

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Community factors associated with stunting, overweight, and food insecurity: A community-based mixed-method study in four Andean Indigenous communities in Ecuador
AUTHORS	Walrod, Jemie; Seccareccia, Erica; Sarmiento, Ivan; Pimentel, Juan; Misra, Shivali; Morales, Juana; Doucet, Alison; Andersson, Neil

VERSION 1 – REVIEW

REVIEWER	Michel VERNAY French National Public Health Agency (Santé publique France)
REVIEW RETURNED	30-Dec-2017

GENERAL COMMENTS	<p>It's an interesting manuscript which intends to identify factors associated with obesity and stunting in children, and household food insecurity in four traditional Andean communities, using both qualitative and quantitative approaches. Preventing childhood unhealthy nutrition status, and latter nutrition-related diseases at adult age, is an important challenge in low and middle-income countries (LMIC), since rapid nutritional transition is generally accompanied by coexistence of obesity and stunting situations in the same households.</p> <p>Even if the manuscript is of interest, clarification of certain points could greatly improve it.</p> <p>Firstly, the authors seem to consider that household food insecurity is one dimension of the nutritional status (l25-27:"the researchers identified three related outcomes (...) as core indicators of nutritional state"). It is more common to consider that the nutritional status (anthropometric status, nutritional biomarkers) reflects both macro and micro nutrient intake and physical activity, and that food intake are determined by availability and accessibility of healthy / unhealthy food. In LMIC, obesity in children and adults is often more frequent among high income households than among low income ones. On the contrary, in high income countries, obesity is negatively associated with socioeconomic position. Then, it is unclear why the authors didn't consider food insecurity as a potential associated factor to children stunting and obesity, and didn't include it in the logistic regression model.</p> <p>Since the reviewer is not familiar with qualitative approach, the purposes of the community discussion groups appear a little bit unclear. Did the authors intend to identify potential explaining factors to include in the logistic regression model? Or did they intend to illustrate certain difficulties participants face in their daily life?</p> <p>Introduction section: P3, L26: the authors should explain more precisely what they mean by "poor nutrition" P4, L7: to identify instead of identifying?</p> <p>Methods section:</p>
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	<p>P6, L30: The authors should explain more precisely what they mean by “We”, and describe the three centralized measurement locations (L32) and the devices they used (brand, references) to carry out the anthropometric measurements (L38 and 41). The authors use alternatively the term “obesity” and “overweight” across the manuscript. They should use the same term from the beginning to the end. Moreover, the BMI should be defined.</p> <p>Results section: The variables used in the analyses are not labelled in the same way: for example “Household had irrigation” in Table 3 becomes “Household has access to irrigation”. The authors should check them. As previously mentioned, it is not clear why food insecurity has not been considered as a potential associated factor to stunting and obesity.</p> <p>P10, L52: Living in a crowded household appears positively associated with children obesity, and negatively associated with food insecurity. These two results are not mentioned. Results regarding food frequencies data are not commented.</p> <p>Discussion section: L40, P14: It is not correct to say that quinoa consumption is protective against food insecurity. It would be more correct to say that households which consume quinoa are less likely to report food insecurity. The authors should provide more explanations regarding the underlying reasons. Did households reporting quinoa consumption spend less money to get processed food? As previously mentioned, in LMIC obesity could be positively associated with socioeconomic position, this point should be discussed by the authors.</p>
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REVIEWER	Melissa A. Liebert Assistant Professor, Department of Anthropology, Northern Arizona University, USA
REVIEW RETURNED	16-Jan-2018

