

Mobilizing adolescents and young women to promote healthy diets in urban settings of Colombia and Vietnam: Lessons from two action-research programs

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Abstract

Adolescent and young women face grave nutrition challenges, but limited evidence exists on solutions to improve their diets. Action-research was done over 3 years (2020–2022) in secondary cities of Colombia (Medellin) and Vietnam (Thai Nguyen) to identify nutrient deficits in adolescent and young women diets; elaborate food-based recommendations to improve their nutritional status using Optifood linear programming; and engage respondents in incorporating suggested recommendations to their diet using a Social Innovation Challenge approach. A total of 1001 respondents were interviewed in Vietnam, 793 in Colombia. The probability of nutrient inadequacy in both locations was highest for iron and calcium, followed by the risk of deficiency for several other vitamins and minerals. Social Innovation Challenge teams (11 in Vietnam, 9 in Colombia) were created and supported in developing solutions to improve diets and tackle those deficiencies. Awards and resources were transferred to the most promising solutions to enable their implementation. Pre/post measurements of the interventions' impact using the Global Diet Quality Score as outcome metric showed significant improvement in the diets of Challenge participants. After introducing a series of companion articles that offer detailed results on those various steps, this paper draws strategic lessons from an action-research perspective.

KEYWORDS

action-research, adolescent nutrition, implementation science, nutrition-Colombia, nutrition-Vietnam

INTRODUCTION

Adolescence is a sensitive time in the female life cycle, with nutrition playing a critical role as the need for critical nutrients increases in response to puberty/menarche developments.¹ This period is also viewed as a window of opportunity for nutrition action as it is when growing girls begin to assume adult roles, affirm their independence,

solidify their food preferences,^{2,3} and establish dietary patterns that often carry through adulthood and to their future families. However, knowledge of adolescent girls and young women's dietary patterns, nutrient deficiencies, or food choice motivations remains fragmentary, hampering the elaboration of effective strategies to improve their nutrition.^{4,5} Programmatic interventions discussed in the literature have largely focused on micronutrient supplementation^{5,6} or

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preventive nutrition actions around adolescent pregnancy.⁷ We implemented two action-research programs to tackle this issue, one in Medellin (Colombia) and the other one in Thai Nguyen (Vietnam). In each country, we collected quantitative and qualitative data on the diets of adolescent girls and young women (AYW) living in urban or peri-urban areas and used the findings to engage with them in designing evidence-based approaches to improve their dietary intake using nutrition education, entrepreneurship training, and social media.

APPROACH

As is generally the case with action-research, cascading methods drove the study, with findings from each step informing the next one in a “diagnostic, active-learning, problem-finding, and problem-solving process.”⁸ In both study locations, 24-hour dietary recall methods were used to collect food intake data and identify nutrient gaps. Next, we used Optifood (a linear programming tool) to identify key nutrient deficits associated with each diet and, using detailed databases of local foods, food composition tables, and market price data, to propose locally suitable, affordable food-based recommendations (FBRs) that could reduce those deficits. Qualitative interviews were also used to understand respondents’ food choices and their knowledge of healthy foods. These inputs were combined to design and impart short courses on locally relevant nutrition concepts to respondents, who were then invited to participate in a Social Innovation Challenge (SIC) aimed at developing solutions that adapted the proposed FBRs to their daily diet and at engaging them, as agents of change/social influencers, in promoting their healthy solutions among peers using social media and commercial ventures. SIC solutions were to be low-cost, scalable, and designed to ideally produce lasting, internalized changes in adolescents’ dietary attitudes and choices. The approach we used borrows from the values-alignment model,⁹ which aims to reframe unhealthy adolescent choices as incompatible with values they hold as a group (e.g., peer status or autonomy) and steer them toward committing to healthy behaviors that align with their heartfelt priorities.¹⁰

These successive steps and their associated findings are described in papers in a virtual issue of *Ann NY Acad Sci*.³ This introductory paper presents the context, offers summary findings for each location, and distills strategic insights for future action on AYW nutrition.

SUMMARY FINDINGS

The Medellin intervention

In 2021, we surveyed 793 AYW of low socioeconomic background living in Medellin’s marginal areas. The EVINDI 24-hour recall method, developed by the School of Nutrition at the University of Antioquia, was used to collect dietary data.¹¹ The sample displayed relatively

