) consolidated set of attributes informed the survey questions related to partnerships.[16] The survey consisted of 10 multiple choice questions based on a 5-point Likert scale and 8 open-ended questions. Face content validity of the survey was completed by two external reviewers independent of this evaluation. A response rate of 61% was achieved. Of the responses received, 2 were from Argentina, 2 from Brazil, 3 from Costa Rica, 3 from Paraguay and 1 from Peru. The response data can be found in Appendix 2 and the survey questions administered in Appendix 3.

Interviews

For the evaluation, we accessed data from a qualitative research study that utilized one-on-one semi-structured interviews with the country leads (n=5) and Ministry of Health key informants (n=4) from each participating country. The Ministry of Health key informants are individuals who are arms length to the research and were interviewed due to their role in policy decision making. The interviews were 45 to 60 minutes in duration and explored the barriers and facilitators to implementing sodium reduction policies and programs in the Consortium countries. This data added additional insights to the evaluation of research and consortium outcomes being examined, including social, cultural, and historical contexts on the research landscape in a country. Verbatim transcripts were available during this evaluation, as well as a copy of the preliminary thematic analysis that was derived from these transcripts.

In January 2020, a one-week face-to-face meeting in Costa Rica took place with the Consortium coordinating team at INCIENSA. The coordinating team in Costa Rica were interviewed about the project outcomes. Meeting notes were used to inform the evaluation report. Three additional interviews were conducted with Consortium members, via video conference, to expand upon and add clarity to the outcomes assessed in this evaluation.

Table 1. Overview of outcomes and sources of data examined in this program evaluation.

	Document Review	Survey	Interviews	Qualitative Study
Short term Research Outcomes *(Primary program evaluation outcomes)*				
Outcome 1: Research conducted, data generated and innovations scaled-up or created	X	X	X	X
Consortium Outcomes *(Primary program evaluation outcomes)*				
Outcome 2: Multi-sectoral and multi-disciplinary partnerships are newly formed and/or strengthened, engaged and activated		X	X	
Outcome 3: Partnerships and collaborations formed are equitable, diverse and inclusive		X	X	
Outcome 4: Confidence, capacity, and scientific abilities to conduct research to address public health nutrition issues in LAC is increased		X	X	X
Intermediate and Long Term Outcomes ● As per logic model. Documented if identified during the evaluation.	X	X	X	X

Evaluation Results

This section reviews the findings of the evaluation for each of the Short Term Research (Outcome 1) and Consortium Outcomes (Outcomes 2, 3, 4 and 5).

Outcome 1: Research conducted, data generated and innovations scaled-up or created

This section reviews the findings of the evaluation for each of Research Objectives 1A, 1B, 2, 3 and 4, as described in the logic model (Figure 1). Described in each Research Objective is the overall participation, a brief overview of the methodologies employed, outcomes achieved and successes and challenges experienced. Also reviewed are any innovations that were created and/or scaled up, and the overall implications of the work.

Objective 1A: Assess the sodium content of packaged foods and the proportion that meet sodium reduction targets.

Country participants: Argentina, Brazil, Costa Rica, Paraguay, Peru

Objective: To assess the sodium content of packaged foods in 18 food categories and to compare these levels to the regional sodium reduction targets. Some countries conducted additional analyses to compare their data with country-level voluntary or mandatory sodium targets.

Brief Summary of Methodology: Packaged foods sold in grocery stores were systematically scanned. Photos of the foods, including the Nutrition Facts tables, were taken with a mobile data collector app and uploaded into the University of Toronto Food Label Information Program (FLIP) database that was adapted for the 5 Consortium countries (FLIP-LAC). All countries followed this methodology except Brazil, who did not have a signed agreement for the transfer of funds. Instead, Brazil partnered with the Instituto Brasileiro de Defesa do Consumidor (IDEC) and followed a similar sampling protocol, but did not utilize the FLIP-LAC database. Prior to data collection, all countries underwent training in data collection and data analysis which included mandatory participation in a pilot study. The regional sodium reduction targets used in the analyses were those adopted by the Salt Smart Consortium in 2015.

Outcomes. Data was collected between 2017 and 2019. All five Consortium countries submitted a full set of data on the sodium content of packaged foods across 18 food categories. In total, data on 8314 packaged food products were collected and analyzed. All countries conducted comparisons of their data with the regional sodium reduction targets. Argentina and Costa Rica additionally compared their data to the sodium reduction targets adopted by their national governments.

There were other significant efforts to disseminate the data generated (Table 2). From this work, there were 3 journal articles and one technical report published. There are several more planned publications, including a longitudinal pooled analysis of data from Argentina, Costa Rica, Paraguay and Peru. Brazil declined participation in this analysis.

1. Vega-Solano, J., A. Blanco-Metzler, K.F. Benavides-Aguilar, and J. Arcand. “An Evaluation of the Sodium Content and Compliance with the National Sodium Reduction Targets Among Packaged Foods Sold in Costa Rica in 2015 and 2018.” Nutrients 11, no. 9 (September 1, 2019).
2. Allemandi, L, Mv Tiscornia, L Guarnieri, L Castronuovo, and E Martins. “Monitoring Sodium Content in Processed Foods in Argentina 2017-2018: Compliance with National Legislation and Regional Targets.” Nutrients 11, no. 7 (July 2019).
3. Arcand, J., A. Blanco-Metzler, and B. Legetic. “Sodium Levels in Packaged Foods Sold in 14 Latin American and Caribbean Countries: A Food Label Analysis.” Nutrients 11, no. 2 (February 1, 2019).
4. Franco-Arellano B, L’Abbe M, Sivakumar B,* Arcand J. Sodium levels in Packaged Foods 2015-2018: An analysis of four Latin American Countries. Prepared for countries to submit as part of their final report to the International Development Research Centre. 2020.

Innovations Created and/or Scaled-up. The procedures for collecting and analyzing data were scaled up and adapted from several sources. The University of Toronto Food Label Information Program (FLIP) database, and its accessory FLIP data collector mobile application, were adapted to a LAC regional context to enable the capture of packaged food data from the Consortium countries. This adapted database is called FLIP-LAC. A FLIP-LAC User Guide was developed by the University of Toronto and translated to Spanish. A second data collection manual was developed by INCIENSA and the University of Toronto, which was a scaled-up and adapted a regional data collection protocol (initially developed in Costa Rica) with the requirements of FLIP-LAC. This second manual was also translated to Spanish. To accompany the manuals, a training program was created. First, researchers participated in data collection training sessions led by researchers at the University of Toronto. Next, researchers participated in a pilot study that required collection and analysis of two food categories. This pilot study was conducted under the guidance of Ontario Tech University researchers. Overall, 2 webinars were created and implemented to provide training on data collection and analysis. Importantly, the FLIP-LAC and its manuals and training procedures can be scaled-up to collect food label data from packaged foods in other LAC. It is also understood that the University of Toronto will continue to make the FLIP-LAC database available to Consortium members after the IDRC funding period closes, which represents a significant opportunity to continue this work to leverage data on the nutrition labels that were already collected as part of the main grant, to determine levels of critical nutrients of public health concern in these foods and open doors for policy discussions.

A second innovation that derives directly from FLIP-LAC is the development of a brand-specific database in each country. There is a unique ability to collect not only information about the all nutrients reported on food labels, but also data on individual ingredients and the classification of various types of front-of-package labelling and marketing. There is a noted limitation that these databases currently do not capture data on smaller shops; however, they contain major national brands with larger market share, and thus are likely to influence population sodium intake levels. Importantly, these databases provide an opportunity to explore new hypotheses and inform policies related to other nutrients of public health concern such as trans fat, sugar and saturated fat. It is noted that not all nutrients are reported on the labels of packed foods in LAC, since food labelling regulations do not require all nutrients to be reported on food labels.

Success and Challenges in Knowledge Creation. Some technical issues with the data collector app were experienced by Argentina, which delayed data collection. The possibility of technical issues should be considered in future work. Researchers noted that access to FLIP-LAC, and technical support in data collection and analysis, from the University of Toronto and the Ontario Tech University was very helpful and the response time was expedient. The FLIP-LAC manuals were adapted to a regional context and

translated into Spanish. Consortium members consistently noted that the data collection training tools developed were extremely useful.

Agreements for data collection in grocery stores were obtained for Argentina, Brazil, Costa Rica, Paraguay and Peru. In Costa Rica, the project was declared a public health priority which facilitated the approval and ease of data collection in grocery stores. In contrast, other countries experienced challenges in obtaining grocery store approval. For example, Researchers in Peru first contacted the National Center of Food Education for assistance in obtaining approval for data collection; however, no response was received. Subsequently, they independently sought approval from 3 major supermarkets for data collection which took 3 months to achieve. Additionally, some researchers found that a high rate of staff turnover in grocery stores was a challenge, as new staff were not aware of the data collection authorization. Costa Rica experienced a seamless approval for data collection due to the buy-in and support received from the government. Other countries should attempt a similar approach to Costa Rica by seeking approval from the highest governing bodies instead of the grocery stores themselves.

Implications of this work. Since packaged foods are an increasingly common source of dietary sodium in LAC, this data is critical to inform and monitor national and regional policies related to sodium reduction in the packaged food supply. In 2015, all countries participated in a PAHO-led study on sodium levels in packaged foods. With data from Objective 1A, countries will have the ability to conduct longitudinal assessments of the changes of sodium content of packaged foods for at least two time points. At a national level, this data can directly inform policies and programs, such as the development, or revision, of sodium targets for packaged foods. Indeed, Costa Rica has already had success in this area, as discussed later in this report. Regionally, this data can be used to update the regional sodium reduction targets, which PAHO plans to coordinate in the Spring 2020. Finally, this work has launched new research in the Consortium countries. For example, Costa Rica will combine their data with market share information from Nielsen, which will allow for the calculation and reporting of sales-weighted averages for sodium in packaged foods. Additionally, for all countries, the data acquired can be leveraged to analyze other critical nutrients relevant to non-communicable diseases such as sugars, saturated fat and trans fat. Preliminary analyses of these nutrients are being done as part of the Consortium extension research.

Objective 1B: Determine the sodium content of key artisanal, street & fast foods by direct analysis.

Country participants: Argentina, Brazil, Costa Rica, Paraguay, Peru

Objective: To assess the sodium content and range of sodium levels in key artisanal, street and fast foods through chemical food analysis.

Brief Summary of Methodology: Each country selected 20 artisanal, street and fast foods for analysis based on national consumption patterns and availability. Prior to initiating the analysis, INCIENSA developed and distributed a manual outlining the sampling and analysis procedures to researchers in each country. Countries participated in two online training sessions, which focused on diagnostic and proficiency testing and critical points in the analysis process. Follow-up one-on-one feedback was provided while labs were being prepared to conduct analyses. To determine the sodium content for each of the 20 foods, 6-9 samples (primary sample) of each food was collected and chemically analyzed. A

second protocol was developed to standardize the technical aspects of the chemical analysis procedures.

Outcomes. Overall, 100 street artisanal, street and fast foods were analyzed, which included 20 foods from each country. Data calculated included the mean levels of sodium in a food as well as the variability of sodium content across the samples analyzed.

Researchers have made several efforts to disseminate the data generated in Objective 1B (Table 2). There is one published journal article, and at least one more publication planned.

1. Calliope SR. Samman, NC. Sodium Content in Commonly Consumed Foods and Its Contribution to the Daily Intake. Nutrients. 2020. 12(1)34.

Innovations Created and/or Scaled-up. Costa Rica established the first sampling and procedure manual for the chemical analysis of sodium conducted in their first IDRC grant (2013-2016). The protocol used in this research was adapted and scaled-up to the other Consortium countries, including documentation of standardized laboratory conditions, recommendations, and clear procedures on sampling and conducting chemical analysis for sodium. For this grant, a new manual was created to guide the chemical analysis procedures, as challenges arose with the standardization of laboratory procedures across the consortium countries. For instance, Argentina and Paraguay had variances with humidity and variations of sample analysis.

Success and Challenges in Knowledge Creation. A success of this work was the team, which included two experienced food technologists who provided guidance and mentorship to early career researchers who had limited experience in chemical food analysis. One of the senior food technologists was located at coordinating centre (INCIENSA) and orchestrated the implementation of the training, quality assurance and research in each of the countries. In general, labs had limited staff and trained staff “as they go”. The team and processes ensured that capacity was built in countries that had no previous expertise in the chemical analysis of sodium.

This objective also experienced a number of challenges related to project initiation and productivity. This began with Brazil missing the first round of testing due to extended contract negotiations. Researchers in Paraguay experienced challenges as they commissioned an external lab to conduct the field work. This lab also had competing priorities, with a focus on food security rather than food systems.