GENERAL COMMENTS	<p>Article Review: Community factors associated with stunting, obesity, and food insecurity: A community-based mixed-method study in four Andean Indigenous communities in Ecuador</p> <p>General Feedback:</p> <p>Using a mixed-methods and participatory approach, this article examines factors associated with childhood obesity, stunting, and food insecurity among four Andean indigenous communities in Ecuador, a population undergoing rapid cultural and economic changes. Specifically, this study focuses on the effects of demographics, dietary patterns, and agricultural practices on childhood obesity, stunting, and food insecurity.</p> <p>Key findings from this study demonstrated that food insecurity was prevalent among Andean communities, particularly in households earning below minimum wage. Furthermore, stunted children were more likely to live in households that sold livestock but did not have access to irrigation. Similarly, obese children were more likely to live in households that sold livestock. These results were further corroborated by discussion groups of mothers and farmers who identified irrigation and loss of traditional dietary and agricultural practices as key sources of poor childhood health. Overall, this study provides insights into the effects of lifestyle change and economic</p>
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	<p>development on childhood nutrition in the Andean region of Ecuador.</p> <p>However, I believe that substantial changes need to be made to this paper before publication; thus, I recommend that it should be revised and resubmitted. Major areas of improvement include:</p> <ol style="list-style-type: none"> 1) Organization and presentation of information in the abstract 2) Flow of the introduction and discussion of the research hypotheses 3) Description of data collection procedures and questionnaire variables 4) Presentation of results, particularly in the tables 5) Interpretation of the results using cultural and behavioral evidence from the study population <p>Specific Feedback by Section:</p> <p>Abstract</p> <p>There are several problems with the organization and presentation of information in the abstract, which makes it challenging for the reader to fully understand the study. For example, the abstract is presented as a mixture of incomplete and complete sentences, thereby making it difficult to read. If appropriate, it would be helpful if the authors wrote the abstract in complete sentences. Additionally, it is difficult to understand the data collection procedures as presented in the abstract. For example, what is the overlap between anthropometry and questionnaire data? Were these data collected from all households? How do these data connect with the discussion group data? It would be helpful if the authors could be more explicit about these details in the abstract.</p> <ol style="list-style-type: none"> 1) Page 1, Line 7: "Objectives". The authors do not provide their major hypotheses or research questions in this section of the abstract, which is a requirement for the journal. 2) Page 1, Line 9: "four indigenous communities". This statement is vague and does not provide context for the study population or location. It would be helpful if the authors could be more explicit here. 3) Page 1, Line 12 and Line 19: "household questionnaires" and "298 children from 139 households in four communities". As previously noted, it is difficult for the reader to determine the overlap in data collection. Regarding the household questionnaires, who completed these surveys? All community members or only caretakers of the children included in the anthropometry collection? Please be more explicit about the data collection procedures and how data were collected from participants/households in the abstract. 4) Page 1: "Keywords". Some of the provided keywords (e.g., food supply, feeding behavior) are not directly related to the main objectives and hypotheses of the study (nutritional and disease transitions associated with economic development and culture change). Furthermore, the current keywords do not provide information about the study location. The authors might consider editing the keywords such that they align with the major objectives of the study. <p>Introduction</p> <p>In general, the organization and flow of the introduction could be</p>
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	<p>improved with additional transition sentences between paragraphs. Furthermore, the authors need to expand on the background literature to provide enough context for readers to understand the significance of the present study and how it addresses previous research gaps. Also, the authors do not present or discuss any hypotheses for their study.</p> <p>1) Page 3, Line 21: “where there are additional stresses related to living at high altitude”. It would be helpful if the authors could elaborate on the “additional stresses related to living at high altitude” and how these factors affect stunting among Andean children.</p> <p>2) Page 3, Line 26: The transition between the second and third paragraph of the introduction seems abrupt; it would be helpful to include a transition sentence to connect ideas between these paragraphs.</p> <p>3) Page 3, Line 36: The transition between the third and fourth paragraph of the introduction also seems abrupt; it would be helpful to include a transition sentence to connect ideas between these paragraphs. For example, what “prevalence” are the authors referring to at the beginning of paragraph four?</p> <p>4) Page 3, Line 40: “Market integration can change diet”. Here, it is important that the authors provide an operational definition of “market integration”, especially given that this term differs from other concepts, such as “globalization” and “urbanization”. How are the authors defining “market integration” in their research?</p> <p>5) Page 3, Line 40: “shifting from traditional grains”. The phrasing of this statement is confusing. Do the authors mean “shifting from a diet of traditional grains”? It would be helpful to be more explicit here.</p> <p>6) Page 3, Line 43: “An epidemiological transition follows the nutritional transition”. Is this always the case in all settings? It would be helpful if the authors provided more provisional statements here, unless there is significant evidence to suggest that an epidemiological transition always follows a nutritional transition.</p> <p>7) Page 3, Line 48: “The healthcare system in Ecuador is not prepared to deal with this dual burden[15] and its costs.[16,17]”. It would be helpful if the authors elaborated on the “dual burden” mentioned here. Is the “dual burden” related to stunting and obesity? If so, that relationship should be emphasized. Furthermore, when the authors mention “costs”, are these referring to “financial” or “physical costs associated with negative health outcomes”? Please be more explicit here.</p> <p>Methods</p> <p>To help with the flow of the methods, the authors could reverse the first (beginning on Line 15) and second paragraphs (beginning on Line 34) in this section. This would allow the reader to understand the data collection setting (four communities in the Northern Andes) before the specific details of the mixed-methods approach. Furthermore, the authors mention that “cognitive mapping groups” are used without providing additional information on this method.</p> <p>1 Page 4, Line 15: “cognitive mapping groups”. It would be helpful if the authors elaborated on this method. What are “cognitive mapping groups” and what types of data do they provide? The authors primarily refer to this method as “discussion groups” in the manuscript; thus, the use of “cognitive mapping groups” here seems random and vague.</p> <p>2) Page 4, Lines 17-19: “b) questionnaires administered to all</p>
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	<p>households and c) anthropometric measurement of children". As previously mentioned, it would be helpful if the data collection setting were presented prior to the information on the mixed methods approach. In its current state, it is difficult for the reader to understand where data collection occurred, specifically the context of "all households" and "measurement of children". For example, it would be helpful if the authors emphasized that questionnaires were administered to all households in the four communities and anthropometric data were collected from children in all households in the four communities.</p> <p>3) Page 4, Line 29: "...household demographics, productive activities, sales of these products, and food consumption habits". What do the authors mean by "these products"? It would be helpful if examples of products typically sold by households were provided here.</p> <p>4) Page 4, Line 47: "Farmers and mothers of the communities participated in cognitive mapping groups while the household survey took place in 2014". The phrasing of this sentence is confusing and does not allow the reader to understand the timing of data collection. Also, as previously mentioned, it would be helpful if the authors provided more information on "cognitive mapping groups".</p> <p>5) Page 5, Line 5: "They asked mothers why they feel nutrition is a problem in their community and asked farmers why they think agriculture changed in their community in recent years". To clarify, were the discussion groups only asked one question or a survey of questions? It would be helpful if the authors could be more explicit here.</p> <p>6) Page 5, Line 17: "We later transcribed our notes and categorized them into identifiable factors". How did the authors conduct this process? How were factors identified? Was a program (e.g., Atlas.ti) used?</p> <p>7) Page 5, Line 27: "The CHW asked to interview the person who regularly prepares household meals". It is difficult to determine who completed the household questionnaire (e.g., person who prepares meal, caretakers/mothers of children) since this information varies throughout the manuscript. It would be helpful if the authors were more explicit about who completed these questionnaires (in most cases) and how these individuals were related to the children who provided anthropometric measurements.</p> <p>8) Page 5, Line 32: "We administered surveys in Chilcapamba during July and August (dry season) of 2013, and used the same technique in 2014 to administer surveys in the three other communities". The phrasing of this information is confusing. When the authors mention that they "used the same technique in 2014", does this suggest that data were also collected during the dry season or using the same methods? It would be helpful to clarify here.</p> <p>9) Page 5, Line 39: "The questionnaire contained four sections: demographic information, agricultural information, food frequency, and food security". Did this questionnaire include questions about hunting practices? Given that hunting provides important sources of protein for indigenous Ecuadorian populations (and is a traditional practice that is changing greatly due to market integration), this is an important question for the authors to address. If hunting does not provide important sources of protein for this population (historically or currently), then the authors should also address those issues.</p> <p>10) Page 5, Line 41: "The demographic section contains...". In this section, the authors switch between past tense (e.g., contained) to present tense (e.g., contains). For the flow of this section, it might be helpful to use only one tense.</p>