homogenous diets, characterized by a very low consumption of fruits and vegetables, dairy and other animal-source foods, and plant-based sources of protein; and a high intake of starches, fats, and sugars. The sample’s nutritional profile shows that AYW were generally deficient in energy, fiber, calcium, folate, and iron, but consumed an excessive amount of saturated fat and simple carbohydrates.¹² The mean score of the NOVA score (a measure of ultra-processed food (UPF) intake) among study participants showed that 27% of AYW’s total energy intake came from UPFs, exacerbating the problem of poor-quality diets in this population segment.¹³ Using body mass index (BMI) from self-reported weight and height, 7%, 19%, and 5% of respondents, respectively, were underweight, overweight, or obese. Also, the mean Global Diet Quality Score (GDQS) in our sample was a low 13.7 (range 0–49), reflecting a high risk of poor quality diets and noncommunicable disease (NCD)-related outcomes.¹⁴ The Optifood analysis also confirmed that calcium and iron are key problem nutrients in that population and that these deficiencies could not be addressed solely with locally available foods. A cost-effective option to fulfill all nutrient needs among this sample of AYW would require the use of iron-folate acid tablets in addition to the increased intake of other nutrient-rich local foods.¹⁵ Given the difficulty of having AYW develop solutions that address all nutrient deficiencies at once, a decision was taken to focus the SIC effort on iron and calcium. Based on these inputs, a subset of AYW ($n = 75$) from the original sample volunteered to participate in our SIC. Nine distinct groups were formed and trained using CINDE’s CERES educational approach¹⁶; then each group developed an innovative solution that could address problem nutrients and encourage healthy eating among peers. Proposed solutions ranged from the preparation and sale of healthy street snacks to the confection of meat-free, protein-based home recipes.¹⁶ Prizes were awarded to the three most promising solutions and additional resources were offered by the Project to promote the awarded solutions. A randomized controlled trial was carried out to assess the impact of this action-research initiative on AYW’s nutrition behaviors, using the GDQS as outcome metric. Compared to the nonintervention group, participants in the SIC showed a statistically significant increase in their GDQS after the intervention, bringing them from high to moderate risk of poor-quality diet.¹⁴ This shows that a locally adapted nutrition education intervention designed on the basis of value-aligned principles and promoting participants’ creativity can be effective in improving their nutrition (at least in the short term). Regrettably, we could not measure the sustainability of those effects due to the end of the project.

The Thai Nguyen intervention

In the Vietnam study, a 24-hour dietary recall was carried out among 1001 AYW from urban and peri-urban neighborhoods of Thai Nguyen city, using the INDDEX24 methodology.^{17–19} Findings from anthropometric measurement showed that more than a third of AYW (34.6%) were underweight (BMI <18.5 kg/m²) and 12.5% were overweight/obese based on the cutoff for the Asian population (BMI ≥23 kg/m²).²⁰ Energy intake was lower than 85% of Estimated Energy

^a See <https://nyaspubs.onlinelibrary.wiley.com/doi/toc/10.1111/ISSN1749-6632.adolescent-woman-nutrition-in-colombia-and-vietnam>.

Requirement (EER) in two-thirds of the sample, and the Mean Probability of Adequacy of 11 micronutrients was only 33%. Calcium and iron intake were particularly low,²¹ like in our Medellin study. Vietnam's diets being reasonably diverse, about 60% of AYW achieved minimum dietary diversity for women (at least five food groups) and ate many of the foods categorized as healthy by the GDQS, but intake levels were too low relative to national dietary guidelines. This, combined with the common consumption of unhealthy foods (processed meats, baked sweets, instant noodles) resulted in low GDQS scores, with 32% of the sample classified as moderate and 23% as high risk of poor-quality diets and related NCD outcomes.²² Similar to the findings in Medellin, the Optifood analysis for the Vietnam sample found that improving nutrient intake based solely on local foods would be challenging. Dietary changes would need to be complemented by micronutrient supplementation or staple food fortification.²³ A SIC was organized to advance these suggestions. A total of 75 respondents from the original sample volunteered and formed 15 subgroups that were trained and supported by national nutritionists in basic nutrition concepts using values-aligned principles,⁹ and in developing solutions to address, in a commercially sustainable way, the deficits in problem nutrients. Proposed solutions ranged from a cooperative to produce and market healthy snacks for school cafeterias to the development of apps (on TikTok, Instagram) offering nutrition education to AYW in enticing ways. Prizes were awarded in various categories and a media campaign was launched to publicize these advances.

The research team did not have the opportunity to test the impact of the SIC solutions but carried out additional analyses of the data collected to generate new insights on the drivers and consequences of diets. The team tested the following two hypotheses: (1) that the occupational status of AYW affects their diet; and (2) that diet quality influences mental health in this age group. Both hypotheses found significant support. First, when contrasting salaried workers to students, we found meaningful differences in the types of unhealthy foods consumed by working AYW compared to students. Workers tended to consume significantly lower proportions of fast foods, instant noodles, or baked/grain-based sweets than students but a higher proportion of other unhealthy items (soft drinks, sweets, processed meats).²¹ Second, with reference to mental health, we found a significant association between diet quality as measured by the GDQS and behavioral health/depression.²² These two findings, taken again below, offer insights on how factors such as these should be considered when designing nutritional behavior change interventions.