Laboratory-based challenges were also experienced. Significant variation was observed among the laboratories which required extensive one-on-one training to prepare the labs and standardize approaches. The coordinating centre at INCIENSA developed a second manual to support the standardization and optimization of laboratories and the chemical analysis procedures. Another challenge was a lack of standardization in sampling procedures, with researchers in two countries deviating significantly from the sampling protocol. Researchers were provided with online training related to the diagnostic and proficiency testing, but not sampling procedures. Although researchers were provided with written instructions on sampling procedures; it is possible the researchers also would have benefited from an online training session focused on sampling. Additionally, a comprehensive contract should be created for multi-centre collaborations to outline clear expectations about the sampling techniques and required conditions for laboratories. In addition, future work should consider in-person training and demonstration, as well as site-initiation visits from the coordinating centre to ensure that training and laboratory conditions meet the expected requirements of future projects.

Implications of the Research. Prior to this research, there was minimal information on the sodium content of artisanal, street and fast foods in LAC. Therefore, this research contributes novel data that is highly relevant to public health efforts since these types of foods are commonly consumed. Consortium members mentioned that the data are highly beneficial in supporting policies aimed at addressing the high sodium content of these foods. These data can also benefit public health and research efforts, with the possibility of submitting the data for inclusion in the LATINFOODs database.

Objective 2: Research and development of a social marketing and communication strategy

Country Participants: Brazil, Costa Rica, Paraguay, Peru

Objective: To Identify consumer-related barriers, facilitators, beliefs, values and motivations related to discretionary salt reduction, and to develop a regional social marketing and communication strategy. A secondary objective was to provide training to researchers, to build social marketing skills prior to embarking on social marketing research.

Brief Summary of Methodology: Researchers conducted qualitative research on the target audience and then contributed to the development of a regional social marketing and communication plan. To successfully implement the methods, researchers received a significant amount of training that was delivered by USF. Training sessions were online and face-to-face. Training began in February 2017 with a virtual course on social marketing concepts. This was followed by a face-to-face workshop, held in Costa Rica, which focused on applying the social marketing concepts, including the identification of a target audience. Researchers obtained ethics approval and conducted focus group interviews to collect data on the target audience to examine barriers, facilitators, beliefs, values and motivations related to discretionary salt reduction. Additional online training was provided by USF to guide qualitative data analysis. An additional webinar and a face-to-face meeting (held in Costa Rica) further supported the development of the social marketing and communication plan. In Costa Rica, researchers presented the results of their research to creative content personnel who devised innovative communication strategies. These activities directly informed a regional social marketing and communication plan that was created by researchers at the USF.

Outcomes. All participating countries conducted the training program, with over 26 people enrolled in the initial training course (85% completion rate). All countries identified priority population segments and conducted qualitative research among target groups to understand behavioural barriers and facilitators. This research informed creative concepts which were integrated into the regional marketing plan.

Significant efforts were made by researchers to disseminate the data generated as part of Objective 2 (Table 2). Journal publications related to social marketing research have been published, submitted or are in preparation. One technical report has been submitted.

1. Ponce-Lucero V, Saavedra-Garcia L, Cateriano-Arévalo E, Perez-Leon S, Villarreal-Zegarra D, Horna-Alva D, Miranda JJ. Parents' Perceptions about Salt Consumption in Urban Areas of Peru: Formative Research for a Social Marketing Strategy. Nutrients. 2020;12(1).176.
2. Sommariva, S., Makris, A., Liddell, V., Khaliq, M. (2019) Take it with a pinch of salt: Sodium reduction and social marketing. Journal of Social Marketing. Minor revisions submitted.
3. Khaliq, M., Sommariva, S., Bryant, C.A. (2020) Building capacity for success: Evaluation of a social marketing training program to foster engagement in the Caribbean and Latin American regions. To be submitted to Social Marketing Quarterly.

4. Khaliq M, Sommariva S, Bardfield L, Blanco-Metzler A, Benítez G., Saavedra L, Gomes A, Vega J. Salt reduction in Latin America: A Regional Social Marketing & Communication Plan. Project - IDRC 108167 Scaling Up and Evaluating Salt Reduction Policies and Programs in Latin American Countries. 2016-2020 Tres Ríos, Costa Rica: Costa Rican Institute of Research and Teaching in Health and Nutrition (INCIENSA), 2019.

Innovations Created and/or Scaled Up. The social marketing training program is a significant innovation created for the Consortium countries. It allowed for the development of capacity and expanded skills in qualitative research, and an understanding of social marketing and the process of building a social marketing plan. The training program, led by Mahmooda Khaliq Pasha from the USF, was delivered through a series of virtual online courses, in-person workshops, one-on-one tutoring, interactive presentations and group discussions. The online courses were developed specifically for the LA context. In 2016, Consortium members had various levels of experience in social marketing. This type of course can be scaled-up to other interested countries in the region. It is now available as a virtual course, available on the PAHO Virtual Campus.[1] Researchers at the USF are currently developing a follow-up 4-module course for researchers looking for more advanced-level training social marketing.

Participation in the Consortium research also prompted the development of a new LAC social marketing network called the Association Latin Americana de Mercadeo Social (http://www.mercadeosocial.org/). The conception of this network was co-led by Consortium member Villarmina Ponce Lucero from Crónicas UPCH who has prior knowledge and experience in social marketing. This network enables public health professionals in LAC to develop social marketing skills, participate in social marketing discourse and in forming collaborations with other LA social marketing researchers.

Success and Challenges in Knowledge Creation. A major success of the social marketing objective was the overall engagement and enthusiasm of participating Consortium members, and of the Ministry of Health and stakeholders in several countries. For some, the successful aspects of the social marketing research experience was not only about training and knowledge creation, but also about the development of meaningful collaborations and friendships.

One challenge experienced was that researchers were expecting to create country-level social marketing plans under the guidance of USF researchers; as opposed to submitting their data for to USF researchers to develop a single regional plan on their behalf. In contrast, USF researchers understood that one regional plan was to be developed, which would be later adapted at the country-level. Some researchers were disappointed about this. Another challenge related to disagreements with what constitutes authorship on publications. These disagreements occurred when data was submitted for publication at the end of the funding period. Researchers were disappointed when they were excluded from publications. For future work, the contract or agreement approved for this collaboration should be evaluated to assess where the misalignment of expectations occurred. In the future, contracts should carefully itemize the deliverables, provide clear expectations of product delivery and associated costs, and establish authorship based on international guidelines and intellectual property a priori.

Implications of the Research. In many LAC, discretionary salt remains the predominant source of dietary sodium. Social marketing is an innovative way to promote a reduction in discretionary salt use through the use of marketing concepts and principles. The development of social marketing skills among researchers and the availability of a regional social marketing and communication plan could significantly impact population-wide salt reduction efforts in the region. However, success will be dependent on countries investing resources to adapt and implement the plan. Importantly, some countries who participated in the Consortium have already begun adapting the regional plan to the

national context. Costa Rica will conduct this work under grant obtained by the LINKS Resolve to Save Lives program (2020-22) (2019).

Objective 3: Assessing the health and economic costs of dietary sodium

Country Participants: Brazil, Costa Rica

Objective: To determine the health and economic benefits of population-wide sodium initiatives.

Brief Summary of Methodology: Country-level health and economic data was integrated into the PRIME (health impact) and IMPACT (economic impact) models, which were used to quantify the health and economic impacts of population-wide sodium reduction initiatives. Researchers from both Costa Rica and Brazil received online training on use of the PRIME model from researchers at the Université Laval. The Brazilian country lead (Eduardo Nilson) received 2 weeks of face-to-face training on the IMPACT model at the University of Liverpool (UK), and then subsequently trained researchers in Costa Rica. Researchers were trained on the PRIME methodology through two online workshops from researchers at the Université Laval.

Outcomes. To date, Brazil and Costa Rica have completed the health impact analysis using the PRIME model. Manuscripts for this are prepared or under review. Brazil has completed their economic analyses using IMPACT. Costa Rica has only partially completed their economic modelling with IMPACT, and will continue to work on this analysis after the funding period is over.

Two papers have been accepted for publication, and one us under peer review.

1. Nilson EAF, da Silva EN, Jaime PC. Developing and applying a costing tool for hypertension and related cardiovascular disease: Attributable costs to salt/sodium consumption. The Journal of Clinical Hypertension. 2020;n/a(n/a).
2. Custos atribuíveis à obesidade, hipertensão e diabetes no Sistema Único de Saúde em 2018" (Attributable costs to obesity, hypertension and diabetes in the National Health System of Brazil, 2018). Pan American Public Health Journal. In press.
3. Nilson EAF, Blanco Metzler A, Labonté ME, Jaime PC. Modelling the Effect of Compliance with WHO Salt Recommendations on Cardiovascular Disease Mortality and Costs in Brazil" Submitted PLOS One. Under peer review.

Success and Challenges in Knowledge Creation. A significant success of this work was that LAC researchers were trained in conducting health economic analyses, which is a skillset not widely available in the region. Competencies in using the PRIME model were built in both Costa Rica and Brazil, with training received directly from methodological experts at the Université Laval.

There were some challenges encountered with this research. First, pertinent data needed for entry into the models was missing or not available from health information custodians. This was a challenge in Costa Rica as health information is not publicly available, and must be accessed via the social security system or other health information custodians. As a result, researchers in Costa Rica were required to make assumptions for the data entered into the IMPACT model. This led the researchers in Costa Rica to have low levels of confidence in their results derived from the IMPACT model. Another challenge was the training approaches taken and human resources available to support this work. Specifically, Costa Rica researchers also felt that they did not have sufficient mathematical, statistical or clinical background training to work with the models, especially the IMPACT model. Costa Rica researchers did not receive training directly from experts at the University of Liverpool, but rather obtained secondary training from

Brazilian researchers on the IMPACT model, which may have also impacted overall confidence in working with the data.

Another challenge occurred at the onset of the research. The researcher who committed to provide technical assistance and training on the Cardiovascular Disease Policy Model for the health impact analysis was no longer available to participate. As a contingency plan, the Consortium members changed to PRIME (already in use at the University of Toronto). IMPACT to accommodate both health and economic analyses, which was recommended by the IDRC. The model change resulted in unexpected costs incurred because Costa Rica hired a statistician to review long term trends.

Implications of the Research. Data on the health and economic benefits of public health interventions to reduce dietary sodium is an under-studied area in LAC. In fact, health and economic analyses for many public health nutrition issues in the region have not been evaluated using these or any other methods. The research was conducted in a pragmatic and cost-effective way for countries with limited resources to acquire health economic data. For decision makers, cost estimates on disease prevention are core arguments for informing political action on dietary sodium reduction. Now that capacity in health and economic analysis has been built, the PRIME and IMPACT models can be applied to generate health and economic data related to other public health priorities.

Objective 4: Disseminate research findings using a researcher developed and initiated a knowledge translation (KT) strategy that is specific to each country and research objective.

Country Participants: Argentina, Brazil, Costa Rica, Paraguay, Peru

Objective: To disseminate research findings using a researcher developed and initiated knowledge translation (KT) strategy that is specific to each country and research objective.

Brief summary of methodology: Researchers used a validated KT workbook that was customized to each research objective in the logic model; thus, there were 4 versions of the workbook. In a stepwise fashion, the KT workbook prompted researchers to define a message, choose a target audience, identify time points of engagement with key audience members, select KT strategies and describe an implementation plan. In November 2018 an interactive online training session was held by Ontario Tech University on developing a KT plan and how to use the workbooks. KT plans were developed and submitted for review by Ontario Tech University researchers. Follow-up one-on-one sessions were scheduled to provide feedback to the researchers. In February 2019, researchers shared their KT plans with other Consortium members in a face-to-face KT workshop.

Outcomes: All countries created a KT plan for each research objective in which they participated. The evaluation of KT plans was beyond the scope of this work; however, most country leads and researchers were actively engaged in dissemination activities as summarized in Table 2. Appendix 4 includes a detailed summary of KT activities per research objective.

Table 2. Summary of KT activities across different target audiences

Summary of KT Outputs							
	Government	**Health and Education**	**Industry and Food Service**	**Civil Society**	**Scientists**	**International**	**TOTAL**
Objective 1A	26	9	10	41	34	16	**136**
Objective 1B	11	10	15	5	20	13	**74**
Objective 2	11	9	0	10	36	4	**70**
Objective 3	2	1	0	0	6	5	**14**
Objective 4	6	14	4	43	5	4	**76**
Objective 5	4	35	2	41	19	19	**120**
TOTAL	**60**	**78**	**31**	**140**	**120**	**61**	**490**

Innovations Created and/or Scaled Up: The KT workbooks were developed and validated for face and content validity during the funding period. They were adapted for both a research and regional context, including translation of key terms in Spanish, using widely accepted KT planning templates and frameworks (i.e., Hospital for Sick Children's Knowledge Translation Planning;[17] Innovation to Implementation plan).[18] The KT plans encouraged researchers to apply both integrated and end-of-study KT strategies, using the Canadian Institutes of Health model (CIHR, 2015). The KT workbook development and validation was led by a graduate student at Ontario Tech University as part of a graduate course. One KT workbook template was created, which was then customized for each research objective defined in the logic model. Creating a KT plan for each research objective was an important step in the overall project as high quality and audience specific KT strategies for each objective could lead to research evidence uptake by key decision makers.