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	<p>11) Page 5, Line 44: “Income was converted from a continuous variable into a binomial using categories below and above minimum wage (\$350/month). How was income quantified in this question (e.g., by day, week, month, etc.)? Also, how was the minimum wage value estimated? Is this a standard minimum wage value for this population, and if so, how was this determined?</p> <p>12) Page 5, Line 48-50: “animals raised” and “traditional agricultural practices”. In this sentence, it would be helpful to provide examples of types of animals raised in this population as well as the types of agricultural practices. It is challenging for the reader to gather information on the cultural context without these details.</p> <p>13) Page 5, Line 50: “The food frequency section asked participants to identify whether 21 different foods had been consumed in their household in the last 24 hours.”. Here, it would be helpful if the authors provided a list of the foods included in the FFQ or connected the reader to a table where they are listed. Also, did the FFQ account for food seasonality or hunting practices? The FFQ in this study only accounted for food consumed in the past 24 hours, which provides a limited understanding of the general dietary patterns of this population, particularly in relation to food seasonality.</p> <p>14) Page 6, Line 3: “We did not establish the amount of foods consumed.” As previously noted, the data collection procedures of the FFQ are limited since they do not provide quantitative information on dietary patterns across a broader time range. The authors should address these limitations in their manuscript. Furthermore, it would be helpful if the authors were more explicit about the phrasing of the FFQ questions (e.g., yes/no response).</p> <p>15) Page 6, Line 19: “We found, however, that a binomial of food secure (including the absent and light categories) and food insecure (including moderate and severe categories) was more useful for analyzing our population”. It would be helpful if the authors provided more information here. For example, what analysis was conducted to determine these results (e.g., sensitivity analysis)?</p> <p>16) Page 6, Line 36: “We measured the height and weight of each child”. Here, it would be helpful to provide the units of measurement (e.g., cm, kg). Also, what was the time range between the FFQ interviews and anthropometric measurements? Since the FFQ is based on the past 24 hours, it is important that these data were collected concurrently.</p> <p>17) Page 6, Line 48: “WHO...”. Sentence should not start with an acronym.</p> <p>18) Page 6, Line 55: “We performed a quantitative analysis using CIETmap...”. What does this program do? What does it test? More information is needed here.</p> <p>19) Page 7, Line 16-17: “...to avoid overestimation of statistical confidence”. What do the authors mean by “statistical confidence”? Is this technique used due to clustering of multiple kids per household? It would be helpful if the authors elaborated here.</p> <p>20) General Comment on Methods Section: When describing the details of the questionnaire items, it would be helpful if the authors were more explicit about the types of variables (e.g., dichotomous, continuous); this would enhance interpretation of the results.</p> <p>Results</p> <p>1) Page 7, Line 50: “We found convergence in the conversations with mothers and farmers about nutrition and agriculture respectively”. The phrasing of this sentence is confusing. Was there convergence in the conversations among mothers and farmers separately, or was there convergence among mothers and farmers</p>
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	<p>together? Please consider revising this sentence.</p> <p>2) Page 8, Table 1: "Rating of Importance by Community". It would be helpful to include the rating scale in the table as a reminder for readers, so they don't have to search through the text.</p> <p>3) Page 8, Table 1: "Risk Factor". The authors need to provide more information regarding how these risk factors were determined. Was a program (e.g., Atlas.ti) used? Or were these factors extracted through discussion among the authors?</p> <p>4) Page 9, Line 13: "A total of 139 households...". For clarity, it would be helpful if the authors stated, "A total of 139 households across four communities".</p> <p>5) Page 9, Line 16: "The female caretaker respondent". As previously mentioned, the authors are inconsistent when describing the participant who completed the household questionnaire (e.g., individual who prepares food, female caretaker). It would be helpful if the authors elaborated on their data collection methods and remained consistent throughout the manuscript.</p> <p>6) Page 9, Line 20: "Most households earn income...". It would be helpful to provide the quantitative value here for clarity.</p> <p>7) Page 9, Table 2: "Children investigated for parasites". In the text, the authors do not mention the parasite analysis and how these data were determined. Were fecal samples collected for parasite analysis? If so, a description of this data collection protocol is needed in the Methods section.</p> <p>8) Page 9, Table 2: "Consumed sugar". How was this question phrased? Were participants asked about their consumption of added sugar or consumption of sugary foods (e.g., cookies, cakes, etc.)? These details should be clarified in the Methods section.</p> <p>9) Page 9, Table 2: "Consumed meat" and "Consumed vegetables". For both these food items, the authors should provide examples, either in the table or text.</p> <p>10) Page 9, Table 2: "Crowded household (>2 people/room)". How was this question phrased? Is this question related to sleeping quarters? Please provide more context here.</p> <p>11) Page 10, Line 32: "...report eating meat". As previously noted, it would be helpful if the authors provided examples of the types of meat consumed by participants (either in the Methods or Results sections).</p> <p>12) Page 10, Line 38: "Most children live in a household that owned (251/298 or 84.2%), animals". This sentence is out of order. To clarify, "animals" should be after "owned".</p> <p>13) Page 11, Table 3: In general, it is difficult to interpret the results presented in Table 3, particularly the risk factors. It would be helpful if the authors defined the coding system for the risk factors (i.e., which variable represents 0 or 1) in association with the odd ratios. Also, the variable "children investigated for parasites" is confusing. Does this variable account for the children who had parasites or just the number of those who participated in parasite collection? Furthermore, the authors should consider adding percent values to the "had outcome" column; it is difficult for the reader to estimate these values when presented with ratios (e.g., 66/131).</p> <p>14) Page 12, Table 3: "Consumed potatoes". Only a positive response for this variable is provided; changes to the table should be made.</p> <p>15) Page 12, Table 3: "Variables used for multivariate analysis are pointed with *". Why are these variables used for multivariate analysis? Because they're significant? The authors should provide more information here. For example, "variables used for multivariate analysis are pointed with * because they are statistically significant"?</p>
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	<p>Discussion</p> <p>1) Page 13, Line 14: "...indigenous children". The authors should provide more information on the study population and data collection setting here (e.g., indigenous Andean children from Ecuador).</p> <p>2) Page 13, Line 16: "Additionally, the sale of livestock and household income were significantly associated with childhood stunting, obesity and food insecurity, respectively". The use of "respectively" in this sentence is confusing. It would be helpful if the authors could clarify the relationships presented here.</p> <p>3) Page 13, Line 38: "Research done in Latin America[28,29] and rural Pakistan[30] shows that irrigation can be protective against food insecurity". It would be helpful if the authors elaborated on this research and discussed the effects of irrigation on food insecurity, particularly with regards to their study population.</p> <p>4) Page 13, Line 48: "Selling animals was associated with obesity and stunting". The authors need to elaborate on these complex findings and discuss why selling animals would be associated with both obesity and stunting in the study population.</p> <p>5) Page 13, Line 52: "sustenance farming". Do the authors mean "subsistence farming" here?</p> <p>6) Page 14, Line 5: "Birken also noted that male children were more likely to be overweight,[34] and it may be attributable to variations in activity levels and food consumption patterns among individuals within a household.[35]". The presentation of this study is confusing. It would be helpful if the authors prefaced the literature (e.g., In a recent study conducted by Birken and colleagues...). Also, the authors don't mention the participants involved in this study (e.g., Western or non-Western children).</p> <p>7) Page 14, Line 24: "Low income is consistently associated with food insecurity, childhood obesity, stunting, and poor health,[38,39] but programs that address income independently of other variables are ineffective at improving childhood health status.[40,41]. Among which populations (e.g., Western or non-Western) have these patterns been discovered? Also, what types of "other variables" are the authors referencing here? Please be more explicit.</p> <p>8) Page 14, Line 40: "Consumption of quinoa...". A transition sentence would be helpful here (e.g., This study further demonstrated that consumption of quinoa...).</p> <p>9) Page 15, Line 3: "Several factors may drive the loss of traditional knowledge...". It would be helpful if the authors provided examples of the "factors" discussed here; currently, this statement is vague.</p> <p>10) Page 15, Line 10: "Our analysis was limited...". It would be helpful if the authors provided a transition into their limitations section (e.g., The present study faced several limitations. For example,...).</p> <p>11) General Comments on Discussion Section: In general, the discussion section could be strengthened if the authors elaborated on their conclusions and supported their ideas with cultural and behavioral evidence from the study population. The ideas presented in the discussion section are vague and not interpreted in association with ethnographic data from the study population. Also, it would be helpful to modify how previous studies and results are presented in the Discussion; only presenting the lead author's last name is confusing and reduces the readability of this section.</p> <p>Conclusion</p> <p>1) Page 15, Line 41: "ways adopting and improving more". The phrasing of this statement is confusing and should be modified for</p>
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	<p>clarity.</p> <p>2) General Comments on Conclusion Section: The Conclusion statement is vague and should be modified to end the manuscript on a strong note. For example, the authors ambiguously mention that “many complex variables affect these processes” but do not provide examples. Furthermore, the authors suggest that “some deleterious effects could be minimized”; however, they do not discuss the specific deleterious effects. Finally, the authors do not discuss the significance of this research for the study population and other indigenous populations.</p>
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VERSION 1 – AUTHOR RESPONSE

