

Final Technical Report

I. Cover page

Project Title: Non-Communicable Disease Research Training Program. A Graduate and Postgraduate Initiative in Central America

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II. Executive summary

Central America share a research-knowledge gap and a lack of human research capacity needed to produce, conduct, and disseminate high quality research outcomes, strong enough to influence the development of non-communicable diseases (NCD) control strategies and policies. The Research Training Program (RTP) aimed was to strengthen research capacity in Central America needed to generate policy relevant evidence leading to non-communicable diseases (NCD) prevention and control, by providing mentored research awards and training to recent healthcare graduate professionals and postgraduate students. The RTP on NCD has successfully established a new generation of 23 young Central American researchers (11 graduate professionals or fellows and 12 postgraduate students or scholars) and gave them the opportunity to experience all the process implied on conducting a research project: from topic definition to results dissemination. Additionally, the scholarship component has offered opportunities to enhance mentors' skills of professors at the participating universities (National Autonomous University of Honduras; National Autonomous University of Nicaragua; Rafael Landivar University in Guatemala; San Carlos University in Guatemala; and University of Costa Rica), increasing research capacity on NCD at institutional level. Topics chosen by fellows and scholars were 70% related to nutrition/physical activity/body weight; 17% to smoking; and 13% to other NCD themes. After completing the RTP, all Mentees agreed that their statistical knowledge; data management; manuscript writing; and budgetary, project management, and negotiation skills were greatly improved. Most research fellows and scholars (83%) were able to present the main results of their study in an international scientific meeting. However, only 13% were able to publish their work in a peer-reviewed scientific journal. Efforts will continue to support fellows and scholars to submit their manuscript to a journal. The RTP let Mentees broaden their cultural and intellectual horizons and been mentored by highly recognized and prepared researchers, was definitively a plus for their academic career. Fellows and scholars experienced and learned to have psychosocial support, career guidance, role modeling, and advanced communication skills through mentoring. These features were definitively an addition to their intellectual strengths. The RTP also allowed mentors to experience

enhancement of their own personal and professional knowledge while teaching and learning from each Mentee. The pattern of regular contact of the mentorship relationship; the level of adherence to the mentoring program structure; the level of satisfaction and commitment with regard to several aspects of the programs by both Mentor and Mentee; the Mentees personal experiences and perceptions during the program; the level of effectiveness of mentoring as a tool for research capacity building and academic development and advancement; and the level of impact of research outcomes were all measureable outcomes for evaluating the positive achievement of the Programs' goals by means of an adequate Mentoring Process. It is also worth mentioning that, throughout the RTP, there were noticeable increased personal interaction and valuable collaboration among the Mentoring Programs Director, Fellows, Scholars, NCD researchers, senior policy-thinkers, and key stakeholders across different government and private sectors. The decision that all fellows and scholars worked in the same topic (food environment) during the last year of the RTP, increased the potential for clearly influenced in policy-making. This RTP has also increased the visibility of CIIEC/INCAP among academic and government institutions in the Central American region. From a short-term perspective, building research capacity has been achieved judging by the fellows' projects, growing interest in the Program, and building a research network within participating universities. Although evaluating the mid- and long- term impact of the mentoring relationship and this Program is an ongoing process, we have made considerable progress. Regarding the country's research capacity, impact at this level will require more time.

III. Research problem

Since 2002, the Pan American Health Organization (PAHO) recognized that non-communicable diseases (NCD) are the number one cause of premature death and disability in Latin America (1). In 1990, NCD and injuries accounted for 69% of deaths and 65% of disability adjusted life years (DALYs) in the region. By the year 2000, the corresponding figures were 73% and 76% (2). The rapid rate of urbanization in the region, accompanied by the adoption of western lifestyles, has led to increased consumption of tobacco, refined sugars, saturated fat, and salt, as well as a decrease in physical activity level (1). Central American countries, even though have historically faced high morbidity from poverty-related conditions including infectious diseases and undernutrition, during the last decade have also faced obesity and diabetes epidemics, experiencing a double-burden of disease. The Central America Diabetes Initiative (CAMDI) study indicated a prevalence of diabetes ranging from 5.4% to 12.9% and a prevalence of obesity among 11.5% to 18.8% in six countries of the region (3,4). The highest cardiovascular risk was found among females who were older, obese, and less educated (5).

To reduce the NCD burden, the Institute of Medicine (IOM) and the United Nations have concluded that it is necessary to improve local data and monitoring mechanisms, and build knowledge of affordable and feasible interventions (6,7). However, Central American countries still have limited expertise in the skills, tools, methods, and infrastructure to describe the population-level impact of NCD, study their determinants, translate findings into policies/interventions, or evaluate the impact of policies or prevention programs. Furthermore, investment by the government and private sectors on research and development in those countries remains low. Specific investment in training of researchers is particularly worrisome. Even though the annual growth rate of epidemiologic research has increased over the last 50 years, it remains low and mostly driven by papers whose first author is not affiliated with a local institution (8). The percentage of papers whose first author is affiliated with a country institution ranges from 32.7% in Costa Rica to 8.2% in Guatemala (8). In addition, universities in the region prioritize teaching over research. As a result, in the most recent (2010) research contribution ranking of healthcare universities in Latin America, the first Central

American stands in 67th place (out of 416) (9). Nevertheless, there is political recognition that urgent actions are needed to curb the NCD epidemic. In 2011, all Central American Ministers of Health and Head of Governments signed the “Antigua Declaration” that includes promotion and support for NCD research (10).

The Research Training Program (RTP) aimed to provide research mentoring and training to recent healthcare graduate professionals and postgraduate students. The premise of this project was that mentorship could play an important role in strengthening NCD research capacity in Central America (11,12). Mentorship is recognized across disciplines in both academic and practice settings as an important contributor to building capacity within organizations and among individuals. Even though a novel concept for the local teaching environment, it has gained recognition as a useful capacity-building tool. Creating a mentoring culture has had a multiplier effect and contributed to the creation of a critical mass of researchers that would enhance capacity both within local institutions and among individual researchers. Consequently, more knowledge and evidence can be generated leading to significant changes in NCD control. The RTP built upon the successful experience of a previously completed 4-year Fellowship Program. That Program successfully established, through mentorship, a new generation of young researchers dedicated to influencing the development of NCD prevention and control policies.

Objectives

General:

- To strengthen, through mentored research awards for graduate and postgraduate students, research capacity in Central America needed to generate policy relevant evidence leading to NCD prevention and control.

Specific:

- To conduct NCD determinants research to strengthen systemic research capacity and to support NCD control strategies based on the WHO Global Monitoring Framework.

- To strengthen local and regional capacity to conduct research training and implementation by funding graduate and postgraduate research design, implementation, and dissemination.
- To strengthen research capacity at the individual level by providing research funds, training, and mentoring for their research work to graduate and postgraduate students.
- To strengthen research capacity at the organizational level by building a mentoring culture with onsite faculty as they oversee students' research work and provide career advice.
- To provide cross-country and multi-disciplinary joint mentorship through a research network in NCD research.

IV. Progress towards milestones

According to the Grant Agreement, table 1 shows all project milestones. In general, all payments and all technical and financial reports were delivered on time. In May 2016, a 6-month non-cost extension was requested and it was granted by IDRC a month later. Hence, the project was extended until July 31st, 2017. This extension allowed that the last group of fellows and scholars could complete their 12-month research training and perform dissemination meetings to academic, civil society, and government authorities.

Table 1. Project milestones accomplishment

Milestone	Due date	Submitted by	Centre payment amount	Date of accomplishment
Commencement	Official Commencement date (see section 5)	n/a	n/a	February 1st. 2013
initial payment	Upon signature of this memorandum by the Recipient	n/a	100,600 CAD	February 2013 US\$98,098.49
second payment	6 months after commencement date	n/a	100,600 CAD	August 13th. 2013 US\$97,104.25
First technical progress report, covering the first 12 months of research work	12 months after commencement date	Recipient	n/a	April 1st, 2014
First financial report, covering the first 12 months of Research work as per the requirements of section A13.2	13 months after commencement date	Recipient	n/a	April 28th. 2014