Success and Challenges in Knowledge Creation. Several Consortium members expressed a high level of enthusiasm about the KT principles and concepts they learned during the grant. In the evaluation survey, 91% of researchers reported that they had a better ability to develop and implement a knowledge translation plan. Specifically, Consortium members reported that the KT workbooks helped them identify target audiences, generate strategic and impactful KT activities, and demonstrate that opportunities for information sharing can occur at multiple time points throughout the project cycle (not just at the end of the project). In fact, the concept of KT was a new concept for some but found great use with knowledge dissemination challenges due to time and resource limitations at the end of a project. Going forward, a Consortium member recommends that future studies in their country follow a similar KT planning by embedding this component directly into future projects. Similarly, another Consortium member mentioned that the knowledge dissemination typically occurred at the end of the project. Through the KT planning exercise, this Consortium member will now take a different approach with knowledge dissemination among policy makers by engaging them at the onset funding to ensure maximal usability and uptake of data.

While the researchers were enthusiastic about the benefits of integrated KT plans, in reality this concept was not discovered by the Consortium until the second year of the grant when the training occurred. Future Consortium projects should allocate time and resources to build KT plans at the beginning of the funding period, using tools like the KT workbooks, to maximize impact of the findings at an earlier stage of the grant.

Implications of the Research. Health research discoveries are growing in LAC, yet limited resources, a lack of KT capacity, and unpredictable political climates pose challenges when linking evidence-informed research to policy action. Research evidence is not reaching the intended audience members, resulting in a knowledge to policy action gap. A KT plan is a suitable tool to address these limitations, increase interdisciplinary research collaboration and facilitate audience specific dissemination of research results. To our knowledge, a KT tool does not exist in LAC. The KT workbook is an innovation of the grant which can be readily adopted by LAC given that the study's KT workbook considers the regional LA context.

Objective 5: Establish structures, processes and strategies for optimal project administration and Consortium partnership building, to ensure overall project success, evaluate if objectives have been achieved.

Participants: Costa Rican Institute for Research and Teaching in Nutrition and Health (INCIENSA) as the lead Consortium coordinating site, University of Toronto, Ontario Tech University, Pan American Health Organization. Collectively, these participants are known as the Core IDRC members.

Objective: Establish structures, processes and strategies for optimal project administration and Consortium partnership building, to ensure overall project success, evaluate if objectives have been achieved.

Summary of Activities and Outcomes: Each member of the Costa Rican team coordinated regionally 1-2 objectives in coordination with the PI. A part-time administrator managed the financial aspects and agreements with the country. An Advisory committee had a governance role of the Consortium, with primary functions to support the Costa Rican coordinating team in making decisions about the coordination of the research consortium and to facilitate with efficiencies in the implementation of the project objectives. This group included the Costa Rican coordinating team (Adriana Blanco-Metzler, Karla Benavides Aguilar, and Jaritza Vega); the University of Toronto (Mary L'Abbe and Beatriz Franco Arellano), PAHO (i.e. Ruben Grajeda and Nadia Rosas); and Ontario Tech University (JoAnne Arcand and Janice Padilla-Moseley). The Costa Rican team held planned periodic meetings with researchers in the participating countries, coordinated team, organized and facilitated all the training, planned and executed face to face meetings, and provided technical and scientific support to the Consortium countries.

Success and Challenges

The governance and communication structure was important for the operation of this grant. Advisory group meetings allowed for organization of upcoming activities, status updates of grant and training activities, problem solving and resource allocation. Meetings and training sessions used technology-based platforms (e.g. GoToMeeting, Skype, and Zoom) as a cost-effective approach to maintain close communication given that researchers were geographically dispersed. Through this mode of communication, researchers gained exposure to technology platforms which they were not familiar with prior to this grant. Formal training sessions took place both online and face-to-face. Online learning is flexible, accessible and can be completed on your own time; however, the evaluation survey found that many researchers spoke very highly of the opportunities to connect and train face-to-face. These interactions were considered invaluable, offering an opportunity to more clearly express ideas, to brainstorm new ideas with freedom and flexibility, and to build long-lasting relationships and

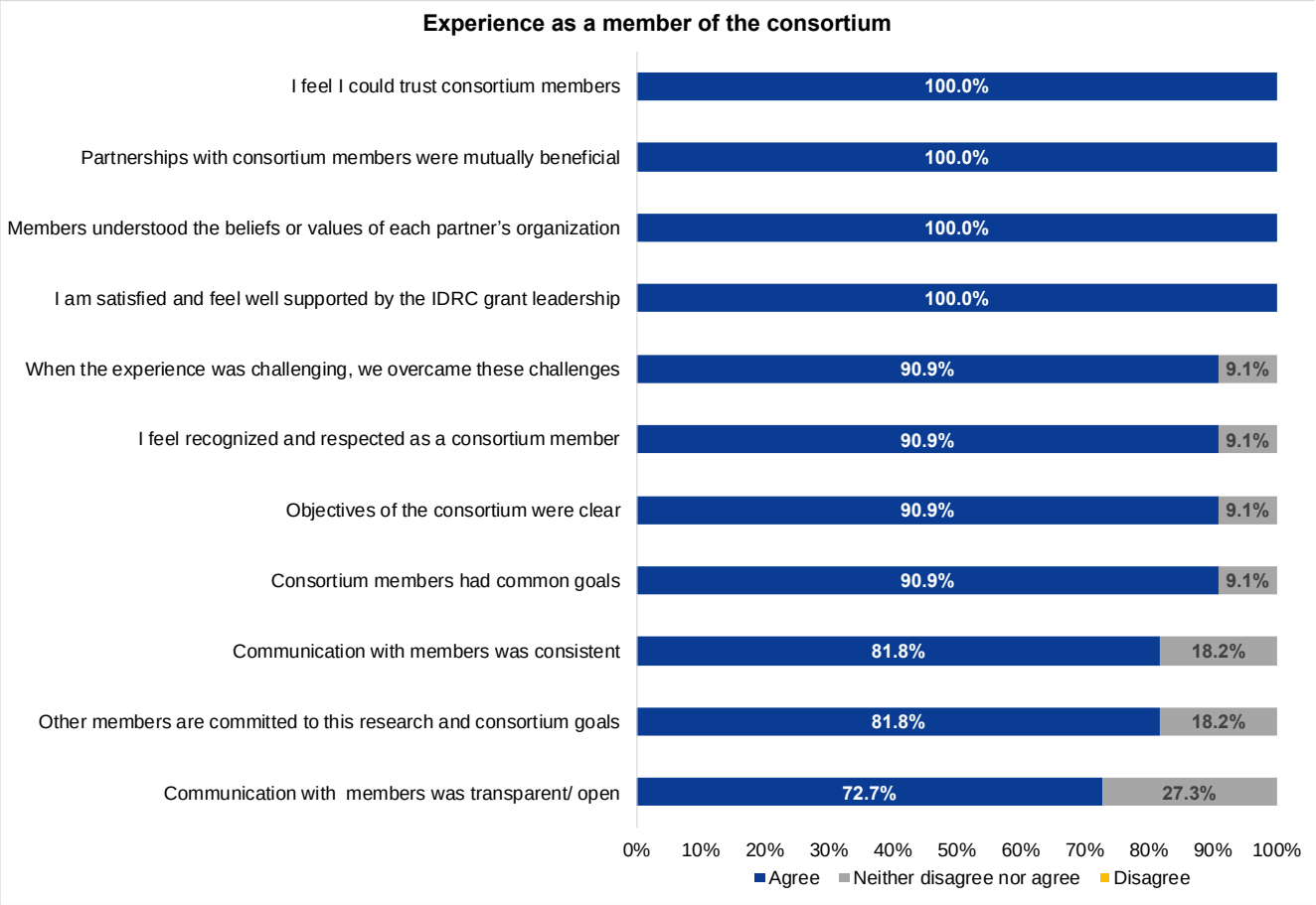
collaborations. A combination of both online learning/collaboration and face-to-face sessions should be encouraged as part of future Consortium.

Researchers were very satisfied with their experience working as part of the Consortium; which is a direct reflection of the leadership provided by the Costa Rican team. In the program evaluation survey, 100% reported that they were very satisfied or satisfied with their experience as the country/research lead for the project. Other metrics of experiences as part of the consortium are summarized in Figure 2. Overall, team members felt respected, felt they could trust others and felt a strong sense of determination and teamwork when overcoming challenges. The Principal Investigator, Adriana Blanco Metzler, is a reputable, renowned, knowledgeable and highly experienced public health nutrition researcher with over 36 years of experience in the field, it is understandable why consortium members were strongly satisfied by the IDRC grant leadership.

There were challenges with agreement negotiations. While the transfer of funds from the Foundation of the University of Costa Rica (FUNDEVI) to country leads and researchers mostly proceeded as planned, a significant challenge occurred with Brazil which led to major delays and setbacks. The initial issue was that the Ministry of Health in Brazil perceived a conflict of interest and did not want to accept funds on behalf of the country lead (an employee of the Ministry) Alternative attempts were made to flow grant funding to the University of Sao Paulo and the University of Brasilia. However, the partnerships were not executed as the contract terms were not accepted by the University of Sao Paulo and University of Brasilia did not use the appropriate institutional signatory. As a result, Brazil's participation in Objective 1B was delayed due to contract negotiation challenges, and Objective 1A and 2 research was conducted without IDRC funding support. The coordinating team at INCIENSA committed substantial amounts of time and efforts to address this challenge. This issue highlights the importance of ensuring that contracts are fully executed prior to initiating any research activities or work requiring disbursement of funds. This will ensure that expectations of all parties are clearly outlined, identify any risk mitigation considerations, ensure compliance with the grant protocol, and most importantly, it will serve as a collaboration and communication tool.

There were also challenges with currency fluctuations. The funding was assigned in Canadian Dollars and transferred to Costa Rica to distribute to the four other LAC. However, INCIENSA and FUNDEVI experienced challenges associated with fluctuating exchange rates. The dynamic nature of exchange rates did not account for strong and weak currencies of participating Consortium members. In particular, Argentina experienced a large decrease in value of their currency over the funding period. It was unclear if the exchange rate should be adjusted to account for the currency fluctuation. To that end, future work involving grants longer than one year must consider currency fluctuations with clear guidance on how to manage these situations.

Figure 2. Experience as a member of the consortium[a]



[a] Responses were measured on a 5-point Likert scale (Strongly Disagree to Strongly Agree). For the analysis, responses for "Strongly agree" and "Agree" were collapsed into "Agree"; and "Strongly Disagree" and "Disagree" were collapsed into "Disagree".

Outcome 2: Multi-sectoral and multi-disciplinary partnerships are newly formed and/or strengthened, engaged and activated

Consortium Formation

Strong regional connections and past research successes were the catalyst for the formation of the Consortium. The Principal Investigator, Adriana Blanco-Metzler, achieved significant success with her first IDRC grant (Grant 106888, 09/2013 to 03/16) and was well-positioned and supported to lead a multi-national research project. PAHO was also pivotal in orchestrating the Consortium formation. In support of Ms. Blanco-Metzler, the PAHO regional advisor on Non-Communicable Diseases invited other low- and middle- income LAC to join the research consortium; with Argentina, Brazil, Paraguay and Peru expressing interest. PAHO also facilitated the involvement of researchers from the WHO Collaborating Centre on Social Marketing/USF. Public health nutrition scientists from the University of Toronto and Ontario Tech University researchers, who collaborated with Ms. Blanco Metzler in the past, supported the development of the research proposal.

Throughout the funding period of the Consortium, several multi-sectoral and multi-disciplinary partnerships were formed, and this was considered a notable area of success. The following sections report Consortium members perceptions and experiences related to partnerships and collaborations, as well as the types of partnerships that were formed. Partnership challenges with a large-scale consortium project are also reviewed.

Partnerships and Collaborations with Stakeholders External to the Consortium

As part of the evaluation, researchers reported many different types of partnerships and collaborations formed, as described in Figure 3. During the interviews and surveys, narrative data was collected from researchers about the types of partnerships they established. These are presented in Appendix 5. While this may not be a complete compendium of partnerships, it illustrates the diversity of collaboration and engagement that occurred within the five countries.

The greatest number of collaborations occurred with national governments (82%), non-governmental organizations (73%), and educational (82%) and research (64%) institutions were the most common partners over the course of the funding period.

In the following section, the principle partnerships and collaborations established are reviewed.