Detailed response

Reviewer: 1

Reviewer Name: Michel VERNAY

Institution and Country: French National Public Health Agency (Santé publique France)

Competing Interests: None declared

It's an interesting manuscript which intends to identify factors associated with obesity and stunting in children, and household food insecurity in four traditional Andean communities, using both qualitative and quantitative approaches. Preventing childhood unhealthy nutrition status, and latter nutrition-related diseases at adult age, is an important challenge in low and middle-income countries (LMIC), since rapid nutritional transition is generally accompanied by coexistence of obesity and stunting situations in the same households.

Even if the manuscript is of interest, clarification of certain points could greatly improve it.

Firstly, the authors seem to consider that household food insecurity is one dimension of the nutritional status (I25-27: "the researchers identified three related outcomes (...) as core indicators of nutritional state"). It is more common to consider that the nutritional status (anthropometric status, nutritional biomarkers) reflects both macro and micro nutrient intake and physical activity, and that food intake are determined by availability and accessibility of healthy / unhealthy food. In LMIC, obesity in children and adults is often more frequent among high income households than among low income ones. On the contrary, in high income countries, obesity is negatively associated with socioeconomic position. Then, it is unclear why the authors didn't consider food insecurity as a potential associated factor to children stunting and obesity, and didn't include it in the logistic regression model.

R/ We have included this analysis in Table 3 (row 5). The association of stunting and overweight with food insecurity was not significant.

Since the reviewer is not familiar with qualitative approach, the purposes of the community discussion groups appear a little bit unclear. Did the authors intend to identify potential explaining factors to include in the logistic regression model? Or did they intend to illustrate certain difficulties participants face in their daily life?

R/ This has been addressed in the methods, paragraph 3.

"The goal of these discussion groups was to develop an understanding of the communities' perspective to guide interpretation of quantitative data. In addition, group discussion is key to engage communities in meaningful reflections to identify actionable factors to promote change."

Introduction section:

P3, L26: the authors should explain more precisely what they mean by "poor nutrition"

R/ This has been clarified.

"Malnutrition (defined as poor anthropomorphic measures) could underlie as much as 50% of early childhood mortality, and has been found to be associated specifically with increased mortality rate of diarrhea and acute respiratory illness."

P4, L7: to identify instead of identifying?

R/ This sentence has been re-structured. We have deleted identify and changed it to "towards".

"In this context, this study is a collaboration with four communities that asked for assistance to research nutrition and agriculture, with a view towards community action to address their health concerns."

Methods section:

P6, L30: The authors should explain more precisely what they mean by "We" (R/ The initials of the authors were added.), and describe the three centralized measurement locations (L32) (R/ We have specified that the locations were school houses.) and the devices they used (brand, references) to carry out the anthropometric measurements (L38 and 41).

R/ We have provided brands and references of the measuring tools.

The authors use alternatively the term "obesity" and "overweight" across the manuscript. They should use the same term from the beginning to the end (R/ We have used the term overweight to be consistent.). Moreover, the BMI should be defined

R/ BMI was defined as a simple index of weight-for-height. Overweight was defined as a BMI of two or more standard deviations above average.

Results section:

The variables used in the analyses are not labelled in the same way: for example "Household had irrigation" in Table 3 becomes "Household has access to irrigation". The authors should check them.

R/ This has been corrected.

As previously mentioned, it is not clear why food insecurity has not been considered as a potential associated factor to stunting and obesity.

R/ This is a valid point and important to include as part of the analysis. Food insecurity has now been incorporated in Tables 2 and 3.

P10, L52: Living in a crowded household appears positively associated with children obesity, and negatively associated with food insecurity. These two results are not mentioned.