Third payment by the Centre, following acceptance of first technical progress report and satisfactory financial report	One month after receipt of satisfactory reports	n/a	Yes	July 14th. 2014 US\$107,404.22
Fourth payment	18 months after commencement date	n/a	Yes	August 14th. 2014 US\$104,792.98
Second technical progress report, covering the first 24 months of Research work	24 months after commencement date	Recipient	n/a	March 1st, 2015
Second financial report, covering the first 24 months of Research work as per the requirements of section A13.2	25 months after commencement date	Recipient	n/a	May 25, 2015
Fifth payment by the Centre, following acceptance of first technical progress report and satisfactory financial report	One month after receipt of satisfactory reports	n/a	Yes	June 9th. 2015 US\$117,508.67
Sixth payment	30 months after commencement date	n/a	Yes	August 13th. 2015 US\$112,229.72
Third technical progress report, covering the first 36 months of Research work	36 months after commencement date	Recipient	n/a	March 15th, 2016
Third financial report, covering the first 36 months of Research work as per the requirements of section A13.2	37 months after commencement date	Recipient	n/a	March 1st, 2016
Seventh payment by the Centre, following acceptance of first technical progress report and satisfactory financial report	One month after receipt of satisfactory reports	n/a	Yes	August 11th. 2016 US\$44,160.91
Eight payment	42 months after commencement date	n/a	Yes	September 7th. 2016 US\$51,128.34
Final technical report, (two print copies and, where possible, an electronic copy)	On or before Research Work Completion Date (see Section 5)	Recipient	n/a	September 4 th , 2017
Final financial report, covering all funds expended on the Project, in the same form and including the details of the Budget as set forth in Attachment C (see section A13.6)	On or no more than 30 days after the Research Work Completion Date (see Section 5)	Recipient	n/a	September 4 th , 2017
Final payment by the Centre, following acceptance for the final technical including among other things, the research results dissemination plan) and satisfactory final financial report,	30 days after receipt of satisfactory final reports (see Section 5)	n/a	Up to 44,650 CAD	n/a

V. Synthesis of research results and development outcomes

Increased appropriateness of types and number of selected applicants annually

Overall, the RTP supported to 23 young researchers (11 fellows and 12 scholars) and gave them the opportunity to acquire new skills, tools and methods by experiencing all the process implied on conducting a research project: from topic definition to results dissemination. Additionally, the scholarship component has offered opportunities to enhance mentors' skills of professors at the participating universities (National Autonomous University of Honduras; National Autonomous University of Nicaragua; Rafael Landivar University in Guatemala; San Carlos University in Guatemala; and University of Costa Rica), through co-mentoring along with an INCAP's mentors; face-to-face and on-line meetings; and discussion of key articles about mentorship. This interaction increased research capacity on NCD at institutional level. According to the Clinical Research Appraisal Inventory (CRAI) results, participants indicated that they had improved their study design, data analysis and communication skills. The project has also provided 22 research topics on NCD to the Central America region, topics which otherwise would not had been studied or would had been difficult to be conducted with such a scientific rigor. Research results are been used as novel information that are promoting and will add up to future investigations' results in order to promote political actions.

The RTP has been successful in selecting a number of highly qualified male and female Mentees (Annex 1). To provide Mentees with the opportunity to network with other NCD active researchers, and to have the experience of living in first-hand what is happening today in the research world, the INCAP/CIIPEC was designated as the headquarters of both mentoring programs. Scholars in other countries did not have that opportunity, although many of the research training activities were available on-line. Topics chosen by fellows and scholars were 70% related to nutrition/physical activity/body weight; 17% to smoking; and 13% to other NCD themes (Annex 1). Research topics were deeply discussed with Mentors and approved for their implementation.

High Quality Research Tools Acquired by Mentees through the RTP

As previously mentioned, LMICs share a research-knowledge gap and a lack of human research capacity needed to produce, conduct, and disseminate high quality research outcomes, strong enough to influence the development of chronic disease control strategies and to promote healthy food environments in the Region. From initial evaluations, it was inferred that all Fellows and Scholars started the RTP with noticeable research-knowledge gaps on many research key elements, especially regarding statistical skills. Traditional academic preparation in their home countries only included clinical rather than research training. Initial statistical and data management gaps was a heavy burden most Mentees had to carry throughout the RTP as could be appreciated in the following quotes:

Fellows:

“Thanks to Fernanda’s research acquaintances in other countries, we had the opportunity to be part of a Statistical Summer Course in Mexico City, this partly filled the initial statistical gaps we all had regarding general statistical matters; however, we are still having serious problems with data analyses” (Amarilys Alarcon and Emma Cosenza).

“Too much data was generated from my study.... I have no idea on how to prepare a plan of analyses...I don’t know which tables to use and show in my final report and which tables retain only as background data....I’m sending a constant bombing to my mentors with my flow of questioning, but at the end this is a new and a great learning experience for me, I am gaining a lot of knowledge from this” (Emma Cosenza).

Scholars:

“I am finishing my Masters’ Degree already, but on statistical matters I feel like a baby....I’m lacking lots of basic knowledge on the subject and this is making the analyses of data very difficult” (Irina Zamora).

“I’m losing valuable time and making lots of mistakes because I don’t know how to manage all the data generated from the field work.” (Ana Paula Cruz).

“Along the program I learned to use a huge amount of learning aids and resources to undertake self-directed learning, especially regarding statistical matters...this experience allowed me to have a growth in knowledge.” (Tatiana Gamboa).

However, it was interesting to notice that from the final CRAI evaluations (i.e., at the end of the RTP), all Mentees agreed that, after completing the RTP, their statistical knowledge had increased and they were able to do adequate statistical data analyses and discussion of outcomes.

Proper budget management was another key element of the RTP Mentees had to learn how to deal with. Each Mentee had to present a detailed item-wise breakdown of the budget along with proper justification for each item. Hence, the RTP provided the opportunity for Mentees to be the managers of their own research budget. This turn out to be a good learning experience to Mentees who have never before had the chance of managing a budget and making key budget decisions that could influence success. The Scholar Carmen Sanchez, for instance, was a clear example of this situation. Already on the field work and not as part of her initial research protocol, Carmen needed to develop a manual to serve as an on-line tutorial that helped participants better understand the correct filling up of the research instrument; this action however was a financial burden and a time consuming process, but necessary to prove if the instrument was useful. At the end, the tutorial was greatly helpful, therefore the last minute improvisation of the initial budget was correctly performed.

Additionally, the allowed budget also required to allocate a certain amount of the resources to hire research assistants (RA). To such regard, it was interesting to notice that being involved in the whole hiring process was a unique experience for all Mentees, since they had never been in charge of such procedure. It could be said that although for all Mentees managing a research team was a challenge, it was seen as a valuable research learning tool. More specifically, for some Mentees choosing the right research assistants was a new exciting and daunting experience, for others it was the result of an excellent team work since they shared the same RAs with a slight switch in methodologies depending on the research topic being considered. This situation was clearly laid down in the following quotes:

Fellows:

"I have 2 RAs and we are making a great team. They understand completely what I want to do and support me with the field work...I couldn't have chosen better RAs." (Amarilys Alarcon)

"I was lucky....I got to work with the same RAs that other Fellows had in their program. I started the RFP in September, I was already 5 months behind the other Fellows, so to have the support of RAs already trained to work with nutrition related topics was a plus. I really thank Amarilys and Emma for giving me so much help on this regard." (Andres Pineda).

Scholars:

"I asked Fernanda Kroker to accompany me in the RAs hiring process. I interviewed several candidates and was extremely happy to know that the finalists I chose coincided with those chosen by Fernanda....it was an amazing new experience for me....to have Fernanda's approval gave me so much confidence on my own judgement." (Irina Zamora).

"I never had to hire a RA before. To be present in the whole hiring process from beginning to end gave me lots of understanding on how crucial this process is if I want to obtain excellent outcomes" (Ana Paula Cruz).

"I couldn't find a better RA...Daniela was my perfect complement. We supported each other and discussed everything before taking actions, and even improvised when the occasion demanded it, ... I see hiring a RA as a form of mentorship, we learned so much from one another" (Carmen Sanchez).

Furthermore, it can be said that knowledge offered by the RTP provided a wide spectrum that cover not only mere scientific aspects per se, but also key negotiation skills needed to facilitate collaboration among research partners and allies, so as to make outcomes stronger and most striking.

Fellows:

“This is something I really appreciate from the program, without Violeta I wouldn’t have known how to write to a professor and if it was appropriate.”

(Andrea Aguilar, fellow 2015)

Scholars:

“I had been sending letters and calling the office of Dr. Adriana Blanco, an expert on Food Labelling in Costa Rica, asking her for help and advice regarding my research topic. I had a total rejection from Dr. Blanco. However, Fernanda Kroker came to Costa Rica and after meeting with Dr. Blanco, I was amazed at how easily Fernanda convinced Dr. Blanco of my true research intentions, and assured her that such intentions were good and transparent. From this meeting I realized that having excellent negotiation skills is a plus in this business. I learned that a high quality researcher must be tolerant, have excellent negotiation skills, never lose control, and have lots of patience.” (Tatiana Gamboa).

Other improved skills that few Mentees mentioned were English writing; leadership; teaching; mentorship peers; among others. Several Mentees had also pursued post-graduate studies abroad, either a Master program (five Fellows) and a PhD program (two Scholars). Workshops and courses on data analysis, abstract presentation and scientific writing, mostly part of other CIIPEC’s capacity-building research projects, improved Fellows and Scholars abilities, which they applied on their on-going research projects. These training opportunities were one of the most highly evaluated pros of the program.