> "*…with the results obtained in the research we have expanded our knowledge about the problem of excessive sodium consumption in the country, which at the same time helped us to create alliances with other sectors for the generation of new policies and strategies aimed at the prevention of NCDs*."
>
> Consortium researcher who also worked at the Ministry of Health

Figure 3. Partners and collaborations formed

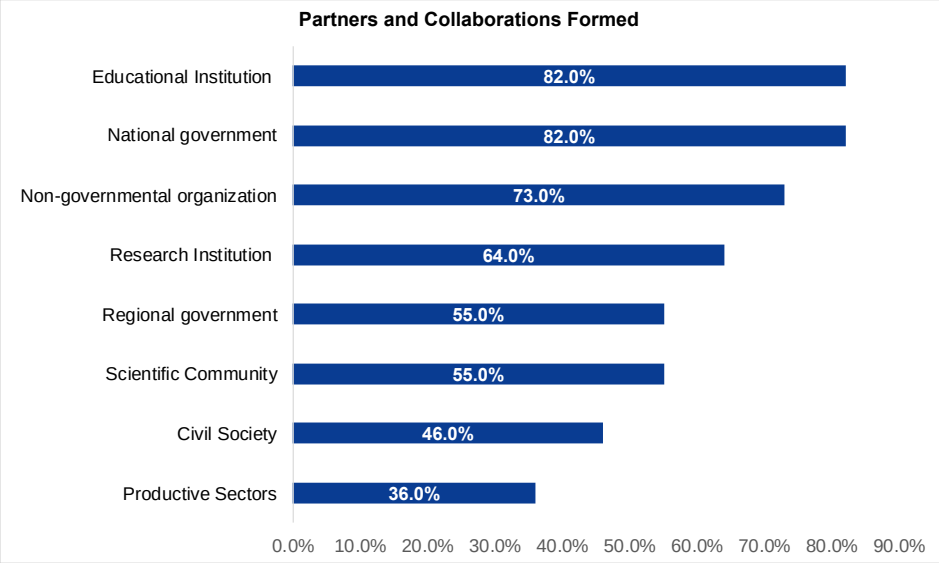
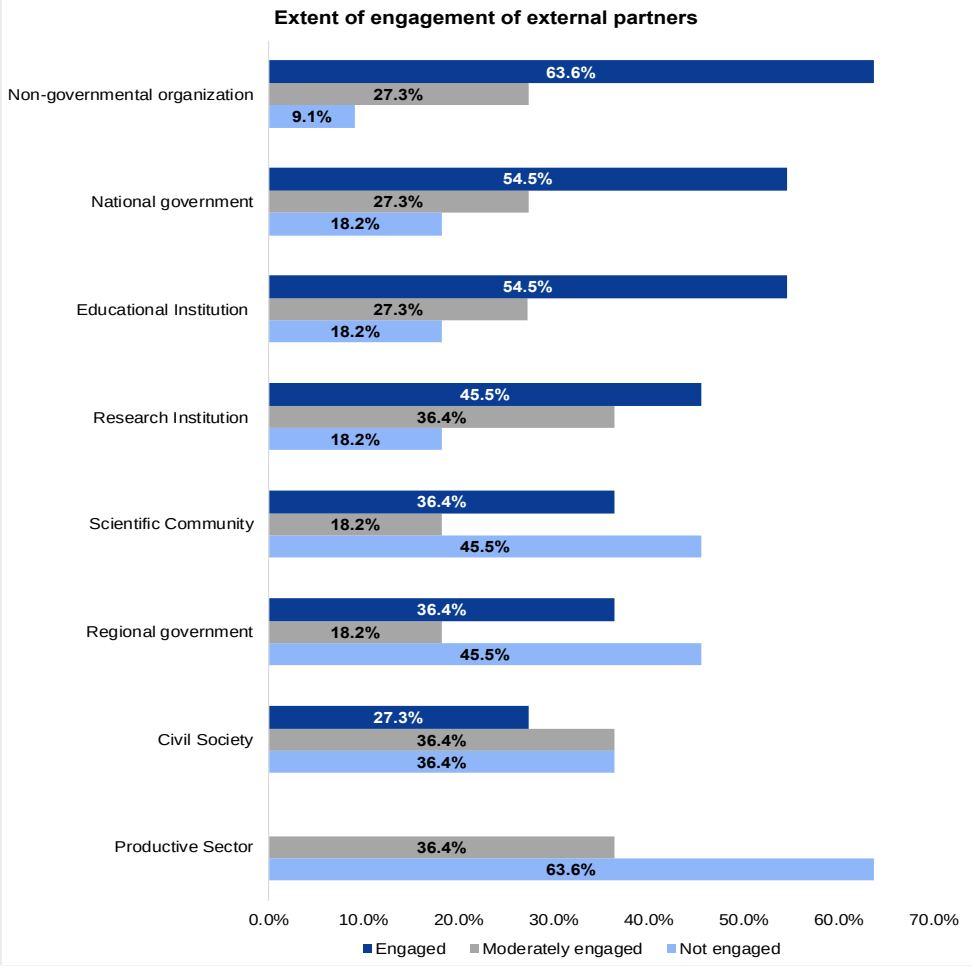


Figure 4. Extent of engagement of external partners[a]



[a] Responses were measured on a 5-point Likert scale (Very Engaged to Very Disengaged). For the analysis, responses for “Strongly engaged” and “Engaged” were collapsed into “Engaged”; and “Strongly Disengaged” and “Disengaged” were collapsed into “Disengaged”.

Government partners and collaborators are critical to ensure the outputs of research can be used to inform policies and programs. Ideally governments would consider research results in creating or revising policies and programs related to dietary sodium. In the program evaluation, we found a fairly high level of collaboration among government partners, with 81.8% and 54.5% of researchers forming partnerships with national and regional governments, respectively. The following are some highlights about the involvement of government in the Consortium research:

- Argentina, Brazil Costa Rica and Paraguay had strong governmental support and buy-in for the project. Each country has sodium reduction as part of their national plans on non-communicable diseases.
- Researchers from Argentina, Costa Rica and Peru formed partnerships with the regional government.
- The office of the Minister of Health in Peru learned about the research and connected with researchers directly, indicating interest in initiating sodium reduction policies. This is a very big achievement, as the current government priorities are anemia and diabetes. This important connection resulted in sodium reduction being added to the political agenda. A key informant from the Ministry of Health in Peru stated: "I think we are divorced from the private sector, from academia. We have work to do in that regard."
- Ministers of Health in Costa Rica, Paraguay and Peru were strong supporters of the research. The Minister of Health in Paraguay contributed additional resources and support to carry out the research.
- The Minister of Health in Costa Rica facilitated an alliance with the food industry on sodium reduction in the food supply, as described under Intermediate Outcomes (reviewed below).

The time that partners became engaged in the research aligned with the research activities. National governments were engaged before the start of the project (72.7%) and at the time at the end of the project (54.5%). The increased government engagement at the end of the grant reflects dissemination activities, since the government is the most critical target audience for the research findings. However, only 54.5% and 27.3% of researchers were engaged with government partners at the end of the study; thus, some researchers did not engage with decision makers who could use this research to inform policies and programs.

> *"There is a positive perception of PAHO's support at the Ministry of Health. People trust their opinion; they believe that if PAHO supports something it must be reliable; it must be true. The technical support they provide is really important during the entire process, mostly when we first approach academia and when we start showing scientific evidence. Thanks to their support we can count on foreign experts who come, share their experience and support us with what we are starting right now*."
>
> -Consortium researcher

Non-governmental organizations. NGO involvement occurred throughout the project. At the onset, PAHO was instrumental in supporting the formation of the Consortium. During the project, PAHO provided guidance, secretarial support, and opportunities to disseminate research results to the entire region via webinars. Non-governmental organizations were engaged in the middle and end of research

projects, which highlights their role in informing the research, providing support (in particularly PAHO), and in knowledge dissemination. In the evaluation survey and interviews, PAHO was identified by all countries to be a significant influential partner. One researcher mentioned that “There is a positive perception of PAHO's support at the Ministry of Health. People trust their opinion; they believe that if PAHO supports something it must be reliable; it must be true. The technical support they provide is really important during the entire process, mostly when we first approach academia and when we start showing scientific evidence. Thanks to their support we can count on foreign experts who come, share their experience and support us with what we are starting right now.” In addition, the InterAmerican Heart Foundation who was an established partner on this IDRC grant was instrumental with broadening the reach for dissemination of research findings through the coordination of webinars and providing technical assistance with developing a Policy Brief for the overall project. Individual researchers formed partnerships with non-governmental organizations, as described in Appendix 5.

Scientific and Educational Institutions. In the evaluation survey, almost all respondents reported working with scientific or educational institutions at some point during the funding period. There was a relatively high level of engagement from these partners. This is likely because of direct scientific collaborations on the research being conducted. Educational and research institutions were most engaged mid-way through the research projects, which reflects the technical support and scientific collaboration that occurred.

Table 3. Point of partner/collaborator engagement

Point in research project that partners/collaborators were engaged [n (%)]					
	Before Project	**Start of project**	**Mid-way through project**	**End of project**	**Not applicable**
National government	8 (72.7%)	4 (36.4%)	4 (36.4%)	6 (54.5%)	1 (9.1%)
Regional government	2 (18.2%)	2 (18.2%)	4 (36.4%)	3 (27.3%)	4 (36.4%)
Food industry	2 (18.2%)	2 (18.2%)	3 (27.3%)	2 (18.2%)	7 (63.6%)
Civil society	2 (18.2%)	3 (27.3%)	6 (54.5%)	3 (27.3%)	4 (36.4%)
Non-governmental organizations	5 (45.5%)	2 (18.2%)	5 (45.5%)	5 (45.5%)	1 (9.1%)
Educational institutions	3 (27.3%)	4 (36.4%)	7 (63.6%)	5 (45.5%)	2 (18.2%)
Research institutions	2 (18.2%)	3 (27.3%)	7 (63.6%)	5 (45.5%)	2 (18.2%)
Scientific community	3 (27.3%)	2 (18.2%)	5 (45.5%)	5 (45.5%)	4 (36.4%)

Partnerships and Collaborations with Stakeholders Internal to the Consortium.

Partnerships Strengthened, Engaged and Activated

Throughout the grant, the internal collaborations and partnerships of the Consortium demonstrated characteristics of an engaged and activated relationship.

Networking

Researchers acknowledged and deeply appreciated the team building, interprofessional collaborations and "the network that was built during the process" as a key factor leading to the success of the Consortium. In the evaluation survey, 100% of the consortium members agreed that the collaborations formed helped execute the project objectives. Overall, 90.9% of researchers agreed that the overall level of engagement with collaborators was high. These are considered great achievements of the Consortium. Some viewed collaborators as friends, which is not surprising as the survey identified high levels of trust and mutual respect. Some researchers valued the formation of new allies to support current and future public health efforts. This demonstrates a very positive experience and enthusiastic approach to improve productivity and efficiency in executing project objectives.

> "We managed to complete and overcome (with the extension) the work to which we had committed to very good quality results (including scientific publications, achievement of commitments and evaluation of public health policies), we achieved a regional teamwork despite the differences and circumstances, we generate many and several types of work partnerships." – Costa Rica

Supportive Culture

Overall, there was a supportive culture within the Consortium itself. This was evident by several responses on the evaluation survey:

- 100% felt that other members of the consortium understood the beliefs or values of each partner's organization
- 81.8% felt that communication with other consortium members was consistent.
- 72.7% felt that communication with other members was transparent and open.
- 90.9% felt that common goals were shared and that the objectives of the consortium were clear.
- 81.8% felt that other members were committed to this research and consortium goals.

A supportive culture was embedded throughout the grant through monthly team meetings with multiple Consortium sub-groups for project updates, to solve problems, provide feedback, as well as team bonding and celebrations. As an example, in February 2019, the Consortium formally recognized Dr. Mary L'Abbe for her appointment as a member to the Order of Canada, Canada's highest lifetime achievement award. A relatively lower score for transparent and open communication (72.7%) speaks to the partnership challenges which are described at the end of this section. Given the number of collaborators involved both at the regional and international level, this result demonstrates that work is required to ensure that the values and beliefs of each partner's organization are understood.

Partnership Challenges

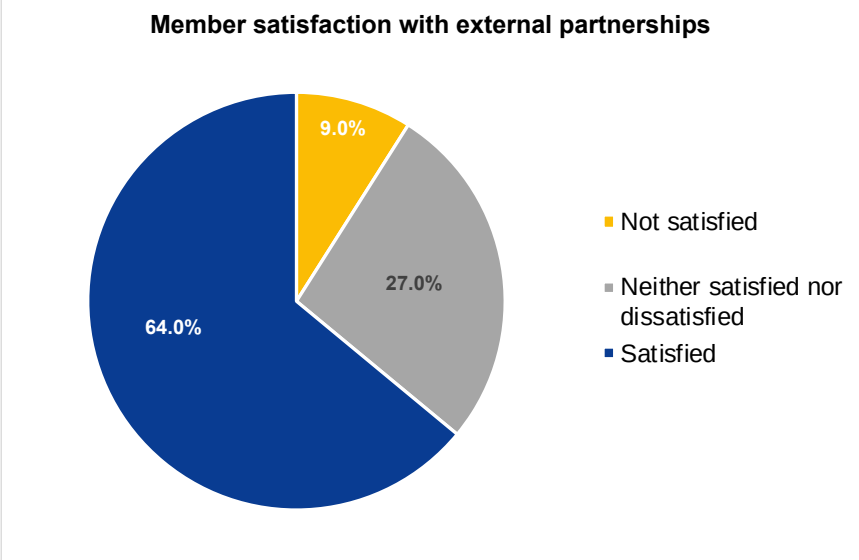
Despite the positive partnerships that were established over the grant period, some challenges were encountered along the way. The main challenge with partnerships was related to staff turnover.