R/ Bivariate analysis identified significant associations between risk factors and the three tested outcomes (Table 3). An additional analysis identified significant associations that remained independent after multivariate analysis (Table 4). We only discuss independent associations to avoid spurious conclusions.

Results regarding food frequencies data are not commented.

R/ Please see above response.

Discussion section:

L40, P14: It is not correct to say that quinoa consumption is protective against food insecurity. It would be more correct to say that households which consume quinoa are less likely to report food insecurity (R/ This has been corrected.). The authors should provide more explanations regarding the underlying reasons. Did households reporting quinoa consumption spend less money to get processed food? (R/ We explained that quinoa was used as a proxy for traditional agriculture.)

As previously mentioned, in LMIC obesity could be positively associated with socioeconomic position, this point should be discussed by the authors.

R/ This has been explored in the discussion, paragraph 6.

Reviewer: 2

Reviewer Name: Melissa A. Liebert

Institution and Country: Assistant Professor, Department of Anthropology, Northern Arizona University, USA

Competing Interests: None declared.

The comments below are also provided in the file attached.

General Feedback:

Using a mixed-methods and participatory approach, this article examines factors associated with childhood obesity, stunting, and food insecurity among four Andean indigenous communities in Ecuador, a population undergoing rapid cultural and economic changes. Specifically, this study focuses on the effects of demographics, dietary patterns, and agricultural practices on childhood obesity, stunting, and food insecurity.

Key findings from this study demonstrated that food insecurity was prevalent among Andean communities, particularly in households earning below minimum wage. Furthermore, stunted children were more likely to live in households that sold livestock but did not have access to irrigation. Similarly, obese children were more likely to live in households that sold livestock. These results were further corroborated by discussion groups of mothers and farmers who identified irrigation and loss of traditional dietary and agricultural practices as key sources of poor childhood health. Overall, this study provides insights into the effects of lifestyle change and economic development on childhood nutrition in the Andean region of Ecuador.

However, I believe that substantial changes need to be made to this paper before publication; thus, I recommend that it should be revised and resubmitted. Major areas of improvement include:

- 1) Organization and presentation of information in the abstract
- 2) Flow of the introduction and discussion of the research hypotheses
- 3) Description of data collection procedures and questionnaire variables
- 4) Presentation of results, particularly in the tables
- 5) Interpretation of the results using cultural and behavioral evidence from the study population

Specific Feedback by Section:

Abstract

There are several problems with the organization and presentation of information in the abstract, which makes it challenging for the reader to fully understand the study. For example, the abstract is presented as a mixture of incomplete and complete sentences, thereby making it difficult to read. If

appropriate, it would be helpful if the authors wrote the abstract in complete sentences. (R/ The reviewed version uses complete sentences.) Additionally, it is difficult to understand the data collection procedures as presented in the abstract. For example, what is the overlap between anthropometry and questionnaire data? Were these data collected from all households? (R/ This point is clarified in the reviewed version.) How do these data connect with the discussion group data? (R/ This point is clarified in the reviewed version.) It would be helpful if the authors could be more explicit about these details in the abstract.

1) Page 1, Line 7: "Objectives". The authors do not provide their major hypotheses or research questions in this section of the abstract, which is a requirement for the journal.

R/ We clarified the research question.

2) Page 1, Line 9: "four indigenous communities". This statement is vague and does not provide context for the study population or location. It would be helpful if the authors could be more explicit here.

R/ We added "Kichwa indigenous communities of Andean Ecuador" to be more precise.

3) Page 1, Line 12 and Line 19: "household questionnaires" and "298 children from 139 households in four communities". As previously noted, it is difficult for the reader to determine the overlap in data collection. Regarding the household questionnaires, who completed these surveys? All community members or only caretakers of the children included in the anthropometry collection? Please be more explicit about the data collection procedures and how data were collected from participants/households in the abstract.

R/ We clarified this point in the abstract and provided the details in the methods section.

4) Page 1: "Keywords". Some of the provided keywords (e.g., food supply, feeding behavior) are not directly related to the main objectives and hypotheses of the study (nutritional and disease transitions associated with economic development and culture change). Furthermore, the current keywords do not provide information about the study location. The authors might consider editing the keywords such that they align with the major objectives of the study.

R/ The keywords have been edited.

Introduction

In general, the organization and flow of the introduction could be improved with additional transition sentences between paragraphs. Furthermore, the authors need to expand on the background literature to provide enough context for readers to understand the significance of the present study and how it addresses previous research gaps. (R/ The flow of the introduction was improved. We completed an in-depth literature review, however in the interest of being concise, we presented only the most relevant ideas and studies. We have pointed out several research gaps; for example, there have been no studies of this kind done in our population, and few studies with a participatory approach.) Also, the authors do not present or discuss any hypotheses for their study. (R/ Our hypothesis has been added to the last paragraph of the introduction.)

"We hypothesized that most of these factors were associated with cultural transition towards a Western lifestyle."

1) Page 3, Line 21: "where there are additional stresses related to living at high altitude". It would be helpful if the authors could elaborate on the "additional stresses related to living at high altitude" and how these factors affect stunting among Andean children.

R/ Although a valid comment, we expand on this point in the Methods section (paragraph 1) where we describe the setting. We explain that higher altitudes create agricultural challenges. In light of not repeating information, we would prefer not to expand on this point in the introduction.

2) Page 3, Line 26: The transition between the second and third paragraph of the introduction seems abrupt; it would be helpful to include a transition sentence to connect ideas between these paragraphs.

R/ A transition sentence has been added.

3) Page 3, Line 36: The transition between the third and fourth paragraph of the introduction also seems abrupt; it would be helpful to include a transition sentence to connect ideas between these paragraphs. For example, what "prevalence" are the authors referring to at the beginning of paragraph four?

R/ A transition sentence has been added.

4) Page 3, Line 40: "Market integration can change diet". Here, it is important that the authors provide an operational definition of "market integration", especially given that this term differs from other concepts, such as "globalization" and "urbanization". How are the authors defining "market integration" in their research?

R/ We added a definition.

"Market integration is defined by Liebert et al as "the suite of social and cultural changes that occur with economic development", specifically as communities have increased participation in and dependence on markets for food resources".

5) Page 3, Line 40: "shifting from traditional grains". The phrasing of this statement is confusing. Do the authors mean "shifting from a diet of traditional grains"? It would be helpful to be more explicit here.