One weakness that was noticed in most Mentees was the lack of manuscript writing experience. Time constraints and lack of English proficiency were two obstacles that were identified. Fellows and Dr. Castañeda, a program’s external advisor, have expressed that one year is too short a period of time to conduct a research project and publish the results. This issue has affected and seriously delayed the output related to publication of results in peer-reviewed journals. We implemented two strategies to overcome this limitation. We set one-week intense one-to-one work with those Mentees with greater potential to elaborate a scientific manuscript. We also organized a manuscript-writing workshop in Guatemala, in which all fellows and scholars were

invited. We invited Dr. Meredith Forth from the University of Colorado and CIIPEC's research associate, who was assisted by Fernanda Kroker and Ana Lucía Mayen (CIIPEC's post-docs). So far, several Mentees have an advanced manuscript, but it will take one or two more months for their submission to a scientific journal.

The Director of the Program (Dr. Manuel Ramírez) graded research outcomes from the last group of Mentees (year 4), as the best outcomes ever obtained since the beginning of the RTP. The professional dedication and commitment shown by each Mentee had led to high quality outcomes. A living proof example of this was the international recognition Fellow Amarilys Alarcón obtained at the American Society for Nutrition Congress in Chicago (2017), where she was rewarded with the "Community and Public Health Nutrition, Research Interest Section Travel Award for Outstanding Graduate Student and Postdoctoral Fellow Presentation". Scholar Carmen Sanchez was also invited and awarded to give a lecture and oral presentation at the Ibero-American Congress of Nutrition that will be held in Lima Peru next September. All Mentees had also been successfully disseminating their main research results, most of them in international scientific meetings (Annex 1). Overall, having the opportunity to disseminate their research outcomes in front of an international scientific audience and having to do it in a foreign language and country, definitively increased Mentees' confidence on their own capacities and broaden up their knowledge spectrum. In addition, the RTP had accomplished the objective of proper dissemination of outcomes, an action that in turn will be expected to have a significant impact on near future NCD risk factors regulations and policies in the region.

Finally, we could perceive and notice that Mentees shared important characteristics: they all are human beings with dreams, with a thirst for knowledge, and the greatest desire to fulfill personal and academic goals. For most of them, the RTP was a dream come true, like winning the lottery big prize, a once in a lifetime opportunity to do research in the best possible way, and a dozen more exciting comparisons. However, everyone agrees that being at the RTP and been mentored by highly recognized and prepared researchers, was definitively a plus for their academic career. The RTP let Mentees broaden their cultural and intellectual horizons by showing them how to set out goals and how to focus and work hard to achieve them, but most importantly, the

RTP showed Mentees how to be strongly confident in their own capacities to succeed and never give up to their dreams. The RTP was undoubtedly very meaningful for all participants.

The information gathered throughout the 4-year program was sufficient to provide a clear picture of the program's effectiveness and how it influenced not only Mentees' personal and professional life, but also its valuable input regarding research capacity in the Region. The Program's ultimate goal of creating a new generation of young researchers dedicated to influence, specifically, the development, prevention, and control policies in the Region of NCD and related topics was definitively achieved.

Increased effectiveness of mentoring as an approach to developing NCD oriented public health research professionals.

Each Mentee was appointed to two Mentors, one local and one from CIIPEC. In all Mentor-Mentee relationships, a very respectful mentoring interaction throughout the entire program was observed. Since the beginning, Mentees started to feel the strong and constant back-up of their Mentors who provided knowledge, guidance, support, advice, strategic feedback, and other relevant insights. As the program progressed, procedure doubts and obstacles emerged, so Mentees had to rely on Mentors from other institutions and countries. For example, Stephanie Vandevijvre from University of Auckland, New Zealand, was a key Mentor who assisted most of the year-4 Fellows and Scholars.

Having a junior mentor in the Fellowship Program, who was the direct supervisor of fellows and in charge of reviewing their proposals, protocols, abstract presentations, final report, etc. before the PI reviewed them, proved a cost-effective strategy, taking into account the low research profile possessed by individuals when entering the program. This strategy also permitted to strengthen the junior mentor's abilities concerning leadership and guidance to others. Another contribution, which accelerated manuscript publication applied with some Fellows, was selecting a young researcher or PhD student from US or Canadian Universities, who guided and enhance the scientific writing process along with the Fellow.

In addition, Mentors and Mentees did establish a reasonable and adequate schedule for the frequency of meetings. Since Fellows were all Guatemalan Mentees, they met with their Mentors once a week and received extra mentoring via e-mails or supplemented by constant telephone calls and Skype sessions. Scholars from other participating countries, also received weekly mentoring by all previously described electronic communication means, as well as by occasional local visits in their home countries, even after completion of their 12-month training period, particularly for manuscript writing support.

Throughout the Mentoring Program, Fellows and Scholars experienced and learned to have psychosocial support, career guidance, role modeling, and advanced communication skills. These features were definitively an addition to their intellectual strengths. Mentors were constantly pointing out and suggesting Mentees those areas where performance was positive and those in where improvement could be beneficial. Possible solutions were constantly explored with open minds, and the potential effects of the solutions were considered and evaluated, but most importantly, Mentors showed Mentees how to be self-taught. This clearly explained why Mentees perceived every single situation that occurred during the RTP as an awesome learning experience, as could be inferred from the following quotes:

Fellows:

“Everybody at the mentoring program gave me a polite and respectful approach. Everybody was always so nice to me...in all my years as a Medical Resident at the Hospital, I never met people who were so kindbeing at the RFP has been an amazing experience since the beginning.” (Amarilys Alarcon).

“The RFP not only fulfilled but in some areas it even exceeded my expectations. I learned to keep focus on my goals despite the heavy work load... at the end, I was amazed at the way my Mentors critically analyzed and gave me unthinkable options to present my outcomes so as to make them more attractive for key stakeholders.” (Amarilys Alarcon).

“Local mentor was key when solving initial problems with RedCap.... Fernanda provided me with unthinkable statistical options that accelerated my data intake and further analyses.” (Emma Cosenza)

“This Program game me the chance of working my own research project right from scratch... I am involved in every single step of the whole process... this project is like my baby and Mentors are teaching me how to take excellent care of it.” (Andrés Pineda).

Scholars:

“Mentoring in this program is INTENSE AND RELEVANT for the development of research abilities (continued academic and technological update, human resources management at different administrative levels, financial management techniques, etc.).” (Carmen M. Sánchez)

“This Program is unique and it is a way to capture Human Talent, ie., students who are really passionate about their research work, compare to those who do research only to meet requirements for their Degrees’ Thesis.” (Carmen M. Sánchez)

“This Program has taught me to look at different scenarios when looking for a solution.. there is always more than one creative way to find the correct answer.” (Tatiana Gamboa).

Additionally, it was noted that Mentors understood from the beginning that not every Mentee had an equal ability to cope with problems, and it was the reason why Mentors needed to be highly flexible with Mentees. By being familiar with the capabilities of each Mentee, Mentors were shown to be in a better position to offer assistance and guidance. To this regard, Mentors showed the ability to maintain an excellent balance between their obligations to provide an optimal mentoring experience, while at the same time remaining empathetic, understanding, and flexible with regard to Mentees' needs, as clearly pointed out by some Mentees:

“I am very satisfy with this program, it is providing me with the tools needed to perform high level research. Even though I had so much work undone, my Mentors are always there to encourage me to keep going...this makes me feel

extremely confident that although my rhythm or work is sometimes slow, things are being done the right way.” (Irina Zamora)

“I had felt welcome by my mentors... they are very picky and demanding regarding quality of results, but this turns out to be good for my preparation. I have been feeling lots of attention and concern towards my work and towards me as a human being; they had helped me to keep focus on my goals.” (Ana Paula Cruz)

“I was not used to work under so much pressure...from my mentors I had learned skills that would be a definite asset to my research work: Tolerance, Negotiation, how not to freak out, and tenacity which are tools needed to cope with present-day challenges.” (Tatiana Gamboa)

It is worth mentioning that besides research knowledge and adequate techniques per se, Mentees learned negotiation skills which will certainly be very useful in their future when trying to present research projects or ideas to colleagues and/or institutions, or when having to convince a committee to provide the needed grants. This situation was clearly exemplified by the Scholar Tatiana Gamboa: Tatiana was very thankful to Fernanda Kroker who accompanied her to INCIENSA and talked to Dr. Adriana Blanco about the RTP and cleared out the purpose of Tatiana’s research. Tatiana considered this meeting as mutually beneficial for INCIENSA and for the RTP. From this meeting Tatiana recognized the importance of having excellent negotiation skills that inspired trust on both sides of the deal.