Once research teams were established, most countries had stable leadership over the grant period; however, some countries experienced several changes in research project leaders and members. This required recruitment of a new researcher and often the duplication of training. Objectives 1A and 1B were most impacted. One researcher, who worked for a Ministry of Health, stated that the project "could only be sustained with the commitment and understanding that the objective of the project was necessary for the country". For future research consortium grants, partnerships with research institutions who have technical teams and resources to support research may offer a more stable, committed partnership.

While the vast majority of researchers were engaged, there were partners who became disengaged throughout the grant cycle i.e., were inaccessible, lacked participation in key meetings, and/or missed training opportunities. This often presented human resource challenges for the coordinating team in Costa Rica, as significant efforts were directed at connecting and engaging with such individuals. Also, the lack of communication with certain researchers raised questions about their research contributions and the type of recognition they should receive based on their participation. This speaks to the 9% of consortium members who were not satisfied with the partnership collaborations formed in the grant as seen in **Figure 5**.

Interestingly, PAHO was identified as a highly influential and strong partner throughout the course of the grant. However, select consortium members noticed a change in focus and disengagement towards the end of the project. One can assume that PAHO's change of priority is attributed to an organizational change over in leadership which resulted in a new public health focus.

Figure 5. Member satisfaction with partnerships [a]



[a] Responses were measured on a 5-point Likert scale (Not at all Satisfied to Very Satisfied). For the analysis, responses for "Very Satisfied" and "Satisfied" were collapsed into "Satisfied"; and "Not at all Satisfied" and "Dissatisfied" were collapsed into "Not Satisfied".

Outcome 3: Partnerships and collaborations formed are equitable, diverse and inclusive

Inclusion of various career stages and expertise

A major achievement noted was the alliances formed between researchers in early-career stages and senior researchers in later-career stages. For example, in Objective 1B two senior food technologists provided mentorship and training on chemical analysis procedures to early-career researchers. Senior researchers provided training, mentorship and technical assistance to less experienced researchers. This diversity was present in each of the research Objectives. A social marketing facilitator considered it a great success to have early career researchers, and researchers in high-level positions in the Ministry of Health and academia, as part of the training program.

Inclusion of researchers with diverse training and disciplines

The Consortium included an interdisciplinary group of researchers were from diverse backgrounds, including dietitians, public health nutritionists, food technologists, social marketers, anthropologists, medical doctors and professors. These individuals worked in a variety of settings such as universities, Ministries of Health, non-governmental organizations, and research institutions. The level of training ranged from those with professional degrees (medical doctor, registered dietitian) and graduate degrees (MSc, MHSc, PhD). Several trainees also were highly involved in the research activities, as described as part of Outcome 4 in this report.

Gender Inclusion

The Consortium was composed predominantly of women researchers. Overall, 3 out of the 5 countries were led by women and most researchers leading the individual research studies within each country were women. This is a significant achievement promoting the role of women in science. Historically, women are under-represented in leadership roles in the workforce, where only 1/5 of leadership roles were held by women.[19] Considering this, the inclusion of only a small proportion of men was not seen as inequitable. Having a high inclusion of women provides an opportunity for an underrepresented group to develop leadership and technical skills to widen the talent pool.

Identified inequities

Some Consortium members found the English-based training sessions to be a barrier and preferred that core training sessions be conducted in Spanish. It was felt that Spanish training sessions would have enhanced knowledge uptake, especially since many researchers were being introduced to concepts, principles and innovations for the first time. In the future, consideration should be made to translate key educational products into Spanish.

Another potential inequity was related to technical training on the IMPACT model for the health and economic analyses. The IDRC grant funded a Consortium member from Brazil to receive specialized training from experts on the IMPACT model. The training took place for two weeks at the University of

Liverpool; and on return the consortium member relayed the training to the Consortium members in Costa Rica. The training received by the experts at the University of Liverpool in economic impact modelling is an extraordinary opportunity, especially for Brazil. Given that Costa Rica was also new to this field of research, an opportunity for direct training from experts would have been beneficial, and more equitable; especially since the IMPACT model is considered more complex. For example, Costa Rica has not yet finalized their analyses using the IMPACT model due to challenges with data acquisition such as missing data.

Outcome 4: Confidence, capacity, and scientific abilities to conduct research to address public health nutrition issues in Latin American countries is increased

Knowledge and Skill Development

Training sessions conducted online and/or face-to-face were organized to ensure team members had the knowledge and skills to conduct the research (Table 2). Overall, the training and educational activities implemented supported the development of a community of practice, where global partnerships were formed among social researchers. Most importantly, a new cohort of researchers in LAC has been established. Many skills extended beyond basic scientific skills to include those related to leadership, networking, collaboration, communication, language, and knowledge translation.

Scientific Abilities. Scientific and research abilities improved over the funding period. In the evaluation survey, 91% and 82% of researchers felt they had an improved ability to collect data and to prepare scientific papers, respectively, after participating in the IDRC funded research. Researchers reported improvement in core skills essential to conducting research, such as content knowledge, protocol development, knowledge of research ethics, as well as project-specific analytic techniques. A summary of skills gained through participation in the different research projects is summarized in Table 4. When researchers shared their findings with others, particularly in the face-to-face sessions, they noted that this further expanded their knowledge and understanding on scientific and research skills.

Social Marketing Skills. “I learned the most in this objective”, relays the sentiments expressed by several social marketing researchers. This finding is not surprising since the social marketing knowledge and skills learned were newly acquired for researchers. The content of training led by USF was considered excellent by the most researchers, which was enhanced by face-to-face sessions. However, researchers note that they would have learned more deeply if the training was conducted in Spanish, since social marketing principles are being learned for the first time. Researchers noted that they may not have the confidence to apply their social marketing skills independently due to limited experience.

In such cases, technical assistance may still be required to support these researchers with implementation of the social marketing plans.

Knowledge Translation (KT) Skills. All countries reported a significant improvement in their knowledge and skills related to KT principles, concepts and their application. From the survey, 91% indicated that they had a better ability to develop and implement a knowledge translation plan. This was facilitated by online and face-to-face training in KT, as well as through the use of practical, step-by-step KT workbooks. The increased understanding and appreciation of the impact and relevance of planned KT strategies was emphasized by one researcher: "…when we have any research grants for small projects that would be funded...an idea [from the] IDRC [grant] is this communication plan…this knowledge transfer is something that is very important for presenting the results, making the results easier to understand for any audience."

Research Leadership. Consortium members reported enhanced leadership and project coordination skills. This was especially true in Costa Rica where, for the first time, the coordinating team led, managed and administered a large-scale, multi-country research consortium project. This opportunity built project management, administrative, negotiation and finance management skills among the team. Knowledge on the ethical principles governing human research was also learned. Some country leads also report developing these skills as a result of managing the project and funding at the country-level. One researcher felt that the professional and leadership skills developed would "facilitate future work in public health nutrition". Another researcher noted that the funded research and training "installed capacity to generate new research and projects". This work also enabled Consortium members to understand the working culture in other countries, which is important for building future collaborations.

Networking, Communication and Language Skills. The training, research and knowledge translation enhanced networking, communication and language skills. Researchers felt their networking skills were developed as a result of opportunities for information sharing and for comparing experiences related to the research. Costa Rican researchers reported confidence in negotiations with the food industry. The Costa Rican coordinating team also noted enhanced digital communication skills through the use of virtual platforms like GoToMeeting and Zoom. One researcher emphasized the importance of face-to-face meetings, stating "networking and communication skills wouldn't be the same if I was not given the opportunity to go to Costa Rica to present the results of the qualitative research I conducted, and I would not have learnt so much about what it is now my main PhD topic. So, I'm really grateful for that!". Finally, since much of the training required writing in English, several researchers noted that their English language skills (writing, speaking and listening) significantly improved over the funding period. Some researchers wrote and published their first scientific papers in English journals, drawing upon both their scientific and language skills.

Table 4. Summary of scientific skills gained, as reported by Consortium researchers

Research Objective	Organized Training[a]	Scientific Skills Acquired
Objective 1A and 1B	• 2 online sessions (Obj 1A) • 2 online sessions (Obj 1B)	• Enhanced abilities to collect and manage large datasets with the FLIP-LAC app and database • Conduct quality assurance measures, statistical analysis, and reporting and presentation of data • Knowledge front of package labelling • Knowledge of how to prepare for and conduct chemical analysis procedures for sodium
Objective 2	• 3 online sessions • 2 face-to-face workshops • 1 online course	• Knowledge of the principles and concepts of social marketing research • Knowledge and skills in identifying target behaviours and populations • Qualitative research skills: creating a qualitative interview guide, conduct interviews and focus groups, coding transcripts • Translating the formative research into a social marketing strategy • Skills in creating a Creative Brief • Creativity
Objective 3	• 2 week face-to-face training (1 country) • 1 face-to-face workshop	• Knowledge of the principles and concepts of health and economic modeling • PRIME model • IMPACT model

[a] Often included one-on-one support. Trainers reported having several follow-up calls with individual researchers who needed additional training and guidance.

Supporting Trainee Development

The research projects conducted under the IDRC funding provided important scientific educational opportunities for several trainees. In some cases, the funded research projects formed the basis of theses and dissertations. Including trainees in research projects is an important strategy to build capacity within the LA region, and also among trainees supervised by the third party researchers (University of Toronto, Ontario Tech University, USF). There were approximately 25 of trainee participants:

- 7 Undergraduate students
- 10 Master's students
- 6 PhD students
- 2 Postdoctoral fellows

Through this work, students and trainees gained policy-relevant research experience and training from experts, and from those with years of experience in public health. The PhD students from a LAC country noted that this was a highly valuable experience for them as their research underwent a peer review by Consortium members who are experts in the field. Some Consortium researchers felt that there could have been greater opportunities for trainees to be involved in the research. This should be considered for future funded projects.

Intermediate Outcomes Attained

The logic model for this research program defines intermediate outcomes as:

- Resources, training and outputs by the researchers are leveraged to address other nutrition topics of public health concern.
- Country level sodium reduction targets established and/or updated.
- Commitments to monitoring sodium in food and diets.
- Commitments from the food industry to reduce sodium to target levels.
- Consumer sodium knowledge, attitudes and behaviours improved.
- National commitment to support and fund the implementation of a social marketing program.

It was not expected that the intermediate outcomes would be achieved during the funding period as these types of outcomes require more time to materialize. However, due to the hard work and skill of the research teams in generating data and forming relationships, progress towards meeting several Intermediate outcomes has been made.

1. Resources, training and outputs by the researchers are leveraged to address other nutrition topics of public health concern.

A 6-month extension of the funding allowed for additional analyses of nutrients of public health concern in Argentina, Costa Rica Paraguay and Peru. The research objectives for the extension were:

- To measure levels of other nutrients of public health concern associated with non-communicable diseases, in alignment with the WHO's Global Strategy on Diet, Physical Activity, and Health
- To determine the nutritional quality of packaged foods using the PAHO Nutrient Profiling model and Chile front-of-pack thresholds
- To evaluate the presence of sodium-related nutrition claims (e.g., "reduced in sodium, low sodium") that are displayed on food package labels
- To evaluate the nutritional quality of food products with marketing to children

The preliminary results of this work were submitted to the IDRC as part of the Final Report:

L'Abbé M, Franco-Arellano B, Mulligan C, Vergeer L, Sivakumar B, Arcand J. IDRC Project 108167 Extension Funding: An Analysis of the Packaged Food Supplies of Four Latin American Countries. Preliminary report. Prepared for submission to the International Development Research Centre. 2020.

Other achievements related to this Intermediate Outcomes include:

- PAHO received a grant from LINKS Resolve to Save Lives to analyze nutrients of public health concern using FLIP-LAC across. All LAC will be invited to participate.
- Costa Rica collaborated with Dr. Simón Barquera, at the Center for Research in Nutrition and Health of the National Institute of Public Health in Mexico. They used the packaged food supply

data generated from this grant to inform a report on that will be submitted to the United Nationals Children's Emergency Fund (UNICEF), titled *'Childhood Overweight and the Retail Environment in Latin America and the Caribbean: Synthesis report', 2019*

- In Peru, a new law on front-of-package labelling law was developed with data from the package foods database generated from this research.
- In Costa Rica, an examination of food environments was conducted in collaboration with the University of Costa Rica. This formed the basis of a student thesis and a published pape:

  Gamboa-Gamboa T, Blanco-Metzler A, Vandevijvere S, Ramirez-Zea M, Kroker-Lobos F. Nutritional content according to the presence of front of package marketing strategies: the case of ultra-processed snack food products in Costa Rica. Nutrients 2019. Vol. 11, 2738

- Additionally, in health and economic impact modelling, researchers in Brazil plan to expand their models to include societal costs (e.g., out of pocket expenses, pensions, early retirements) and apply the models to other public health nutrition priorities such as sugars and taxes on sodas. Currently, information on economic analysis only exists for sodium and fats in Brazil. There are plans to share this information with other LAC.