R/ We clarified this point.

"This integration can change diet and physical activity, shifting from a diet of traditional grains and hunter-gatherer lifestyle to a diet of processed foods high in fats and sugars and sedentary lifestyle."

6) Page 3, Line 43: "An epidemiological transition follows the nutritional transition". Is this always the case in all settings? It would be helpful if the authors provided more provisional statements here, unless there is significant evidence to suggest that an epidemiological transition always follows a nutritional transition.

R/ We added a modifier ("Frequently") to present a more provisional statement.

7) Page 3, Line 48: "The healthcare system in Ecuador is not prepared to deal with this dual burden[15] and its costs.[16,17]". It would be helpful if the authors elaborated on the "dual burden" mentioned here. Is the "dual burden" related to stunting and obesity? If so, that relationship should be emphasized. Furthermore, when the authors mention "costs", are these referring to "financial" or "physical costs associated with negative health outcomes"? Please be more explicit here.

R/ We clarified the issues of dual burden and costs.

"The healthcare system in Ecuador is not prepared to deal with this dual burden of stunting and obesity (and the diseases associated with each) and its costs, both in terms of morbidity/mortality and financial."

Methods

To help with the flow of the methods, the authors could reverse the first (beginning on Line 15) and second paragraphs (beginning on Line 34) in this section. This would allow the reader to understand the data collection setting (four communities in the Northern Andes) before the specific details of the mixed-methods approach. Furthermore, the authors mention that "cognitive mapping groups" are used without providing additional information on this method.

R/ We have changed the sequence of paragraphs as suggested.

1) Page 4, Line 15: "cognitive mapping groups". It would be helpful if the authors elaborated on this method. What are "cognitive mapping groups" and what types of data do they provide? The authors primarily refer to this method as "discussion groups" in the manuscript; thus, the use of "cognitive mapping groups" here seems random and vague.

R/ It was initially our intention to have participants map out the interrelation of factors contributing to the nutritional status of children (cognitive mapping). However, participating community members appeared more comfortable simply discussing these factors. We have clarified this by simply using the term discussion groups rather than cognitive mapping.

2) Page 4, Lines 17-19: "b) questionnaires administered to all households and c) anthropometric measurement of children". As previously mentioned, it would be helpful if the data collection setting were presented prior to the information on the mixed methods approach. In its current state, it is difficult for the reader to understand where data collection occurred, specifically the context of "all households" and "measurement of children". For example, it would be helpful if the authors emphasized that questionnaires were administered to all households in the four communities and anthropometric data were collected from children in all households in the four communities.

R/ The first two paragraphs of the methods section are meant to provide the reader with a general idea of how the study was conducted. We have inverted the paragraphs as has been suggested. However, with regards to specifying the location of anthropometric data collection, this is specified in the "Biometric assessments of children" section of the methods. We felt that repeating this information in the first paragraphs would be redundant.

3) Page 4, Line 29: "...household demographics, productive activities, sales of these products, and food consumption habits". What do the authors mean by "these products"? It would be helpful if examples of products typically sold by households were provided here.

R/ We agree that informing the reader about products typically sold by households would be helpful. This information has been added to the first paragraph of the methods section.

"Typical crops grown by these communities include corn, peas, beans, and potatoes. Typical livestock raised are chickens and guinea pigs which are used to feed the household. Some households also raise pigs or cows, mainly to be sold at a community market."

4) Page 4, Line 47: "Farmers and mothers of the communities participated in cognitive mapping groups while the household survey took place in 2014". The phrasing of this sentence is confusing and does not allow the reader to understand the timing of data collection. Also, as previously

mentioned, it would be helpful if the authors provided more information on "cognitive mapping groups".

R/ We clarified this point.

5) Page 5, Line 5: "They asked mothers why they feel nutrition is a problem in their community and asked farmers why they think agriculture changed in their community in recent years". To clarify, were the discussion groups only asked one question or a survey of questions? It would be helpful if the authors could be more explicit here.

R/ We clarified that a sole question was asked in each discussion group. This has been clarified in the "Discussion groups" section.

6) Page 5, Line 17: "We later transcribed our notes and categorized them into identifiable factors". How did the authors conduct this process? How were factors identified? Was a program (e.g., Atlas.ti) used?

R/ We transcribed our notes to ensure details of the discussion were not forgotten. However, with regards to identifying factors, each discussion group was concluded by having the CHW summarize the factors identified by the participants and having participants rate the importance of each of these factors. We hope this has been clarified in the manuscript.

7) Page 5, Line 27: "The CHW asked to interview the person who regularly prepares household meals". It is difficult to determine who completed the household questionnaire (e.g., person who prepares meal, caretakers/mothers of children) since this information varies throughout the manuscript. It would be helpful if the authors were more explicit about who completed these questionnaires (in most cases) and how these individuals were related to the children who provided anthropometric measurements.

R/ We clarified this point.

"The CHW asked to interview the person who regularly prepares household meals, on the assumption that they are most knowledgeable about nutritional habits. This was most commonly the mother of the youngest generation living in the household, but very occasionally the grandmother or eldest sister."

8) Page 5, Line 32: "We administered surveys in Chilcapamba during July and August (dry season) of 2013, and used the same technique in 2014 to administer surveys in the three other communities". The phrasing of this information is confusing. When the authors mention that they "used the same technique in 2014", does this suggest that data were also collected during the dry season or using the same methods? It would be helpful to clarify here.

R/ We specify the same technique to emphasize that both, (1) the data were collected in the dry season and (2) using the same methods. We have specified the only changes made to the questionnaire in 2014.

"We administered the surveys during the dry season (July and August) using the same technique in all communities. The survey was administered in Chilcapamba in 2013 and in the three other communities in 2014. Two questions were added to the questionnaire in 2014; household crowding and household income."

9) Page 5, Line 39: "The questionnaire contained four sections: demographic information, agricultural information, food frequency, and food security". Did this questionnaire include questions about hunting practices? Given that hunting provides important sources of protein for indigenous Ecuadorian populations (and is a traditional practice that is changing greatly due to market

integration), this is an important question for the authors to address. If hunting does not provide important sources of protein for this population (historically or currently), then the authors should also address those issues.

R/ The questionnaire did not inquire about hunting practices. The TEACH program has been involved with these communities since 2007 and from this relationship we know that hunting is not part of their practices. We have specified this in the 3rd paragraph of the questionnaire section.