Another outcome of Mentoring that is important to be mentioned, is that of Mentees learning to push up to their limits and beyond if a goal was to be reached. The interest and the support provided by Mentors allowed Mentees to have confidence to undertake new and exciting challenges. This situation was clearly exemplified when Mentees had the opportunity to experience, from first-hand, what “research rushing” really means, especially with regard to submission of research abstracts for consideration at an international congress:

Fellows:

"I couldn't believe my research abstract was sent for Congress admission on time....we only had a few days to prepare the abstract and we did it!!!.... This was possible thanks to my Mentors' great support. They encouraged me to prepare the abstract, they reviewed it and together we made the needed corrections until it felt adequate. What really amazed me was the turn mentors gave my abstract to make it look more attractive for NCD researchers and policy makers, something I could have never done by myself, it was an excellent learning experience." (Amarilys Alarcon)

"I was running out of time regarding my abstract being sent to an international congress, to meet the deadlines for submission was really tough. Both my mentors pushed me to have the abstract ready for submission. Mentors reviewed my abstract several times until it looked and felt correct; it was hard work, lots of reviewing and correcting. At the end, my abstract was sent for admission right on time. Mentors' assertive guidance and my best effort made a great team. This was a tough but gratifying experience." (Emma Cosenza).

Furthermore, from the Mentors' Evaluation reports it can be said that the Mentoring Program showed to have positive effects not only for Mentees but also for Mentors. The Mentoring Program allowed Mentors to experience enhancement of their own personal and professional knowledge while teaching and learning from each Mentee. As pointed out by the local Mentor, Dr. Fernanda Kroker: "Mentoring is a unique opportunity to strengthen knowledge translation and promote the continuation of formal post-graduate programs abroad; mentoring is an art that has to be developed by researchers and by doing it correctly, it adds confidence to both the Mentor and the Mentee". Furthermore, working with a Mentee also gave Mentors the opportunity to gain a new talented colleague—one with whom the Mentor may have a close collaborate in the near future. For example, Scholar Tatiana Gamboa was selected immediately as her training finished as Project Director in Costa Rica for a new project that INCAP is implementing in that country. Equally important, Mentors were provided with a significant sense of satisfaction by contributing to create a new generation of young NCD researchers in the Region. To such regard, Local Mentor Dr. Melissa Jensen pointed out

the significance of the RTP as a way to support collaborative research training among Central American LMICs and expert researchers in Mexico, Chile, Brazil, and Australia. The networking obtained from the RTP certainly aimed to sustainably strengthen the research capacity of the LMICs by training in-country experts to conduct research on NCD topics, with the ultimate goal or vision of implementing evidence-based interventions relevant to their home countries. Additionally, it was interesting to notice that all professionals who have agreed to be Mentors showed strong commitment to the process and at the end of the Program, they all were very interested in using Mentoring as an alternative teaching method (as expressed by Fernanda Kroker, Melissa Jensen, Sylvia Vargas).

The involvement of local universities in the Scholarship program allowed strengthening local mentors' capacities, improved the quality of students' thesis, and prove to be an opportunity to create or enhance institutional relationships between universities, INCAP and other research institutions. It was also an opportunity for the University of Costa Rica, for example, to exercise its role as a provider of scientific evidence to national authorities, who need it for decision making concerning a health priority (food environment) in the country, as reported by one local mentor.

Thus far from collected data and personally observed situations, it can be said that although there were unintended problems along the RTP that at the end provided options for future improvement, Mentoring per se definitively helped build a dynamic community and this ensured the success of Mentees as they moved forward professionally and increased confidence in their own abilities. The pattern of regular contact of the mentorship relationship; the level of adherence to the mentoring program structure; the level of satisfaction and commitment with regard to several aspects of the programs by both Mentor and Mentee; the Mentees personal experiences and perceptions during the program; the level of effectiveness of mentoring as a tool for research capacity building and academic development and advancement; and the level of impact of research outcomes were all measureable outcomes for evaluating the positive achievement of the Programs' goals by means of an adequate Mentoring Process.

Improved networking and collaboration among researchers, policy-makers and practitioners on NCD issues to facilitate Knowledge Translation.

Throughout the RTP, it was notorious the alliance being formed among policy-makers and Mentees. In such respect, it can be said that research capacity was increased by means of the RTP since knowledge translation or the translation of research knowledge into improved health, was clearly observed as research outcomes were used to propose changes that will facilitate transfer of good practices, and suggest improvement regarding monitoring and ultimate control policies of NCD. This point was notably evidenced when outcomes from two Fellows were used as relevant country-evidence to rate the proper functioning of current Food Labeling Regulations in the Region:

Fellows:

“My research outcomes will be used in the Workshop of Technical Regulations of Nutritional Labelling in Central America and Dominican Republic, as country-evidence of how regulations regarding Nutritional Composition of Processed and Ultra processed foods are being currently managed. But most important of all, these outcomes will probably be used to propose positive changes in the subject.”
(Amarilys Alarcon).

At the same Regional Workshop, Andrés Pineda’s research outcomes will also be used as evidence of how Front-of-Package Nutrition Labelling is currently presented in the Region and to provide innovative approaches that could help consumers choose healthier diets.

Regarding improved networking, it is worth mentioning that throughout the RTP there were noticeable increased personal interaction and valuable collaboration among the Mentoring Programs Director, Fellows, Scholars, NCD researchers, Senior policy-thinkers, and key stakeholders across different government and private sectors. This was evident in the following quotes:

“Participation at the National Commission of Non-Communicable Diseases and Cancer allowed me to have a close relationship with stakeholders who at the same time are the key actors for the Food-Epi study in Guatemala.” (Carmen M. Sanchez)

“Assertive communication with governmental officials and civil society members motivates the cooperation with my research study, at the same time this facilitates my work and makes me experience relevant networking, which hopefully will be useful in future joint projects and during the elaboration of health related policies.” (Carmen M. Sanchez)

“By having a close virtual communication with similar research teams in Mexico and Chile, I have strengthened the development of my Food-Epi evaluation instrument and this had sped up the process of adjusting the INFORMAS protocol to Guatemala.” (Carmen M. Sanchez).

“A transcription of an informative video of Boyd Swinburn regarding the proper use and interpretation of Benchmarks and Food-EPI was sent to research team in Mexico, this with the purpose of working in partnership to achieve the goals proposed by INFORMAS and to be able to compare Benchmarking and Best Practices used in Mexico to those used in Guatemala.” (Carmen M. Sanchez)

“Constant communication and information sharing with Stephanie Vandevijvere from INFORMAS New Zealand, allowed us to notice important comparisons between New Zealand and Costa Rica, this provided a wider spectrum of how differences due to geographical, cultural, and environmental factors affect healthy food environments surrounding school settings.” (Ana Paula Cruz)

“Once people working at INCIENSA in Costa Rica understood the vision of the RTP and the extremely valuable information it can deliver and share once its different projects are completed, the help and collaboration from them, specially from the team of Dr. Adriana Blanco, was magnificent.... they realized that by sharing important information and working together towards the same goals everyone benefits from it.” (Tatiana Gamboa)

Moreover, the decision that all fellows and scholars worked in the same topic during year 4 (food environment measurements using INFORMAS initiative tools) increased the potential of the research performed, since the integration of results of all studies allowed to show a more comprehensive picture of the food environment situation in Guatemala and Costa Rica. For example, we organized dissemination seminars in

which academic, civil society, and governmental authorities participated and policy briefs were distributed (Annex 2). The junior mentor and the program Director have also been invited to present the results on food environment in high-level scientific and policy-makers meetings in the next couple of months. For example, Dr. Ramirez will make a presentation on those results at the INCAP's Consultative Council meeting and the Technical Commission of Chronic Diseases and Cancer on September 11 to 13, 2017. Both meetings will have high-level representatives of all Ministers of Health from the region. Furthermore, Dr. Ramirez will present the same results in a symposium at the International Nutrition Congress to be held in Buenos Aires (October 15-20, 2017). Finally, databases that contain the food environment data collected were shared to INFORMAS initiative coordinators, so the data can be included in the global database. We have collaborating plans with them, in which we will contribute in the elaboration of scientific manuscripts using the collective data from Latin America (i.e., Fernanda Kroker will lead a paper on results of the Healthy Food Environment Policy Index collected in Mexico, Guatemala, Brazil, and Chile) and the world. The junior mentor F. Kroker gained mentoring experience and leadership skills and now it is recognized as a lead researcher of the INFORMAS network in Central America. She has been in continuous contact with Dr. Stefanie Vandevijvere from the University of Auckland, who is overseeing INFORMAS efforts worldwide and providing technical support to implement protocols and write manuscripts. Given her expertise on food environment monitoring within the INFORMAS network, Fernanda Kroker was asked to co-lead the Food Environment core of the Latin American Urban Health network in partnership with Drexel University. Dr. Kroker has also been awarded by the NIH/Fogarty Fellowship program that has granted seed funds to continue efforts on monitoring food environments in rural communities in Guatemala. During this fellowship, Dr. Manuel Ramirez and Dr. Aryeh Stein from Emory University will mentor her.