2. Country level sodium reduction targets established and/or updated.

- In June 2019, in Costa Rica the Ministry of Health and the CACIA Cámara Costarricense de la Industria Alimentaria (Costa Rican Chamber of the Food Industry) renewed their alliance and commitment to sodium reduction, which includes supporting updated sodium targets for the food supply (photo). Round table discussions involved setting national sodium goals, drivers to reduce sodium and future proposals for sodium reduction through the perspective of the food industry. Costa Rica was the only Consortium country to achieve this outcome.
- The data collected and analyzed as part of this Consortium research demonstrated that a large proportion of products are already meeting the regional sodium reduction targets. Since sodium intakes remain high in most LAC, the Consortium has advocated for more stringent targets. In response, PAHO has committed to revising the regional targets in 2020 with support from the Technical Advisory Group on Cardiovascular Disease Prevention through Population-wide Dietary Salt/Sodium Reduction

3. National commitment to support and fund the implementation of a social marketing program.

No country has implemented the regional social marketing and communication plan. In several countries, advances have been made in adapting the regional plan to national contexts. Advocacy efforts are underway to promote national implementation.

- In Paraguay, municipal governments have used the qualitative research data as a basis for banning saltshakers in restaurant and food service establishments.
- In Paraguay, the government has committed to adapting the regional social marketing plan and is currently seeking funds to implement it.
- In Costa Rica and Peru, while no country has committed to funding a social marketing campaign, researchers have been successful in activating interest of external groups, and social marketing is included in their National Plan. In Costa Rica, a Nutritionist from the Ministry of Health was seconded to INCIENSA to conduct social marketing research. Costa Rica also obtained a LINKS Resolve to Save Lives grant to adapt the regional plan to a national context, and conduct research related to discretionary salt use. In Peru, the Ministry of Health and regional government have a strong interest in food and nutrition interventions for school-aged children and supported the social marketing research. The Ministry of Health is seeking financial support to implement the social marketing strategy, with a pending decision in 2020.

Long Term and Ultimate Outcomes

The long-term outcomes of this project include:

- Sodium intake by population reaches goal set by the national sodium reduction program in each country.
- Reduce prevalence of cardiovascular disease in each country.
- Development of cost-effective approaches to reducing cardiovascular disease.

Measurement of long-term outcomes and the ultimate outcome, which is to reduce morbidity and mortality due to hypertension and cardiovascular disease in LAC, was not part of this evaluation. A much longer time frame would be required to observe changes in these important outcomes.

Recommendations

This multi-national research Consortium successfully achieved the intended objectives. It produced high quality and impactful data related to outcomes that are highly relevant to improving political innovations and food systems. Despite the high level of success, the program evaluation identified areas of improvement related to 1) project logistics, 2) training and education, 3) contract negotiations and agreements, 4) budget considerations 5) partnership time commitments 6) knowledge translation 7) Time zone etiquette. These areas of consideration will support the success of future multi-national research consortiums.

1) Project logistics

Approvals

Countries are recommended to seek buy-in and support from the highest governing bodies for approval to conduct research activities. For Costa Rica, obtaining approval for data collection in grocery stores was a seamless effort due to the strong support received from the government who deemed this project of national importance. By utilizing a top-down approach for approval, decisions can be made and implemented very quickly. In addition, this approach will help align the project goals with the governing body's goals and directions.

Interdisciplinary Approach

Future projects should aim for an interdisciplinary approach for technically and scientifically complex work, an endeavor that tends to produce innovative, high quality work. Teams also report higher levels of satisfaction, increased respect and communication. There were numerous examples in this Consortium that demonstrated exceptional interdisciplinary collaboration, incorporating various perspectives and levels of expertise; however, there were gaps identified that impact productivity and research outputs. As an example, Costa Rica found that they did not have the statistical or clinical background to work with mathematical models on health economic impact for data analysis (Objective 3). It is recommended teams consider gaps in technical expertise at the time of funding. If there are gaps, then appropriate partners could be included on the research team. Funding might be required to hire the appropriate technical experts. A risk and mitigation strategy can also be considered at the onset of the research program. Interdisciplinary teams are an excellent way to address gaps in technical skills and maximize success of the research.

Communication and reporting requirements

Success of a large scale, multi-national and interprofessional project is dependent on effective and timely communication. In this evaluation, some researchers recommended that meetings among those leading research should occur at a greater frequency. Perhaps meetings should be scheduled for 3-week cycles rather than a 4-week cycle or at a cycle that is mutually agreed upon by team members. The Costa Rican coordinating team recommended to shorten the reporting period from an annual basis to a 6-month cycle with a simple, user-friendly quarterly checklist that will be provided to the project funder. This is the current reporting structure for LINKS Resolve to Save Lives grant (2019). Collectively,

these efforts will keep the project on track, within budget, address risks and provide mitigation strategies, and maintain the fidelity of the protocol.

Additionally, it is recommended that funding for high-quality digital communication tools be provided to future multi-country research Consortiums. Such tools allow for recorded webinars, document sharing, and collaborative team meetings. High quality digital communication platforms, such as GoToMeeting or Zoom, are more stable and can handle higher bandwidths compared to free videoconferencing tools (i.e., Skype).

Ample time should be provided for the completion of a program evaluation report post project conclusion. Originally the program evaluation report was due at the project end on September 7, 2019. This was not a feasible time frame to conduct the summative evaluation, given that the final report was being prepared at the time. Fortunately, IDRC extended the project for another 6 months even though the project was on track for achieving its stated objectives. The extension allowed time to complete a more in-depth evaluation as well as an exploration of other emergent findings related to the content of other critical nutrients. A summative evaluation was the method of choice to assess the overall impact of the project, and an evaluation at the mid-way of the project would have been be too early to assess project outcomes. This approach also allows for the measurement of important short-term outcomes that may take some time to appear. For example, several papers were published or submitted after the initial grant deadline. These important outcomes would not have been assessed if the evaluation occurred earlier.

2) Training and Education

In-person training

For the most part, training and development of geographically dispersed research teams has been successful with minor issues. However, recommendations are being made to enhance future training and development opportunities. As a first line of approach, trainees of the project should receive in-person training with experts in the field, especially for objectives such as 1B and 3 which consisted of complex methods. For objective 1B, laboratory training on food sampling analysis was conducted remotely through web-calls. It is recommended for any objective involving lab work, due to the technical aspects of the work, to have in-person demonstrations and on-site initiation visits be the standard. The value of the face-to-face sessions was consistently and enthusiastically communicated by researchers in this Consortium. Future projects should include face-to-face meetings and training at a few time points over the grant cycle.

Language appropriate training

The core training sessions should be conducted in Spanish and not English, given that English is a second language for all Consortium members.

Trainee support

In this report, trainees reported gaining invaluable knowledge, experience and collaborations from attending face-to-face meetings and/or training sessions. To encourage the development of critical research skills among trainees and emerging researchers, it is recommended the IDRC make funds

available for trainee travel. This will ensure long-lasting impacts of the funded work, as trainees often go on to build research programs based on their past experiences.

3) Contract negotiations

Minimizing assumptions

A misalignment of expectations was a common problem that occurred in Objectives 1B and 2. Assumptions were made in objective 1B that research team members were operating under an international laboratory standard which was not the case.

Authorship Agreements

Likewise, ambiguities surrounding the definition and the role of authorship and contributors resulted in a breakdown of partnerships for objective 2. For future research projects, it is recommended that researchers define the requirements for authorship *a priori*. This includes itemized project deliverables, clear expectations and the handling of intellectual property. Ideally this will follow published guidelines, such as those published by the International Committee of Medical Journal Editors. This would clarify working relationships and expectations, avoid contract disputes and protect intellectual contributions of the team. It is recommended that the IDRC also develop training guides and give advice on copyright and intellectual property rights.

Tools and resources for contract development

Most importantly, it is recommended that contracts be written, reviewed and executed by legally trained individuals with an understanding of the legal requirements across multiple jurisdiction. If legal review is not available, IDRC should provide tools and resources for coordinating centres on how to manage a research project with multiple partners when human resources and finances are exchanged.

4) Budget considerations

Long term funded multi-country grant projects require special project expense considerations. It is recommended (for grants funding multiple years) that considerations be given to the currency fluctuations and political changes in the countries. This might mean that annual budget adjustments are permitted. This requires forward thinking in setting budget rates and currency selection through forecasts based on future trends. Through this approach, the currency fluctuations experienced by Argentina could have been mitigated. Despite these efforts, unexpected events in the global market can impact the study budget regardless of the amount of advance planning but this is good practice to address risk mitigation of budget fluctuations.

5) Partnership time commitments

In this program evaluation, researchers communicated that time constraints and competing priorities often resulted in non-participation in critical meetings and delayed responses to communications. When committing to long term projects, it is recommended team members be made aware of the time commitment involved and the efforts needed to meet these commitments. It is also important to

recognize that there is always a risk with working with individuals from the Ministry of Health, as the government's mandate can change the direction and focus of these individuals. This is a risk that project team members must be mindful of when partnering with governments.

6) Knowledge translation

To maximize the investment of the IDRC, it is recommended that all funded research integrate KT strategies as an objective of a project. This will maximize the reach and uptake of the research. For the current grant, this approach worked extremely well, which resulted in numerous knowledge dissemination activities. However, there was a gap in KT strategy in this grant, since it did not include integrated KT activities; activities proven to optimize the usability of the research outputs through involvement of end-users early in the research process. Going forward, it is recommended that future projects use the KT validated workbook to structure knowledge dissemination plans. It is also recommended that a coordinator be responsible for KT activities. This coordinator will be responsible for all aspects of the KT coordination such as seeking, facilitating, and documenting KT opportunities and activities.

7) Time zone etiquette

Successful communication when working with countries in different time zones and seasons requires a management plan, as different countries have a different way of interacting. Coordination of project efforts was required across five different time zones which often presented challenges. As an example, program evaluators were unsuccessful with conducting follow-up calls with some country leads as the timing of the evaluation occurred during the summer holidays in LAC, while this was not the case for the North American program evaluators. Future North and South American partnerships should consider setting one official time zone as the standard for the group, use of tools to navigate through the different time zones, and pay attention to cultural norms, peak vacation periods and statutory and religious holidays.

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Appendices

Appendix 1: List of documents reviewed

Appendix 2: Program Evaluation Survey Responses

Appendix 3: Program Evaluation Survey

Appendix 4: Knowledge Translation Activities per Research Objective

Appendix 5: Description of partnerships formed per country

Appendix 1: List of documents reviewed

1. Submitted grant application,
2. Yearly interim progress reports submitted to the IDRC,
3. Compendium of knowledge translation activities conducted,
4. Team meeting notes and memos,
5. Country-level data on existing programs and policies from PAHO.

Appendix 2: Program Evaluation Survey Responses

Partnerships					
External Partnerships/collaborations formed [n (%)]					
	Yes	**No**			
National government	9 (81.8%)	2 (18.2%)			
Regional government	6 (54.5%)	5 (45.5%)			
Productive sector	4 (36.4%)	7 (63.6%)			
Civil society	5 (45.5%)	6 (54.5%)			
Non-governmental organizations	8 (72.7%)	3 (27.3%)			
Educational institutions	9 (81.8%)	2 (18.2%)			
Research institutions	7 (63.6%)	4 (36.4%)			
Scientific community	6 (54.5%)	5 (45.5%)			
Point in research project that partners/collaborators were engaged [n (%)]					
	Before project	**Start of project**	**Mid-way through project**	**End of project**	**Not applicable**
National government	8 (72.7%)	4 (36.4%)	4 (36.4%)	6 (54.5%)	1 (9.1%)
Regional government	2 (18.2%)	2 (18.2%)	4 (36.4%)	3 (27.3%)	4 (36.4%)
Productive sector	2 (18.2%)	2 (18.2%)	3 (27.3%)	2 (18.2%)	7 (63.6%)
Civil society	2 (18.2%)	3 (27.3%)	6 (54.5%)	3 (27.3%)	4 (36.4%)
Non-governmental organizations	5 (45.5%)	2 (18.2%)	5 (45.5%)	5 (45.5%)	1 (9.1%)
Educational institutions	3 (27.3%)	4 (36.4%)	7 (63.6%)	5 (45.5%)	2 (18.2%)
Research institutions	2 (18.2%)	3 (27.3%)	7 (63.6%)	5 (45.5%)	2 (18.2%)
Scientific community	3 (27.3%)	2 (18.2%)	5 (45.5%)	5 (45.5%)	4 (36.4%)
Extent of External Partner Engagement [n (%)][a]					
	Not engaged	**Moderately engaged**	**Engaged**		
National government	2 (18.2%)	3 (27.3%)	6 (54.5%)		
Regional government	5 (45.5%)	2 (18.2%)	4 (36.4%)		
Productive sector	7 (63.6%)	4 (36.4%)	0 (0.0%)		
Civil society	4 (36.4%)	4 (36.4%)	3 (27.3%)		
Public/Consumer	6 (54.4%)	4 (36.4%)	1 (9.1%)		
Non-governmental organizations	1 (9.1%)	3 (27.3%)	7 (63.6%)		
Educational institutions	2 (18.2%)	3 (27.3%)	6 (54.5%)		
Research institutions	2 (18.2%)	4 (36.4%)	5 (45.5%)		
Scientific community	5 (45.5%)	2 (18.2%)	4 (36.4%)		
[a]Responses of the 5-point Likert scale questions (not engaged to extremely engaged) were collapsed into ‘Not engaged’, ‘moderately engaged’, and ‘engaged’					