"We did not inquire about hunting practices as this is not part of the practices of these communities."

10) Page 5, Line 41: "The demographic section contains...". In this section, the authors switch between past tense (e.g., contained) to present tense (e.g., contains). For the flow of this section, it might be helpful to use only one tense.

R/ This has been corrected and we have been consistent in using the past tense.

11) Page 5, Line 44: "Income was converted from a continuous variable into a binomial using categories below and above minimum wage (\$350/month). How was income quantified in this question (e.g., by day, week, month, etc.)? Also, how was the minimum wage value estimated? Is this a standard minimum wage value for this population, and if so, how was this determined?"

R/ Each respondent reported the monthly income of the household. The minimum wage in Ecuador at the time was determined by asking the CHW and confirmed on the government website. The error in the amount was corrected (340 USD vs. 350 USD).

12) Page 5, Line 48-50: "animals raised" and "traditional agricultural practices". In this sentence, it would be helpful to provide examples of types of animals raised in this population as well as the types of agricultural practices. It is challenging for the reader to gather information on the cultural context without these details.

R/ We have added a brief description of the type of agriculture performed and livestock raised in the 1st paragraph of the methods section. Please see comment 3 above.

13) Page 5, Line 50: "The food frequency section asked participants to identify whether 21 different foods had been consumed in their household in the last 24 hours.". Here, it would be helpful if the authors provided a list of the foods included in the FF Q or connected the reader to a table where they are listed. Also, did the FFQ account for food seasonality or hunting practices? The FFQ in this study only accounted for food consumed in the past 24 hours, which provides a limited understanding of the general dietary patterns of this population, particularly in relation to food seasonality.

R/ We acknowledge the limitation of the food frequency questionnaire and have emphasized this limitation in several parts of the manuscript (primarily in the discussion section). With regards to including the exact foods in the questionnaire, we elected not to include this in the primary text given the word limitation. However, we will include the questionnaire used as part of the materials submitted so readers can refer to it should they be interested in this information.

14) Page 6, Line 3: "We did not establish the amount of foods consumed." As previously noted, the data collection procedures of the FFQ are limited since they do not provide quantitative information on dietary patterns across a broader time range. The authors should address these limitations in their manuscript. Furthermore, it would be helpful if the authors were more explicit about the phrasing of the FFQ questions (e.g., yes/no response).

R/ Please see above. We feel that this limitation was addressed in our manuscript, please see paragraph 8 of the discussion.

15) Page 6, Line 19: "We found, however, that a binomial of food secure (including the absent and light categories) and food insecure (including moderate and severe categories) was more useful for analyzing our population". It would be helpful if the authors provided more information here. For example, what analysis was conducted to determine these results (e.g., sensitivity analysis)?

R/ No analysis was conducted to create a binomial of the food secure variable. It was elected to create this binomial as our study was limited by few households in the communities and it would have been difficult to obtain statistical significance for analysis with more categories.

16) Page 6, Line 36: "We measured the height and weight of each child". Here, it would be helpful to provide the units of measurement (e.g., cm, kg). Also, what was the time range between the FFQ interviews and anthropometric measurements? Since the FFQ is based on the past 24 hours, it is important that these data were collected concurrently.

R/ We have specified the units used as well as the timeline. The food frequency questionnaire is based on foods consumed over the past 24 hrs. Children were measured within 2 weeks of their household having completed the questionnaire.

"Children were measured within 2 weeks of their household having completed the questionnaire. We measured the height (in centimeters) and weight (in kilograms) of each child and recorded values using standardized techniques,[22] height against a wall with a measuring tape secured in place and a table placed over the head of the child (MIES Wooden Measuring Rod 2011)."

17) Page 6, Line 48: "WHO...". Sentence should not start with an acronym.

R/ This has been corrected.

18) Page 6, Line 55: "We performed a quantitative analysis using CIETmap...". What does this program do? What does it test? More information is needed here.

R/ CIETmap (version 2.5 beta 9.5) is an epidemiologic analysis program that uses the open-source R programming language. We directed readers to reference 24 should they be interested in more details regarding the CIETmap program. Including these details in the text might not be necessary or relevant to understanding the analysis.

19) Page 7, Line 16-17: "...to avoid overestimation of statistical confidence". What do the authors mean by "statistical confidence"? Is this technique used due to clustering of multiple kids per household? It would be helpful if the authors elaborated here.

R/ We explained that clustering occurs by community and the reason underlying the overestimation of statistical confidence.

20) General Comment on Methods Section: When describing the details of the questionnaire items, it would be helpful if the authors were more explicit about the types of variables (e.g., dichotomous, continuous); this would enhance interpretation of the results.

R/ Although this is important information for readers to know, the word limit of the article makes it difficult to include such detailed information. Therefore, we will include the actual questionnaires as an appendix to facilitate interpretation of the results.

Results

1) Page 7, Line 50: "We found convergence in the conversations with mothers and farmers about nutrition and agriculture respectively". The phrasing of this sentence is confusing. Was there convergence in the conversations among mothers and farmers separately, or was there convergence among mothers and farmers together? Please consider revising this sentence.

R/ There was convergence in all of the discussion groups. This is described and clarified by Table 1.

2) Page 8, Table 1: "Rating of Importance by Community". It would be helpful to include the rating scale in the table as a reminder for readers, so they don't have to search through the text.

R/ A note has been added to column 3 of Table 1.

3) Page 8, Table 1: "Risk Factor". The authors need to provide more information regarding how these risk factors were determined. Was a program (e.g., Atlas.ti) used? Or were these factors extracted through discussion among the authors?

R/ This point has been clarified. We have replaced the labeling of Table 1, column 1 "Risk Factors" with "Factors identified by discussion groups". The communities identified and agreed on these factors.

4) Page 9, Line 13: "A total of 139 households...". For clarity, it would be helpful if the authors stated, "A total of 139 households across four communities".

R/ We agree that this is more specific and have clarified.

5) Page 9, Line 16: "The female caretaker respondent". As previously mentioned, the authors are inconsistent when describing the participant who completed the household questionnaire (e.g., individual who prepares food, female caretaker). It would be helpful if the authors elaborated on their data collection methods and remained consistent throughout the manuscript.