Policy-makers and practitioners have initiated and have responded positively to collaboration with the RTP and their respective mentees and mentors in a widening variety of NCD research areas. Research outcomes from RTP will probably allow to better monitor and enforce issues related to NCD, as well as to permit authorities to have the necessary evidence and power to make the correct decisions and changes,

and consequently to improve people's nutritional well-being. Furthermore, it can be said that Mentees from the RTP were increasingly well linked into the wider NCD community and that this ongoing close collaboration and information sharing among all involved NCD researchers and Mentees were certainly, the best options for further benchmarking and best practice for healthier food environments and smoking restrictions in different countries. Finally, it is important to mention that if publication of all Mentees research outcomes can be achieved over a short period, knowledge translation would definitively be facilitated and this will at the same time allow to monitor and to follow any progress over time, within countries, between countries, and at a regional level.

In summary, this RTP has increased the visibility of CIIPEC/INCAP among academic institutions in the Central American region. The postgraduate programs of the collaborating universities now recognize CIIPEC as a research institution with which they can collaborate and introduce the mentoring concept in the area of NCD research. We hope that in the near future, we might have collaborative projects with them, other than the work done by scholars.

VI. Methodology

We tailored this program based on the IDRC previously funded “Chronic Disease Control Research Fellowship Program”. Our Program aimed to provide the skills and tools at the personal, workload, supervisory, and systems elements of systemic research capacity building.¹³ Our proposed training program had two interconnected components, one targeting recent graduate students in Guatemala (Fellowship Program) and one targeting postgraduate students enrolled in a master’s degree in Central America (Scholarship Program). Both programs were based on the selection of the best candidates, the co-mentoring, research training opportunities throughout the duration of the scholarship and mentoring for the publication of reports and scientific articles.

The Fellowship Program in Guatemala

The NCD Research Fellowship Program aimed to provide a formal, structured mentoring opportunity for recent health sciences graduates from Guatemala, seeking research training and implementation experience before pursuing further academic, clinical or

research training. The program also included research and mentoring support to an internal medicine residency program in Guatemala in order to introduce the concept of research mentoring. The program allocated time and resources for training two research fellows and one internal medicine resident at Roosevelt Hospital each year in proposal writing, research implementation and knowledge translation and exchange. Residency programs in Guatemala are clinically oriented, ignoring the relevance research has on clinical decision-making and quality of care determinants. Nevertheless, internal medicine residents were required to complete a research project during the 3 years their training lasts. Dr. Mejia, Chair of the Department of Medicine, organized in year-2 a couple of sessions with the residents so that we could present the scholarship and get applicants. Unfortunately, we did not get any positive response from residents. Therefore, after discussing with Dr. Mejia he suggested to contact directly one third-year resident that he considered could be interested. In year-3 of the study was decided to discontinue this component of the program due to lack of interest by Internal Medicine students.

The Program sought to recruit through a competitive process, recent medical, nutritional sciences, and medical anthropology graduates who were interested in pursuing a one-year research fellowship. A committee from UNICAR (up to year 3); the Institute of Nutrition of Central America and Panama/Comprehensive Center of the Prevention of Chronic Diseases (INCAP/CIIPEC for its acronym in Spanish); IDRC; and the Senior Advisory Committee selected the fellows. The Senior Advisory Committee included:

- Scott Leatherdale, PhD. Associate Professor and Cancer Care Ontario Research Chair. University of Waterloo School of Public Health and Health Systems. Ontario, Canada.
- Robert Geneau, Ph.D, International Development Research Centre, Ottawa, Canada.
- Jaime Miranda, MD, Ph.D., Universidad Peruana Cayetano Heredia, Lima, Peru.
- Silvia Castañeda, MD, Landivar University MPH Director, Guatemala
- Eduardo Palacios, MD, National Chronic Disease Control Commission. Coordinator. Ministry of Health. Guatemala.
- Carlos Mejia, MD, Roosevelt Hospital Internal Medicine Program. Director

- Aldo Castañeda, MD, PhD, Cardiovascular Unit of Guatemala (UNICAR). Pediatrics Director.

Each year, after the list of applicants had been narrowed up to four applicants, they discussed with members of the Committee and if appropriate interviewed by one of them in order to select the two fellows. The Roosevelt fellow was chosen in coordination with Dr. Mejia. Selection of fellows were made based on the following criteria:

1. Academic achievement through their current or previous studies.
2. Quality of their statement of purpose.
3. Interest in NCD prevention and control (particularly population-based approaches versus clinically oriented) research and public health.

In addition to academic criteria, other non-academic criteria were considered in selecting the fellows, as follows:

- Strong social commitment.
- Interest in decreasing the rich-poor gap and in community medicine more so than patient-centered medicine.
- Commitment to learn, but also to become a mentor in the future.
- Basic proficiency in written and spoken English.
- Willingness to collaborate with other researchers and lead a field-work.
- Openness to receiving and providing constructive criticism.
- Enthusiasm to learn new things, including non-research related topics.

Each call for applications was issued in the month of December for two fellows to begin in February of the following year. We used several channels to disseminate our call for applications (INCAP/CIIPEC website; Guatemalan Association of Nutritionist mailing list; UNICAR website, Facebook, posters in the main teaching hospitals and universities).

Following the initial two months during which the fellows went over the required reading, each fellow wrote a research protocol that was implemented during the last 10 months of the one-year fellowship, under the supervision of Ms V Chacon or Dr. J Barnoya in the first three years, and Dr. F Kroker and Dr. M Ramirez thereafter. Research themes were selected after several brain storming meetings with the program director. Fellows were required to read the WHO NCD “Global Monitoring Framework” document

in order to have their projects be policy relevant.¹⁴ After narrowing down the topics, they discussed them with the Senior Advisory Committee. Through the Committee and our established network, we also identified experts in the selected theme to work with the fellow and providing career advice. Protocol writing was done according to the IDRC proposal format, including budget, and each proposal was required to fully address gender and ethical considerations. Once completed, the protocol was subject to internal peer-review with the Senior Advisory Committee. Once reviewed, the fellow addressed the reviewers' comments under the supervision of the mentors. After these final comments were addressed, the project was considered approved and ready to be implemented. Activities included protocol writing, developing and adapting questionnaires, interviewing, data entry and analysis, and research-to-action, including publishing and presenting results to different target audiences in appropriate formats. Each project contained its own research-to-action/ dissemination strategy and funds were allocated within each project for that purpose. Research-to-action activities included seminars, policy briefs, meetings with policy-makers or parliamentarians, report writing, conference presentations, and peer-reviewed articles.

The Postgraduate Scholarship Program in Central America

The Postgraduate Scholarship Program focused on directly providing the tools and skills to postgraduate trainees within academic institutions in order to strengthen NCD research capacity at the local and regional level and indirectly enhance the structures, systems, and roles of regional universities. This program emphasized capacity building at the individual level. The proposed Scholarship Program included six countries and mostly recruited students who were in the final stages of their master's degree in health and other allied sciences. They were committed to have at least a presentation at an international conference and ideally a peer-reviewed manuscript. The program also emphasized institutional capacity building, bringing the opportunity to recruit a faculty who has mentoring and research dissemination skills. The Scholarship Program also had an on-site mentor overseen by a CIIPEC mentor. As a result, the idea was to increase the mentoring capacity at the host institution at local universities, as the student thesis supervisor served as a mentor. To further increase the mentoring capacity, mentors were required to complete a list of mandatory reading pertaining to mentoring.

Through the recruitment and mentorship of postgraduate research trainees, we aimed to undertake research on policy relevant issues and translate knowledge into action. Students enrolled in Health Related Master programs and interested in NCD, from either Guatemala, Nicaragua, Honduras, or Costa Rica were recruited through annual request for proposals (RFP), with specific rules and expectations. We did not succeed on recruiting students from El Salvador or Panama. Of the awards granted per year, at least one was based in Guatemala, except in year 3 where there was no scholar from that country. The other selected scholars were from the other countries (two in years 1 to 3 and three in year 4).

Each call for applications was issued in January-May for scholars to begin one-two months later. We used several channels to disseminate our call for applications. All directors of postgraduate programs identified in the region were contacted by email and phone calls, by the program coordinator and project leaders. The call for applications was sent to the Director of each program identified, who disseminated the information to faculty members and students. We also posted the call at CIIPC's website and facebook. After its dissemination in year-1, follow-up via telephone was made to each Program's Coordinator to explore how the process was taking place inside the university and to solve possible doubts. At the end of the process we had few applications, which complicated the selection process. For the following years, in-person visits to all Master programs were another strategy to disseminate the call. In those visits, the program was presented to the Master's program Director and to enrolled students.

After the third call for applications, it was decided that G Mejicano and M Ramirez focus their visits to those postgraduate programs that we have identified as the most promising to send applicants, and that they should have a meeting directly with the Master students from each university. Two issues worth it to note that emerged from those meetings with students were that few students were interested in doing a thesis on NCD prevention and that English proficiency is a barrier. The first issue might be likely related to the still low emphasis and relevance given to this topic in the postgraduate programs and in general in the health sector.