Satisfaction with external partnerships		
Not satisfied	1 (9.1%)	
Neither satisfied nor dissatisfied	3 (27.3%)	
Satisfied	7 (63.6%)	

Experience as a member of the Consortium[a]			
	Disagree	**Neither agree nor disagree**	**Agree**
Overall, collaborators had a high level of engagement in the project	0 (0.0%)	1 (9.1%)	10 (90.9%)
The collaborations I formed helped execute project objectives	0 (0.0%)	0 (0.0%)	11 (100.0%)
Objectives of the consortium were clear	0 (0.0%)	1 (9.1%)	10 (90.9%)
Members of the consortium had common goals	0 (0.0%)	1 (9.1%)	10 (90.9%)
Members of the consortium understood the beliefs or values of each partner's organization	0 (0.0%)	0 (0.0%)	11 (100.0%)
I feel I could trust members of the consortium	0 (0.0%)	0 (0.0%)	11 (100.0%)
Other members of the consortium are committed to this research and consortium goals	0 (0.0%)	2 (18.2%)	9 (81.8%)
I feel recognized and respected as a consortium member	0 (0.0%)	1 (9.1%)	10 (90.9%)
Partnerships with consortium members were mutually beneficial	0 (0.0%)	0 (0.0%)	11 (100.0%)
Communication with members were transparent and open	0 (0.0%)	3 (27.3%)	8 (72.7%)
Communication with members was consistent	0 (0.0%)	2 (18.2%)	9 (81.8%)
I am satisfied and feel well supported by the IDRC grant leadership	0 (0.0%)	0 (0.0%)	11 (100.0%)
When the experience was challenging, we overcame these challenges	0 (0.0%)	1 (9.1%)	10 (90.9%)

[a] Responses were measured on a 5-point Likert scale (Strongly Disagree to Strongly Agree). For the analysis, responses for "Strongly agree" and "Agree" were collapsed into "Agree"; and "Strongly Disagree" and "Disagree" were collapsed into "Disagree".

Capacity			
Changes to knowledge and skills of members[a]			
	Disagree	**Neither agree nor disagree**	**Agree**
Better ability to collect scientific data	0 (0.0%)	1 (9.1%)	10 (90.9%)
Better ability to write scientific papers/reports	0 (0.0%)	2 (18.2%)	9 (81.8%)
Better ability to develop a knowledge translation plan	0 (0.0%)	1 (9.1%)	10 (90.9%)
Better ability to implement a knowledge translation plan	0 (0.0%)	1 (9.1%)	10 (90.9%)
[a] Responses were measured on a 5-point Likert scale (Strongly Disagree to Strongly Agree). For the analysis, responses for "Strongly agree" and "Agree" were collapsed into "Agree"; and "Strongly Disagree" and "Disagree" were collapsed into "Disagree".			
Satisfaction with training sessions[b]			
Dissatisfied	0 (0.0%)		
Neither dissatisfied nor satisfied	0 (0.0%)		
Satisfied	11 (100.0%)		
Satisfaction with experience as lead[b]			
Not satisfied	0 (0.0%)		
Neither dissatisfied nor satisfied	0 (0.0%)		
Satisfied	1 (100.0%)		
[b] Responses were measured on a 5-point Likert scale (Not at all Satisfied to Very Satisfied). For the analysis, responses for "Very Satisfied" and "Satisfied" were collapsed into "Satisfied"; and "Not at all Satisfied" and "Dissatisfied" were collapsed into "Not Satisfied".			

Appendix 3: Program Evaluation Survey

IDRC Program Evaluation Survey

Thank you to all IDRC project team members for your hard work on this valuable project. As the project ends, a program evaluation report shall be written to support IDRC's mission to fund research in developing countries to promote knowledge innovation and drive large-scale positive changes to improve people's lives. This program evaluation report will assist IDRC to strengthen their processes of the research they support, and to increase their understanding of the contribution of this research.

The objectives of this survey are to assess some of the short-term consortium and intermediate outcomes.

This survey will take 30-45 minutes to complete.

We know this is a busy time of year for you, and that you are soon going on vacation! We are asking for your cooperation as we are working on a short timeline. Therefore, we kindly ask that you complete this survey by Wednesday, January 15, 2020, or at your earliest convenience, as your responses are critical inform the project evaluation report for IDRC.

Thank you for your time and please feel free to contact me if you have any questions.

Janice Padilla-Moseley
University of Ontario Institute of Technology (Ontario Tech University)
Email: janice.moseley@uoit.ca
Tel (WhatsApp): 1-416-569-4743
Skype: janice.padilla-moseley
* Required

1. Full Name *

2. Email address *

3. Country *

4. Which research objective did you work on? (select all that apply) *

Check all that apply.

- [ ] Objective 1A: Assess sodium levels in packaged foods
- [ ] Objective 1B: Assess sodium levels in street, artisanal and restaurant foods
- [ ] Objective 2: Social Marketing
- [ ] Objective 3: Health and economic analyses

Consortium Outcome

Multi-sectoral and multi-disciplinary partnerships are newly formed and/or strengthened, engaged and activated.

Partners and collaborators can support the research process in many ways. These partners may be internal to the IDRC grant (i.e., researchers in other countries conducting similar work), or external to the IDRC grant (i.e., the Ministry of Health in your country). The external partners may participate in the research (i.e., inform data collection and analysis) or they may support dissemination of the research findings. The following questions ask about external (outside of the research team) and internal (within the research team) partnerships.

5. 1. Did you form partnership(s) and/or collaboration(s) for this research with external individuals? □ (Note: partnerships and collaborations may have been formed at any stage of the research process, from data collection through to knowledge translation) *

Mark only one oval per row.

	Yes	No
a. National government (e.g. policy decision makers)	◯	◯
b. Regional government (e.g. local, municipal, state, provincial)	◯	◯
c. Food industry	◯	◯
d. Civil society (e.g. individuals, organizations, members of society that are independent of the government, public, consumer)	◯	◯
e. Non-governmental organizations (e.g. PAHO, InterAmerican Heart Association, Consumer's International)	◯	◯
f. Educational institutions	◯	◯
g. Research institutions (e.g. health, nutrition, education and culture).	◯	◯
h. Scientific community	◯	◯

6. 2. If you answered YES to Q3 above, please name the organization(s) and indicates what sector they belong to (i.e., food industry, educational institution). *

7. 3. At what time point during the research project were the partners/collaborators engaged? *

Check all that apply.

	Before project start	Start of project	Mid-way through project	At the end of the project	Not applicable
a. National government (e.g. policy decision makers)	☐	☐	☐	☐	☐
b. Regional government (e.g. local, municipal, state, provincial)	☐	☐	☐	☐	☐
c. Food industry	☐	☐	☐	☐	☐
d. Civil society (e.g. individuals, organizations, members of society that are independent of the government, public, consumer)	☐	☐	☐	☐	☐
e. Non-governmental organizations (e.g. PAHO, InterAmerican Heart Association, Consumer's International)	☐	☐	☐	☐	☐
f. Educational institutions	☐	☐	☐	☐	☐
g. Research institutions (e.g. health, nutrition, education and culture).	☐	☐	☐	☐	☐
h. Scientific community	☐	☐	☐	☐	☐

8. 4. To what extent were the external partners and/or collaborators engaged? *

Mark only one oval per row.

	Not engaged	Slightly engaged	Moderately engaged	Engaged	Extremely engaged
a. National government (e.g. policy decision makers)					
b. Regional government (e.g. local, municipal, state, provincial)					
c. Food industry					
d. Civil society (e.g. individuals and organizations independent in society that are independent of the government)					
e. Public/consumer					
f. Non-governmental organizations (e.g. PAHO, InterAmerican Heart Association, Consumer's International)					
g. Educational institutions					
h. Research institutions (e.g. health, nutrition, education and culture).					
i. Scientific community					

9. 5. Overall, how satisfied are you with the external partnerships that I formed to support the IDRC research? *

Mark only one oval.

- Not at all satisfied
- Not satisfied
- Neither satisfied nor dissatisfied
- Satisfied
- Very satisfied

Consortium Outcome

Partnerships and collaborations formed are equitable, diverse and inclusive.

10. 6. Please tell us about your experience in participating in this IDRC research consortium *

Mark only one oval per row.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Not applicable
a. Overall, my collaborators had a high level of engagement in the project						
b. The collaborations I formed helped execute the project objectives						

11. 7. Thinking about the partnerships and collaborations you have formed in IDRC project, at what time point during the research project were your partners/collaborators engaged. *

Check all that apply.

- [ ] Before project start
- [ ] Start of project
- [ ] Mid-way through project
- [ ] At the end of the project
- [ ] Not applicable

12. 8. How much do you agree or disagree with the following statements about the IDRC research consortium that was formed? *

Mark only one oval per row.

	Strongly disagree	Disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
a. The objectives of the consortium were clear.					
b. Members of the consortium had common goals.					
c. Members of the consortium understood the beliefs or values of each partner's organization.					
d. I feel that I could trust members of the consortium.					
e. Other members of the consortium are committed to this research and consortium goals					
f. I feel recognized and respected as a consortium member.					
g. My partnerships with consortium members were mutually beneficial.					
h. Communication with my consortium members were transparent and open.					
i. Communication with my consortium members were consistent.					

j. I am satisfied and feel well supported by the IDRC grant leadership					
k. When the consortium experienced challenging times, we overcame these challenges through perseverance and determination.					

Consortium Outcome

Confidence, capacity, and scientific abilities to conduct research to address public health nutrition issues in Latin American countries is increased.

Training and skill building was an important outcome of the IDRC funding. The following questions ask about what you learned by working on the IDRC consortium research projects.

13. 9. Please list the exact knowledge and skills you learned since the research consortium was formed in 2016. These can relate to research skills, content knowledge, knowledge translation abilities, professional skills (i.e., communication, networking) or anything else that you feel is important: *

14. 10. Which training opportunities did you find most helpful, or that best supported you, in your role in the project. *

15. 11. Training and skill building was an important outcome of the IDRC funding. Please tell us how your knowledge and skills have changed since the beginning of the grant period in 2016 by answering the following statements. *

Mark only one oval per row.

	Strongly disagree	Disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
a. I have a better ability to collect scientific data.					
b. I have a better ability to write scientific papers or reports.					
c. I have a better ability to develop a knowledge translation plan					
d. I have a better ability to implement a knowledge translation plan					

16. 12. Overall how satisfied are you with the training sessions that were included as part of the research process? *

Mark only one oval.

	1	2	3	4	5	
Extremely dissatisfied						Extremely satisfied

17. 13. Please tell us how many (if any) undergraduate, graduate and postdoctoral students participated in the IDRC research, as part of their training program. Please indicate the number of students at each level of training. *

Consortium Outcome

Resources, training and outputs by the researchers are leveraged to address other nutrition topics of public health concern.

18. 14. Based on your experience in the consortium, what recommendations do you have for scaling up research processes to other Latin American countries? *

Overall Experience

Congrats, you've made it to the last page!

19. 15. What challenges did you experience with implementing the project activities and how did you overcome these challenges? *

20. 16. What do you consider to be the greatest successes of the project? *

21. 17. How satisfied or not satisfied are you with your experience as the country/research lead for the IDRC project? Please provide a rationale for your response Click or tap here to enter text. *

Mark only one oval.

- Not at all satisfied
- Not satisfied
- Neither satisfied nor dissatisfied
- Satisfied
- Very satisfied

22. 18. Do you have any other comments to share about the research outputs and outcomes of the project that would support and inform the program evaluation report for IDRC? *

Thank you for your time!