STRATEGIC LESSONS

Notwithstanding the cultural, environmental, and geographic differences between the two study locations, AYW nutrition profiles showed several similarities (Figure 1). Iron and calcium were deficient in both locations, and a moderate to high risk of deficiency was seen in many other micronutrients (including zinc, vitamins A, B1, B9, B12, B6, and C in Colombia; and zinc, vitamins A, B9, and B12 in Vietnam). Energy requirements were below 85% of EER in more than half of the respon-

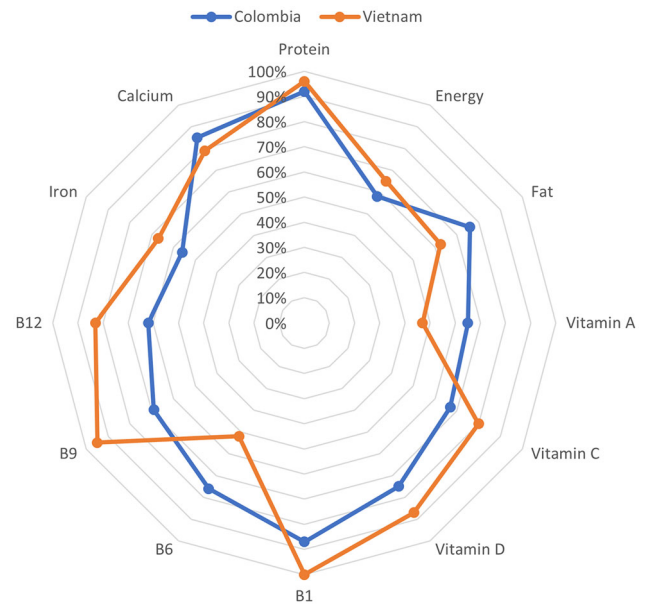


FIGURE 1 Proportion of sample that meets recommended nutrient intake (RNI) for key nutrients.

dents in both countries (65% in Vietnam, 53% in Colombia). There were important differences in the foods consumed, but a common feature was the low consumption of high-nutrient, healthy foods (pulses, nuts and seeds, dairy, egg, and vitamin A-rich fruit and vegetables) and excess consumption of foods such as cereals and tubers that are cheaper and more filling but less nutritious. Food diversity was higher in Vietnam, but the low intake of healthy foods left respondents equally deficient in many nutrients. These imbalances are leading to a double burden of malnutrition in both countries, with a more severe problem of overweight and obesity in Colombia (24%) and a predominant problem of underweight in Vietnam (35%).

In addition to generating detailed information about AYW diets in our two study locations, several strategic lessons were learned that we discuss below, hoping to help future efforts to improve AYW diet quality in low- and middle-income countries (LMICs).

A recent paper called for inviting adolescents to “be active partners in shaping local and global actions that support healthy eating patterns.”⁴ This was our intent from the start, and it was not difficult in our studies to obtain AYW collaboration, as they proved very receptive to learning about healthy diets. The opportunity to create transformative or subversive proposals appealed to SIC participants. This, we believe, was motivated by features that are specific to this age group, such as a preoccupation with self/body-image, peer status, and some rebellious inclination. For instance, SIC solutions focused not only on improving food intake but also on promoting physical exercise (C2), on an internalized sense of self-respect (C4, V8); and on a rejection of the food industry’s advertising of UPFs (C5, V1, V5).¹⁶

Notwithstanding these positive outcomes, the sustainability of the changes induced by our project is in question. It has been pointed out that adolescents tend to focus on immediate rewards and that it may be difficult for them to maintain changes that offer long-term, rather than

immediate benefits.¹⁰ Our findings support this: for instance, it was difficult in both locations to sustain the entrepreneurial momentum after the awards were granted, even when resources were offered to support a continued mobilization. The return on investment may have seemed too slow, the commitment too demanding.

It was not possible either to assess the staying power of the changes we induced in individuals. One aspect that plays a role in the retention of good habits in adolescents is the ability to express agency and autonomy in their decisions,⁴ and, indeed, AYW in our studies gave a high premium to autonomy from parental control.⁹ However, exerting autonomy was easier said than done. The notion that adolescence is when individuals begin to assert their autonomy and become their own agents did not extend to dietary decisions. In both locations, AYW's food intake remained almost entirely under parental or school control. Clearly, recent circumstances—the pandemic, global inflation, food insecurity—affected AYW's discretionary income and their capability to exert choice, forcing them to rely on traditional sources of food. But even in normal times, AYW from socioeconomic settings such as those we studied may have little independent funds of their own, at least until they begin to work or become married. This leads us to conclude that, while the wisdom of engaging and educating AYW about healthy diets and nutrition remains, those who make the main decisions about their diets should also be educated if we are to improve the quality of AYW's diets in a sustainable way. Possibly, both aims could be pursued at once, using AYW as agents of change in the domestic space, helping them introduce healthy eating, new recipes, physical activity to caregivers and other family members. In the same vein, trained AYW could be agents of change at school, not only among their peers but also by demanding healthier school meals, eliminating the sale of UPFs in and around schools, and so on.