As with the fellowship program, scholars were required to read the WHO NCD "Global Monitoring Framework" to narrow down their topics.¹⁴ Those topics were policy or

clinically relevant and, when possible, on the universities' research priorities. As with the fellowship program, the Senior Advisory Committee were involved in topic selection. Through CIIPEC partners and the "Network of Research Institutions in Chronic Diseases" (RIIEC for its acronym in Spanish), we identified candidates. The MPH program directors were involved in scholar selection as the first screening process, followed by the CIIPEC's coordinators (Ramirez-Zea and G Mejicano) and ultimately the Advisory Committee. Applications included in their initial requested documentation, a statement of career interests and goals, curriculum vitae, official University transcripts, proof of basic English skills, two letter from referees and a sponsor letter from the Research Director/Coordinator of the institution stating the interest of the institution of the applicant's participation in the program. English skills were required given that this language is the most commonly used to publish in the academic literature and some courses might be in English. However, local dissemination was expected to be in Spanish and according to the educational level of the target audience. Additionally, applicants were asked to send a *preliminary* (250 word limit) project proposal including Background, Objective, Methods, Expected Results, and potential outcome. After a first screening, applicants were interviewed in person, via Skype or telephone by the project leaders (Ramirez-Zea, Barnoya, Mejicano). A twelve-month scholarship was offered to each trainee and a local as well as a CIIPEC's mentor were assigned, based on common interest (peer-based research). Candidates were selected based on their competencies and interest in pursuing a research career, independently of their country of origin, in order to achieve the general objective and therefore be able to obtain the best results out of the program.

In order to integrate efforts around a similar area of work to generate stronger policy relevant evidence leading to NCD prevention and control in Guatemala, fellows and scholars worked on developing and implementing a module of the initiative INFORMAS. The International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) is a new global network of public-interest organizations and researchers, which aims to address the gap on food environments and policies through monitoring, benchmarking and supporting public and private sector actions to create healthy food environments and reduce obesity, NCD and their related inequalities (15).

INFORMAS was founded in November 2012 and the 14 foundation papers describing INFORMAS and its 10 monitoring modules have now been published and contain literature reviews, monitoring frameworks and proposed indicators for the 10 modules, plus the plans for knowledge translation and action support within countries to improve the healthiness of food environments (15,16-27). We mentored each fellow and scholar to develop his/her study protocol around an INFORMAS module. After an extensive literature review on INFORMAS modules, Mentees had the opportunity to choose a research topic related to the creation of healthy food environments and reduction and control of NCD and their health-related inequalities within their home countries.

The program relied on a local on-site mentor and a CIIPEC mentor. The local mentor was affiliated with the university where the student was enrolled. This mentor was required to have previous experience in thesis development and implementation. Responsibilities of the local mentor included:

- Assist the scholar in theme selection, protocol writing, and project implementation, analysis and dissemination
- Assist the scholar in a local and international knowledge-translation plan
- Meet, at least, on a weekly basis with the scholar
- Provide career advice to the scholar
- Discuss, via skype, telephone or in-person, with the CIIPEC mentor scholar's project and career progress.

Regarding CIIPEC's mentors, their responsibilities and duties were:

- Overseeing the postgraduate scholarship program (Dr. Ramirez-Zea)
- Coordinate scholars and local mentors selection with MPH program directors and senior advisory committee
- Travel to each of the participating countries to disseminate the scholarship program
- Assist the scholar and local mentor in theme selection, proposal writing, project implementation, analysis and dissemination.
- Meet on a weekly basis via skype or in-person with the scholar and mentor, together and each one separately to assess project development and mentor-mentee progress.

- Advise the scholar and local mentor on their future research career plans and help in building their own research network through CIIPEC.

The on-site mentor mostly undertook project supervision, while scholarship and career progress by the CIIPEC mentor. To select the on-site local mentor, we relied on the Master program director or Research Coordinator from the host institution and the trainee to make the choice.

Our proposed scholarship program was innovative for these Central American countries in at least two ways. First, we provided trainees with funds to adequately allocate time for research design, implementation, and dissemination. Therefore, trainees had the opportunity to dedicate at least half time to their master research work. Second, we aimed to develop strong ties between the mentors (local and at CIIPEC) and mentee that were based on common research interest but went beyond the postgraduate research work into career advice and network building. Accordingly, our program supported research stipends and expenses, and dissemination costs (US\$ 6,500 maximum budget). Activities included protocol writing, recruiting research assistants, developing and adapting questionnaires, interviewing, data entry and analysis, and knowledge-translation, including publishing and presenting research results to different target audiences in appropriate formats. Each project contained its own knowledge-translation/dissemination strategy. Knowledge-translation activities included policy briefs, meetings with policy-makers, report writing, conference presentations, and peer-reviewed articles. In addition to the work from their thesis, trainees had access to all training activities organized by CIIPEC. During the initial two months in the program, trainees wrote a full research protocol to be implemented during the next 10 months, under the mentorship of the local mentor and supervised by the CIIPEC mentor. All scholars were able to choose their research theme, wrote their protocol and get IRB approval within the first three to four months of the program. Regarding field-work, it ranged from 2 to 5 months, allowing enough time for results analysis and dissemination during the last 3 to 4 months. Every protocol was submitted to the local institutional review board (IRB) to guarantee protection of human subjects. After this process was completed, the protocol was implemented with the approved budget. Budget expenses were disbursed as needed and according to the protocol timeline.

Trainees spent at least three days at the beginning and at the end of the scholarship at CIIPEC. The local mentor also participated in the three-day meeting at the beginning of each scholarship. Periodic follow-up virtual sessions (at least weekly) were carried out between each trainee and his/her mentors. Once fieldwork was underway, the team kept close contact via Skype and site visits by the CIIPEC's mentor.

Training

Trainees from the Fellowship and Scholarship Programs had access to all training activities at CIIPEC. Even though some fellows had basic biostatistics and epidemiology knowledge, we provided them with statistical and other supporting textbooks. Fellows were also allowed for a limited number of courses related specifically to NCD research and control. Fellowship and Scholarship Programs included NCD research workshops; monthly Journal Club sessions; and Webinars. To guarantee adequate protection of human subjects, fellows in both programs and research assistants required to take the US National Institute of Health "Protecting Human Research Participants" (<http://phrp.nihtraining.com/users/login.php>).

Monitoring and Evaluation

We used few evaluation tools to obtain detailed information on Mentees' experiences throughout the length of the program. We allocated funds to hire someone for continuous program evaluation. Expected outcomes were measured at the individual and organizational levels. Most of these tools were specially adapted to fit the nature of the program. The Clinical Appraisal Inventory (CRAI), for instance, is a survey tool used with Clinical Fellows at Washington University in St. Louis. In this case however, the CRAI was modified to be adequate for monitoring and evaluating performance. The CRAI evaluated the Mentee's ability to perform and his/her degree of confidence in doing several research tasks such as conceptualizing, designing, planning, and funding a study, level of collaboration with others, protecting research subjects and responsible conduct of research, and ability to interpret, report and present research data. The CRAI used a numeric scale from 1 to 5 to describe the Mentee's level of confidence in performing each research task. Mentees were asked to complete the CRAI at the beginning of the Program and once again at the end of it to allow for comparison of outcomes.

Monthly reports were also gathered the first week following the reported month. These reports contained a special column where Mentees were asked to describe any personal experience (positive or negative) they had encountered during the development of the Program. Mentees were also asked to describe the main factors that benefit or obstruct the application of their research protocol. A mentors' final appraisal report was obtained from each mentor, and for those students who had the opportunity to disseminate their research outcomes in an international congress, a post-congress experience report was required.

A Performance Monitoring Framework (PMF) was another tool used to document the level of impact of the program. The PMF integrated adaptations from Outcome Mapping strategies and was specially designed to evaluate Mentees' development throughout the Program. Outcomes were categorized into ultimate goal (ie., the Program's vision), and long, middle, and short-term outcomes. In each outcome, a progress marker was employed to facilitate its identification as it emerged. Outcomes documented in the PMF provided a detailed history of achievements during the program and outlined those areas in which accomplishments were positive, as well as those in which corrective actions or proactive improvements were required and suggestions thereon were welcome. The PMF allowed judging the success of the activities by being associated with program quality, therefore providing accountability and feedback for funding agencies and key decision-takers.

A questionnaire regarding Mentees' direct experience with their Mentors was provided at the end of the program. In a numeric scale from 0 to 4 Mentees had to grade several behavioral aspects such as: learned behaviors, emotional behaviors, career progression behaviors, and successful/failed mentoring relationships. Mentees' acquaintance with the term "Knowledge Translation" and how it can be applied in their future professional life was also evaluated by means of a specific questionnaire.

A Mentors' final appraisal report was obtained from each Mentor, and for those students who had the opportunity to disseminate their research outcomes in an international congress, a post-congress experience report was required.

Finally, monthly Skype sessions as well as personal meetings took place between Mentees and the External Evaluator to discuss monthly reports or anything considered as important to be acknowledged.