Appendix 4: Knowledge Translation Activities per Research Objective

KT activities for Objective 1A by sector and activity type

	Government	Health and Education	Productive Sector	Civil Society	Scientists	International	TOTAL
Presentation	7			2	9	1	**19**
Oral presentation	5		4		3	5	**17**
Conference/events					3		**3**
Publications					5		**5**
Abstracts					5	3	**8**
Thesis					2		**2**
Posters				1			**1**
Document		1					**1**
Proposal	5	1					**6**
Discussions	1	1				1	**3**
Commitment letters			2				**2**
Lists			1				**1**
Bill/ ordinance	1		1				**2**
Diary				5			**5**
Internet				12			**12**
Bulletin					3		**3**
Radio				2			**2**
Social networks				3			**3**
Website				14			**14**
Database (FLIP)		1				3	**4**
Social Media	1						**1**
Briefs				1		1	**2**
Interviews					1		**1**
TV/New/Press				1		1	**2**
Webinars					1		**1**
Educational material					1		**1**
Training		1				1	**2**
Knowledge exchange					1		**1**
Campaigns		3					**3**
Meetings			1				**1**
Country positions	6						**6**
Agreement/alliance		1	1				**2**
TOTAL	**26**	**9**	**10**	**41**	**34**	**16**	**132**

KT activities for Objective 1B by sector and activity type

	Government	Health and Education	Productive Sector	Civil Society	Scientist	International	TOTAL
Presentation				1	2	1	**4**
Oral presentation	4	1	5		3	7	**20**
Conference/events					1		**1**
Publications					1		**1**
Abstracts					6	3	**9**
Thesis					1		**1**
Proposal	4						**4**
Discussions		1					**1**
Commitment letters			2				**2**
Reports					1		**1**
Lists		2	1				**3**
Bill/ ordinance	1		1				**2**
Bulletin					3		**3**
Website				4			**4**
Social Media	1						**1**
Briefs						1	**1**
TV/New/Press			1			1	**2**
Educational material					1		**1**
Training material		1					**1**
Knowledge exchange		1	2		1		**4**
Campaigns		3					**3**
Meetings			1				**1**
Country positions	1						**1**
Agreement/alliance		1	2				**3**
TOTAL	**11**	**10**	**15**	**5**	**20**	**13**	**74**

KT activities for Objective 2 by sector and activity type

	Government	Health and Education	Productive Sector	Civil Society	Scientist	International	TOTAL
Presentation	1			1	3	1	**6**
Oral presentation	1	1		2	5	3	**12**
Conference/events					1		**1**
Publications					2		**2**
Abstracts					4		**4**
Reports		3					**3**
Bulletin				2	2		**4**
Social Media				1			**1**
Briefs	1				3		**4**
TV/New/Press				4			**4**
Webinars					1		**1**
Educational material	7	4			1		**12**
Training material					13		**13**
Knowledge exchange					1		**1**
Country positions	1						**1**
Agreement/alliance		1					**1**
TOTAL	**11**	**9**	**0**	**10**	**36**	**4**	**70**

KT activities for Objective 3 by sector and activity type

	Government	Health and Education	Productive Sector	Civil Society	Scientist	International	TOTAL
Presentation						1	**1**
Oral presentation	1	1			2		**4**
Publications					1		**1**
Abstracts					1	1	**2**
Bulletin					1		**1**
PRIME Economic Modeling						3	**3**
Knowledge exchange					1		**1**
Country positions	1						**1**
TOTAL	**2**	**1**	**0**	**0**	**6**	**5**	**14**

KT activities for Objective 4 by sector and activity type

	Government	Health and Education	Productive Sector	Civil Society	Scientist	International	TOTAL
Presentation						1	**1**
Oral presentation		3	2		1	2	**8**
Publications					1		**1**
Abstracts					2	1	**3**
Document		2					**2**
Proposal	2						**2**
Reports				1			**1**
Bill/ordinance	1						**1**
Radio				2			**2**
Social networks				3			**3**
Website	1			27			**28**
Social Media	1			5			**6**
Briefs		1					**1**
Interviews				1			**1**
TV/New/Press		1		3			**4**
Educational material				1			**1**
Knowledge exchange		3			1		**4**
Campaigns		3					**3**
Meetings		1	2				**3**
Country positions	1						**1**
TOTAL	**6**	**14**	**4**	**43**	**5**	**4**	**76**

KT activities for Objective 5 by sector and activity type

	Government	Health and Education	Productive Sector	Civil Society	Scientist	International	TOTAL
Presentation						3	**3**
Oral presentation		6	1		12	8	**27**
Conference/events						1	**1**
Publications				1	6		**7**
Abstracts						1	**1**
Poster	1	1			1	2	**5**
Videos	1	3		1		1	**6**
Document	1	4					**5**
Proposal		2					**2**
Discussions		2				1	**3**
Reports		1				1	**2**
Bulletin				1			**1**
Radio				5			**5**
Social networks				12			**12**
Website				12			**12**
Social Media				5			**5**
TV/New/Press				2			**2**
Webinars		2		2		1	**5**
Knowledge exchange		3					**3**
Campaigns		3					**3**
Meetings		3	1				**4**
Country positions	1						**1**
Agreements/alliance		3					**3**
Workshops		2					**2**
TOTAL	**4**	**35**	**2**	**41**	**19**	**19**	**120**

Appendix 5. Description of partnerships formed per country

Partnership Characteristics	
National and Regional Governments	
Costa Rica	• 2013: first IDRC project is declared as being of national and public health interest. • Sodium reduction remains a political priority with the Ministry of Health (MOH) due to a need to reduce hypertension and the rise of morbidity and mortality from non-communicable diseases; thus, the MOH and Minister are highly interested in this project. • Other partnerships: MOH, Ministry of Culture, Costa Rican Social Security Fund[a], National Directorate of Education and Nutrition and Children's Centers for Comprehensive Care[b] and the Guadalupe local government.
Argentina	• 2012: Partnerships and collaborations between the PI at Fundación InterAmericana del Corazón Argentina (FIC) and the regional government continue to strengthen and build upon the first IDRC grant. • Country research lead invited to present the past IDRC grant results to the Senator and advisory team. • FIC was invited to be part of the working group organized by the MOH with a focus on sodium reduction and trans fatty acid elimination. The Secretariat for the prevention of noncommunicable diseases was in attendance.
Paraguay	• Unique external partnerships and collaborations as the MOH has direct involvement in the grant and is responsible for leading the grant objectives in their country. Note: Other consortium countries involve non-governmental organizations leading the objectives, or in the case for INCIENSA, the coordinating centre in Costa Rica which is a research institute that is part of the government, but not the Ministry itself and Peru consists of an academic institution. • The Health Minister, being a physician with a background on non-communicable diseases, has been instrumental in advocating for public health initiatives related to non-communicable diseases. • Other partnerships: Ministry of Education[c], Municipality of Limpio[d], Municipality of Fernando de la Mora[e], Municipality of Caazapá[f], Municipality of Asunción[g], and Directorate of Noncommunicable Diseases[h]. • Research evidence to be disseminated at the Parliament's Health Commission and Chamber of Deputies and the Chamber of Senators • MOH's direct involvement in the grant is highly beneficial as the Consortium research members are held in high regard with key decision makers which creates opportunities to influence change. • Example: A consortium member from Paraguay is a highly influential and credible information source who is highly respected by the Health Minister and congress. In addition, this consortium member provides expert advice to the Health Minister related to several public health concerns. His influence and credibility is highly valuable asset that can be leveraged to influence change and adoption of research evidence into political action
Peru	• Direct connections between consortium members and the regional government were absent at the onset of the grant but evolved close to the end of the grant where a relationship between UPCH and the Ministry of Health was formed.

	• Other partnerships: NIH (National Center of Food and Nutrition), Municipalities and Association of Nutritionists[i], Organización Panamericana de la Salud (OPS), **World Food** Program (WFP), Food and Agriculture Organization (FAO), Unicef, MOH, Ministry of Development, Ministry of Production, Municipalities, NIH, NGOs, Institute of Nutritional research (IIN), academy. • There was an engagement attempt with the National Centre of Food Education to seek support and to facilitate with the data collection in the supermarkets, similar to the approach Argentina and Costa Rica explored; however, they were unreachable.
Partnerships with the Productive Sector	
Costa Rica	• June 11, 2019: A historical event took place between the MOH and the Costa Rican Chamber of the productive sector[j] where an alliance was formed with the President, Minister of Health and the productive sector to reduce sodium in food products at a round table discussion in Costa Rica. The meeting attendees included representatives from the Ministry of Health, CACIA[j], INCIENSA, National Institute of Learning, University of Costa Rica, and University of Ontario Institute of Technology (Ontario Tech). • This is a significant intermediate outcome achievement for Costa Rica, being the only consortium country, to form an alliance with the government and the productive sector which is often inaccessible and hard to reach.
Argentina	• Previously, engagement opportunities with policy decision makers were reserved for the end of the project. However, engagement opportunities with policy decision makers are now done at an earlier stage in the research.
Brazil	• The Country research lead has a unique hybrid role as the lead researcher for this grant in his country, as well as being a long-standing employee in the MOH where he is an active member on policy development groups. • The Country research lead's dual role brings a unique perspective to the research as he has inside knowledge of the decision makers agenda and needs, as well as access to internal and external experts in the country. • Funding partnership with IDRC has been highly influential in the coordination of the grant objectives and sodium focussed initiatives in the country, as this grant is the largest funding opportunity for sodium.
International Partnerships	
Brazil	• Participation in the IDRC project led to international partnerships with subject matter experts in sodium reduction research from Canada and Australia, strengthening Brazil's research evidence on critical nutrients which opened the door for negotiation with the productive sector and policy advocacy efforts in the country.
Research and Educational Institutions	

Argentina,	• Partnerships were formed with the Faculty of Agricultural Sciences at a local University and the Higher Institute of Biological Research[k]
Brazil	• Long standing partnerships with researchers, epidemiologists and individuals working in food nutrition policy. • Other partnerships**:** University of Sao Paulo, and the University of Brasilia. • Brazil continues to build alliances with epidemiologists and economists from research and academic institutions are highly beneficial as this alliance lends human and intellectual resources to facilitate policy discussions and negotiations.
Costa Rica	• Partnerships formed with the Academia and Research Institutions, University of Costa Rica[l], Latin University[m], and Institute of Nutrition of Central America and Panama (INCAP). Collectively, partnerships with these institutions facilitated with advancing the research objectives of this grant.
Paraguay	• Parts of the objectives were carried out by specialists or technicians from the National Institute for Food and Nutrition (INAM) who are close colleagues of the consortium members, while the majority of the objectives were carried out by consortium members form the Ministry of Health. • Expert technicians in nutrition were hired to conduct the field work to fulfill objectives 1A and 1B of the project. • Other partnerships: Faculty of Medical Sciences[n], and National University of Asunción, Faculty of Medicine.
Peru	• Partnerships formed with the School of Nutrition in a University and the Institute of Nutritional Research.
Scientific, Civil and Academic Societies	
Argentina	• The Baker's Association
Brazil	• Brazilian Instituted of Consumer's Right
Costa Rica	• Partnerships with civil society groups: the InterAmerican Heart Foundation (IAHF), Healthy Costa Rica[o], CLAS, Costa Rican Association of Cardiology[p], Professional Association of Nutritionists[q], College of Physicians[r] and Consumer focus group participants. • Partnerships with scientific communities: International Network for Food and Obesity / Non-communicable Diseases (NCDs) Research, Monitoring and Action Support (INFORMAS), World Action on Salt and Health (WASH), and World Hypertension League.
Paraguay	• Partnerships with Paraguayan Cardiology Society, Paraguayan Endocrinology Society, Metabolism Society and Nutrition Society where preliminary results were presented to the groups. • Paraguayan Diabetes and renal patient groups who have a strong interest on the topic. • The patient groups demonstrated strong support for healthy eating and sodium reduction, which are the intended changes for this target audience.

	• A consortium member has close connections as an educator with the School of Medicine at the National University of Asunción, the largest university in the country, where there is potential opportunity for students to be involved in future work as the students can carry out parts of the research objectives.
Peru	• Partnerships were formed with: Association of Nutritionists of Peru[s], NIH (National Center of Food and Nutrition) and the local supermarkets.
Non-governmental Organizations	
Costa Rica	• Strong connections with the National Commission on Non-Communicable Diseases, as well as involvement in PAHO's Technical Advisory group, led a new non-governmental organization called Healthy Costa Rica was created in 2018. •

[a]Caja Costarricense del Seguro; [b] Dirección Nacional de Educacion y Nutricion and Centros Infantiles de Atencion Integral (CEN-CINAI), Dirección Nacional de Educacion y Nutricion and Centros Infantiles de Atencion Integral; [c]Ministerio de Educación; [d]Municipalidad de Limpio; [e]Municipalidad de Fernando de la Mora; [f]Municipalidad de Caazapá; [g]Municipalidad de Asunción; [h]Dirección de Enfermedades No Transmisibles; [I] Colegio de Nutricionistas del Perú; [j]Cámara Costarricense de la Industria Alimentaria (CACIA); [k]Instituto Superior de Investigaciones Biológicas (INSIBIO); [l]Universidad de Costa Rica; [m]Universidad Latina; [n]Facultad de Ciencias Médica; [o] Costa Rica saludable; [p] Asociación Costarricense de Cardiología (ASOCAR); [q] Colegio Profesionales de Nutricionistas; [r] Colegio de Medicos; [s]Colegio de Nutricionistas del Perú