Our research in Vietnam also supported the notion that occupational status affects dietary patterns. There is strong and long-standing evidence for this association in the literature²⁴ but no study we are aware of explored this among AYW in LMICs. Aspects related to working conditions, such as shift work,^{25–27} working hours,²⁸ physical or mental strain,²⁹ and control at work,³⁰ and the availability of disposable income are all known to influence daily eating styles, food choices, and resulting health conditions.³¹ In our Vietnam study, we found that compared to students, working AYW consumed less of some unhealthy foods (sweets and fast foods) but more of other unhealthy items (soft drinks, processed meat).²¹ This provides evidence for a differentiated approach to intervention design, one that accounts for the transitions taking place in education, occupation, and lifestyles among this population group. This finding could also aid in workplace health promotion.

A final set of findings refers to the relationship between nutrition and behavioral health. Our participant cohort was of an age known to be sensitive to behavioral health disorders³² and our Vietnam data showed that AYW's mental health could be affected by the quality of their nutrition.²² Earlier studies have highlighted poor diet as a risk factor for mental health disorders in the population at large.³³ Conversely, a healthy dietary pattern rich in fruits, vegetables, whole grains, low-

fat dairy, and lean protein foods was shown to be associated with a lower risk of behavioral health disorders,^{34,35} particularly among adolescents.³⁰ The biological mechanisms involved relate to the critical role of several nutrients in the neuroendocrine system and the production of neurotransmitters involved in the regulation of mood, appetite, cognition, depression, and anxiety.^{36,37} In Vietnam, reported mental health burden ranged from 8% to 29%, with girls displaying higher rates of emotional problems, such as anxiety and depression.^{38,39} Comparing AYW from our sample using the GDQS, we found those with low/very low GDQS scores to have 2–3 times higher risk for depression than those with higher scores.²² While the directionality of the effect cannot be asserted (does depression trigger poor diet or is it the other way around?), our data suggest that behavioral health should be monitored alongside diets and that dietary modification could be part of a strategy to reduce behavioral health issues among adolescents.

CONCLUSION

The dearth of data on adolescent diets and drivers of food choices has been pointed out repeatedly in the literature. The findings from our two action-research studies documented the poor quality of diets among AYW in two urban/peri-urban LMICs and confirmed the need for prompt actions to improve diet and nutrition in this age group. AYW in our two case studies suffered from both problems of undernutrition (energy and nutrient deficiencies) and excess consumption of UPFs that increase risks of NCDs. These findings highlight the need to design double-duty actions that simultaneously tackle the low-energy and micronutrient-deficient diets of AYW and their excess consumption of unhealthy fast foods, soft drinks, and snacks rich in saturated fat, sugar, and salt⁴⁰. The findings from our case studies in urban/peri-urban settings of Colombia and Vietnam are likely to be found in most LMICs around the world, as the nutrition transition deepens worldwide.

Our study focusing on evidence-based nutrition education among nonpregnant, nonlactating AYW is an attempt to develop customized nutrition education among AYW and test their potential impact. This approach could easily be adapted to cover a range of topics and use a diversity of tools that speak to this age group. Using local food intake as a point of departure proved successful in creating interest and in concretely anchoring choices that significantly affected our outcome metric (GDQS). Social media proved to be a playful and powerful means of mobilization when designed and controlled by AYW. Building on concerns of importance to this population—self-image, self-esteem, peer status—was also a strong lever for behavioral change. Alongside this research, we explored factors (autonomy, mental health, occupational status) hypothesized to modify AYW's choices. Those hypotheses tested positive and thus should be considered when designing nutrition interventions for this age group. In sum, the various contributions presented in this *Ann NY Acad Sci* virtual issue (see footnote on pg. 2) begin to answer the calls made in recent scientific statements¹ and policy documents² to better document AYW's nutrition, and to suggest how we may influence their decisions.

AUTHOR CONTRIBUTIONS

G.B. designed the study and wrote the manuscript. P.H.N.H., N.C.-G., L.M.T., N.T.H., and S.R.-M. led the field work and reviewed the manuscript.

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COMPETING INTERESTS

The authors have no competing interests to declare.

PEER REVIEW

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