An efficient and close administrative support to fellows, scholars, mentors and PI's by the administrative assistant was a crucial aspect for the correct and timely execution of the budgets.

After concluding the scholarship program (April 2017), we did an evaluation of the program with all participating Scholars throughout the project. The idea was to evaluate capacity building at the individual level, and more importantly, at the institutional level. We interviewed the director of each master program, all faculty who participated as local mentors, and few scholars.

VII. Project outputs

We planned to recruit two research fellows per year in Guatemala (n=8); one research fellow from Hospital Roosevelt per year beginning in year 2 (n=3); and three research scholars in years 1 and 2, and four in years 3 and 4 (n=14) from six Central American Countries (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama). Ten research fellows were recruited, but only eight completed the 12-month fellowship. One fellow left the RTP before since she started a Master program abroad (Mexico); the other fellow was recruited late and he was able to complete a 9-month fellowship. Only one research fellow from Hospital Roosevelt completed the RTP. As stated before, in year-3 of the study was decided to discontinue this component of the program due to lack of interest by Internal Medicine students. Finally, 12 research scholars (3 from Guatemala, 2 from Honduras, 3 from Nicaragua, and 4 from Costa Rica) and their local mentors completed the 12-month scholarship (Annex 1). We could not recruit scholars from El Salvador and Panama, even though the same recruitment efforts were exhausted as in the other countries. In year 2, we recruited only two research scholars of the four planned, due to lack of enough qualify applicants. All research scholars were from the same university in each country, but Guatemala (two from Rafael Landivar University and one from San Carlos University).

Topics chosen by fellows and scholars were 70% related to nutrition/physical activity/body weight; 17% to smoking; and 13% to other NCD themes (Annex 1). All research fellows completed their Master program and their thesis work, supervised by their local and CIIPEC's mentors. Most research fellows and scholars (83%) were able to present the main results of their study in an international scientific meeting. However, only 13% were able to publish their work in a peer-reviewed scientific journal. Efforts will continue to support fellows and scholars to submit their manuscript to a journal. Indeed, after the manuscript-writing workshop, we have assigned CIIPEC's researchers with previous experience in scientific publication to all scholars and the last cohort of research fellows for working in their publications. We believe that up to five manuscripts will be submitted to a peer-reviewed journal by the end of 2017.

This project was granted before IDRC's Open Access Policy, which took effect on July 2015. Gray Literature will be uploaded to IDRC Digital Library, as stipulated with IDRC's grant signed since 2008. Other project outputs (interim reports, final report) will be uploaded to CIIPEC's website to make them open access.

VIII. Problems and Challenges

Few problems and challenges during the program worth sharing for futures opportunities concerning strengthening research capacities in Central America are:

- 1) **Lack of interest on research and on NCD prevention.** Insufficient involvement of local universities in a couple of countries (El Salvador and Panama) and other institutions (Hospital Roosevelt) was a challenge during the RTP. There was a general lack of interest in research showed by Internal Medicine residents at Hospital Roosevelt. Residency programs in Guatemala are clinically oriented, ignoring the relevance research has on clinical decision-making and quality of care determinants. The amount of applicants each year was lower than expected; even we did not have any applicant from one country (El Salvador) and no good candidates from another country (Panama). Two issues worth it to note that emerged from meetings with students from different universities were that few students were interested in doing a thesis on NCD prevention and that English proficiency was a barrier. The first issue

might be likely related to the still low emphasis and relevance given to this topic in the postgraduate programs and in general in the health sector.

- 2) **Multiple deficiencies in Mentees skills for doing research.** Traditional academic preparation at universities in the region only includes clinical rather than research training. Initial statistical and data management gaps was a heavy burden most Mentees had to carry throughout the RTP. However, all Mentees agreed at the end of the RTP that their statistical and research knowledge and skills were greatly improved. Another challenge for the RTP was the lack of writing skills for scientific manuscripts among all Mentees and even among Mentors. Time constraints and lack of English proficiency were two obstacles that were identified. We implemented two strategies to overcome this limitation. We set one-week intense one-to-one work with those Mentees with greater potential to elaborate a scientific manuscript. We also organized a manuscript-writing workshop in Guatemala, in which all fellows and scholars were invited.
- 3) **Few scientific publications at the end of the RTP.** During the development of the program, some of the difficulties that emerged was regarding to the follow-up to former participants of the scholarship program for publication of their research findings. The follow-up to Scholars and Fellows for manuscript publication was complicated due mainly to low skills on data analysis, interpretation and scientific writing and that it implied time dedication for manuscript writing after completion of the scholarship, when most of them were already involve in an academic program or full-time job. Several Scholars and Fellows reported that a one-year scholarship was a too short period for research design, implementation, data analysis, interpretation, and manuscript publication. We will continue motivating all Mentees to complete this task at the short-term.
- 4) **Withdrawal of the Project Leader and the junior mentor of the fellowship program.** Building partnerships and strengthening the research network in Central America was one of the objectives of our Program. Regrettably, due to matters not related to the project, the project leader (Joaquin Barnoya) had to leave the RTP on December 2015. Fortunately, ties were kept among most institutions and researchers involved in the study. Since January 2016, CIIPEC/INCAP took the lead of all activities related to the project (fellowship and scholarship programs) and the new project leader

became Manuel Ramirez. This change was taken as an opportunity and facilitated the interaction of this project with other on-going projects led by researchers at CIIPEC and allowed to direct research topics to the INFORMAS modules, after IDRC's approval. Therefore, the last group of fellows and scholars all worked an INFORMAS' module in their own country. This was an excellent opportunity to provide a stronger body of evidence about food environment in the Central America Region. It also provided the opportunity of new links with recognized researchers from the University of Auckland in New Zealand and other institutions in the Latin America Region, which were working in the same modules, and gave fellows, scholars and INCAP international recognition as pioneers working on a topic of worldwide interest.

- 5) **Communication challenges.** The Scholarship Program was a positive learning experience. However, it was difficult to establish constant communication with the scholars and keep track of their progress, particularly with the evaluation expert. One potential reason was that this type of evaluation process is not common and Mentees were not aware about its importance. This issue improved on time by several strategies taken by the evaluation expert (i.e., he/she was introduced to all scholars and local mentors during their visit to Guatemala and his/her responsibility clearly stated, the importance of the evaluation process and how their information is useful in providing feedback).
- 6) **Mentoring challenges.** There were some problems regarding mentoring that needed to be solved. It is worth mentioning that there was one special problem encountered in the RTP that if not corrected in time, it would have hindered the fostering of good relations between Mentor and Mentee and consequently the quality of research outputs. To such regard, there was the particular case with the Scholar Tatiana Gamboa: Tatiana felt she was receiving inadequate direction from her CIIPEC Mentor, Tatiana felt a mismatch between her and the Mentor. She expressed that initial coaching and guidance from her Mentor was too little, not close to what she was expecting from a highly recognized research program. Dissatisfaction and confusion left Tatiana to flounder and inhibited her from moving forward. However, as soon as the Director of the Program, Dr. Manuel Ramirez, heard about this situation, he stood up and took immediate actions. A new CIIPEC Mentor was rapidly

assigned to Tatiana. Tatiana was extremely grateful to every person at the Program for listening to her and providing a quick solution to her problem. Tatiana was not only assigned to a new Mentor, but also to a person with whom she shared similar areas of scientific expertise and therefore, had similar points of view as clearly expressed in the following quote:

“I felt really sorry about my initial CIIPEC Mentor, he was very nice to me at all times, but I was not satisfied with the amount of guidance and back-up received from him... It was really amazing how fast I got a new Mentor, and to my surprise and delight, this time I did not just get a highly recognized researcher as a Mentor but also a Nutritionist.... we have so much in common.” (Tatiana Gamboa).

It is important to notice that while finding a mismatch was regrettable, it was a problem that in this particular occasion was discovered early in the relationship and was quickly solved due to the Scholar's courage to speak out and the good relationship of trust with the Director of the Program. It can be concluded that courage, trust, and willingness to do things right are key factors that can affect personal satisfaction, career development, as well as research outcomes in a Mentoring Program.

Although most local mentors have been working in public health for many years, their experience on mentoring was very limited. One mentor referred that this program allowed her to gain more experience in the field and that she will use this with her students in Nicaragua. To improve the mentorship process of local mentors, we continued providing mentorship skills to local mentors throughout the 12-month period of each scholarship.

From a short-term perspective, building research capacity has been achieved judging by the fellows' projects, growing interest in the Program, and building a research network within participating universities and on this unique opportunity with the INFORMAS network. Although evaluating the mid- and long- term impact of the mentoring relationship and this Program is an ongoing process, we have made considerable progress. Regarding the country's research capacity, impact at this level will require more time.

IX. Administrative Reflections and Recommendations

Evaluation allows to continually improving the RTP. Evaluation is not just about demonstrating success, it is also about identifying why things don't work the way they were expected. As such, identifying and learning from mistakes is one of the key parts of evaluation. To such regard, the following is a list of significant lessons learned from the RTP and relevant suggestions that should be taken into account to improve the quality of the program if it is considered to be offered again in a near future:

- ❖ The RTP is beginning to be recognized in a variety of health related settings; however, it should have a more aggressive advertisement campaign that clearly shows all its advantages and returns at local universities and health related organizations.
- ❖ At the beginning of the Program, high quality research knowledge was missing from the majority of Mentees, this due to a generalized lack of research training opportunities offered in their Universities. So, it would have been adequate to receive strong knowledge and guidelines backup before the beginning of the program, this would have speeded up the writing of the protocol. In addition, initial statistical gaps in Mentees should have been covered before the beginning of the program instead of during data analyses stages, by doing this lots of frustration and time consuming actions could had been avoided.
- ❖ The RTP should be regarded as full-time instead of part-time requirement program. The amount of time used to finish the load of work generated was much more than the required for a part-time job.
- ❖ The Program's allowed budget should have a clause for time extension to cover dissemination expenses that take place after the program has ended. This would allow Mentees to have the opportunity to present their research outcomes to proper audiences and so to expect greater impact.
- ❖ From the Mentors' perspective, more physical presence (face-to-face) mentoring sessions with the International Mentees should be a must in future considerations.
- ❖ All Mentees are still pending publishing of their research outcomes, so it would be a useful suggestion to have a back-up budget to cover for expenses derived from publishing after the RTP has ended.

- ❖ Given the Program's successes to date and increasing interest among students, we hope to continue our efforts on building capacity in Central America by applying for funding. If not through IDRC, we hope that IDRC can help us at looking for additional funding agencies. Given the success of the collaborative approach during year 4 (all research projects within the same theme), we expect to apply for funding with a similar approach, focusing on food environments monitoring, interventions and evaluation.

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Annex 1

Fellowship program outputs

Name (period)	Research project	Event	Publications
Sofia Mazariegos (2013-2014)	Nutritional quality and marketing strategies in fast food children's menus in Guatemala	14 th Obesity Week. Boston, MA, 2014	Mazariegos S, Chacón V, Cole A, Barnoya J. Nutritional quality and marketing strategies of fast food children's combo meals in Guatemala. BMC Obes. 2016 Dec 8;3:52.
Aura Arévalo (2013-2014)	In-store marketing and nutritional quality of child-oriented ready-to-drink fruit and milk beverages available in supermarkets in Guatemala City.	14 th Obesity Week. Boston, MA, 2014	
Renato Melendez (2014-2015)	Newspaper advertising and consumer promotions of fast food chain restaurants with delivery service in Guatemala	American Public Health Association: 2015, Annual Meeting. Chicago, IL, USA.	
Luisa Madrigal (2014-2015)	Perceived barriers for achieving a healthy body weight among adolescent girls in Guatemala City	43rd Annual Meeting of the American Public Health Association. Chicago, IL, USA, 2015	Madrigal L, Adams I, Chacon V, Barnoya J. Perceived barriers to achieving a healthy weight: a qualitative study using focus groups at public and private schools in Guatemala City. BMC Public Health. 2017 Jan 5;17(1):16.

Jose Antonio Loaiza Espinales (2014-2015)	Characterization of chronic renal patients: Prevalence of traditional and non-traditional etiology	American Society of Nephrology: Kidney Week 2015. San Diego, CA, USA	
Andrea Aguilar (2015-2016)	Sugar sweetened beverages perceptions among adolescents in rural Guatemala		
Ana Silvia Salazar (2015-2016)	Exploratory study of four Guatemalan establishments of secondary education on the impact of health warnings on cigarette packages	114th American Anthropological Association Annual Meeting. Chicago, IL, USA.	
Emma Lucía Cosenza (2016-2017)	Food analysis and persuasive marketing techniques in children's TV programming in Guatemala, 2016	American Society for Nutrition Annual Scientific Meeting 2017. Chicago, IL, USA	
Anali Morales* (2016-2017)	Food analysis and persuasive marketing techniques in children's TV programming in Guatemala, 2016		
Amarilys Alarcon Calderon (2016-2017)	Analysis of composition of packaged food products in Guatemala, 2016	American Society for Nutrition Annual Scientific Meeting 2017. Chicago, IL, USA	
Jose Andres Pineda (2016-2017)	Analysis of the package of pre-packaged food and drinks available for sale at supermarkets in Guatemala City, 2016.	XIX Congress Spanish Society of Preventive Medicine, Public Health and Hygiene. Valencia, Spain, 2017	

* She was a fellow for four and half months, since she left to start a Master Program in Mexico.

Scholarship program outputs

Name (Country/period)	Research project	Event	Publications
Jessica Castañeda Reyes (Guatemala/2013-2014)	Factors associated with quality of life of women in climacteric and menopause	National Congress of Gynecology and Obstetrics. Guatemala, 2014	
Lydia Nuñez Parada (Honduras/2013-2014)	Behavioral and biological risk factors of patients with complicated diabetes mellitus type 2 and its cost according to the number of complications in the University School Hospital of Honduras. January – April 2014	XIII Central American and Caribbean Congress of Endocrinology. Costa Rica, 2014	
Juan Morales Parodi (Nicaragua /2013-2014)	Situational analysis of the promotion of healthy diets and physical activity that is provided to the population by health professionals in primary health care centers in the department of Managua	XIX Congress Spanish Society of Preventive Medicine, Public Health and Hygiene. Valencia, Spain, 2017	
Astrid Arriaza (Guatemala /2014-2015)	Availability and characteristics of electronic cigarettes in Guatemala	Society for research on nicotine and tobacco. Chicago, IL, USA, 2016	Chacon V, Arriaza A, et. Al. <i>Availability, Price, and Packaging of Electronic Cigarettes and E-Liquids in Guatemala City Retailers</i> . Nicotine & Tobacco Research, 2017, 1–5
Jeancarlo Cordoba (Costa Rica / 2014-2015)	Quality of life of the administrative workers of the University of Costa Rica and its relationship with the level of physical activity, overweight and obesity	2015 International Conference on Health Promoting Universities and Colleges. Vancouver, Canada	
Nancy Ninoska Arias Zelaya (Honduras/ 2014-2015)	Socioeconomic inequalities in the prevalence of tobacco use in the Lenca	Faculty of Medicine Congress, National Autonomous University of Honduras, 2015.	

	population of the municipality of Intibucá, Honduras, C.A. August 2014-June 2015		
Miguel Navarro Murillo (Nicaragua /2015-2016)	Implementation of smoke-free environments in bars, restaurants and casinos of the cities of Managua, Granada and León, Nicaragua, Year 2015	2016 Epidemiology Congress of the Americas. FL, USA.	
Teodoro Tercero (Nicaragua/ 2015-2016)	Feasibility and acceptability of an intervention to promote the sale of "healthy eating" on the Campus Rubén Darío, of Universidad Nacional Autónoma de Nicaragua -UNAN-Managua, 2015	International Congress on Public Health: Instituto Nacional de Salud Pública (INSP). Cuernavaca México, 2017	
Carmen Sanchez Nochez (Guatemala/ 2016-2017)	Scope of the implementation of public policies on healthy diet environment (Food-EPI) in Guatemala, 2016	XIX Congress Spanish Society of Preventive Medicine, Public Health and Hygiene. Valencia, Spain, 2017	
Ana Paula Cruz (Costa Rica/ 2016-2017)	Development and validation of a protocol to assess the food environment in the environments of the public schools in Costa Rica	XIX Congress Spanish Society of Preventive Medicine, Public Health and Hygiene. Valencia, Spain, 2017	
Tatiana Gamboa (Costa Rica/ 2016-2017)	Claims and Promotional Strategies Declared on Front-of--pack of Processed and Ultra-processed Food Products Targeted to Children and Adolescents in Costa Rica, 2016	American Society for Nutrition Annual Scientific Meeting 2017. Chicago, IL, USA	
Irina Zamora Corrales (Costa Rica/ 2016-2017)	Analysis of the advertisement of food and beverages directed to children who live in Costa Rica, as a base for a regulatory policy. Costa Rica, 2016	American Society for Nutrition Annual Scientific Meeting 2017. Chicago, IL, USA	

Annex 2

All policy briefs are attached to this report as pdf files.

- **Policy brief 1:** ¿Es saludable para la niñez el ambiente alimentario de Costa Rica?
(Is the food environment of Costa Rica healthy for children?)
 - **Policy brief 2:** ¿Es saludable para la niñez el ambiente alimentario en Guatemala?
(Is the food environment in Guatemala healthy for children?)
 - **Policy brief 3:** Alcance de la implementación de políticas públicas sobre ambiente alimentario saludable en Guatemala al 2016, mediante el índice Food-EPI (Scope of the implementation of public policies on healthy food environment in Guatemala to 2016, through the Food-EPI index)
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