R/ This has been clarified in the methods section (the 1st paragraph of the "Questionnaire" section). Please refer to Methods comment 7.

6) Page 9, Line 20: "Most households earn income...". It would be helpful to provide the quantitative value here for clarity.

R/ We have clarified this point.

"Most households earn income less than or equal to the minimum wage of the region (340 USD/month)."

7) Page 9, Table 2: "Children investigated for parasites". In the text, the authors do not mention the parasite analysis and how these data were determined. Were fecal samples collected for parasite analysis? If so, a description of this data collection protocol is needed in the Methods section.

R/ We have removed this variable from the manuscript as it was purely based on history obtained from the mother of the child. We acknowledge that this is an inaccurate method of data collection and should be confirmed with public records. Therefore, given the poor collection method of this variable it is difficult to interpret its role in the nutritional status and growth of children. We have therefore chosen to completely remove it from the results presented.

8) Page 9, Table 2: "Consumed sugar". How was this question phrased? Were participants asked about their consumption of added sugar or consumption of sugary foods (e.g., cookies, cakes, etc.)? These details should be clarified in the Methods section.

R/ We will append the questionnaire used from which we read the questions to the participant. Although important information, we feel that describing each individual question within the text would require a great amount of space. For this question specifically, we asked if anyone in the household ate any sweetened foods such as sweets, candies, pastries, chocolates, honey, added sugar, marmalade, cookies or other sources of sugar.

9) Page 9, Table 2: "Consumed meat" and "Consumed vegetables". For both these food items, the authors should provide examples, either in the table or text.

R/ Similar response to above. Please refer to the appended questionnaire. For these specific questions:

Consumed vegetables: We have adjusted this variable to include all the vegetables that the household consumed in the past 24hrs. This includes questions 10 to 14 in the food frequency questionnaire (Vegetables rich in vitamin A, legumes, green vegetables, all other vegetables, examples of each category are included in the appended questionnaire).

Consumed meat: This corresponds to question 16a and 16b of the food frequency questionnaire (chicken, pork, beef, guinea pig, insects and any internal organs of these animals).

10) Page 9, Table 2: "Crowded household (>2 people/room)". How was this question phrased? Is this question related to sleeping quarters? Please provide more context here.

R/ We will append the questionnaire. For this variable we asked participants the total amount of rooms in their house and how many people living in their house and then performed the calculation ourselves.

11) Page 10, Line 32: "...report eating meat". As previously noted, it would be helpful if the authors provided examples of the types of meat consumed by participants (either in the Methods or Results sections).

R/ We have added this in the Methods section paragraph 1.

12) Page 10, Line 38: "Most children live in a household that owned (251/298 or 84.2%), animals". This sentence is out of order. To clarify, "animals" should be after "owned".

R/ This has been corrected.

13) Page 11, Table 3: In general, it is difficult to interpret the results presented in Table 3, particularly the risk factors. It would be helpful if the authors defined the coding system for the risk factors (i.e., which variable represents 0 or 1) in association with the odd ratios. Also, the variable "children investigated for parasites" is confusing. Does this variable account for the children who had parasites or just the number of those who participated in parasite collection? Furthermore, the authors should consider adding percent values to the "had outcome" column; it is difficult for the reader to estimate these values when presented with ratios (e.g., 66/131).

R/ We have removed the variable "children investigated for parasites" as we acknowledge that it was not investigated robustly.

With regards to including the percentages in the table, it is important to take into account that the summary measure is the odds ratio (OR). Therefore, the percentage will not add important information.

Also, 2x2 tables are typically presented in a standard fashion with the presence of the outcome always being the first column (eg. stunted) and the absence of the outcome always being the second column (eg. normal height for age). Being exposed to the exposure is typically set as the first row (eg. child lived in crowded household) and the non exposure set as the second row (eg. did not live in a crowded household). We have followed this standard presentation. We have nonetheless, specified that the first item listed (in the risk factor column) is the exposure being considered.

14) Page 12, Table 3: "Consumed potatoes". Only a positive response for this variable is provided; changes to the table should be made.

R/ This has been corrected.

15) Page 12, Table 3: "Variables used for multivariate analysis are pointed with *". Why are these variables used for multivariate analysis? Because they're significant? The authors should provide more information here. For example, "variables used for multivariate analysis are pointed with * because they are statistically significant"?

R/ We specify in the Quantitative analysis section of the Methods, that "The multivariate analysis saturated model included all significant associations from the bivariate analysis". However, to facilitate the interpretation of table 3, we have included this in a footnote as well.

Discussion

1) Page 13, Line 14: "...indigenous children". The authors should provide more information on the study population and data collection setting here (e.g., indigenous Andean children from Ecuador).

R/ We have clarified and specified that we are referring to children who partook in the study.

2) Page 13, Line 16: "Additionally, the sale of livestock and household income were significantly associated with childhood stunting, obesity and food insecurity, respectively". The use of "respectively" in this sentence is confusing. It would be helpful if the authors could clarify the relationships presented here.

R/ This point has been clarified.

"Additionally, the sale of livestock was significantly associated with childhood stunting and overweight and household income was significantly associated with food insecurity."

3) Page 13, Line 38: "Research done in Latin America[28,29] and rural Pakistan[30] shows that irrigation can be protective against food insecurity". It would be helpful if the authors elaborated on this research and discussed the effects of irrigation on food insecurity, particularly with regards to their study population.

R/ This has been expanded on in the 3rd paragraph of the discussion.

4) Page 13, Line 48: "Selling animals was associated with obesity and stunting". The authors need to elaborate on these complex findings and discuss why selling animals would be associated with both obesity and stunting in the study population.

R/ This point has been expanded on in the 4th paragraph of the discussion.

5) Page 13, Line 52: "sustenance farming". Do the authors mean "subsistence farming" here?

R/ This has been corrected.

6) Page 14, Line 5: "Birken also noted that male children were more likely to be overweight,[34] and it may be attributable to variations in activity levels and food consumption patterns among individuals within a household.[35]". The presentation of this study is confusing. It would be helpful if the authors prefaced the literature (e.g., In a recent study conducted by Birken and colleagues...). Also, the authors don't mention the participants involved in this study (e.g., Western or non-Western children).

R/ The reference has been changed and the population specified.

7) Page 14, Line 24: "Low income is consistently associated with food insecurity, childhood obesity, stunting, and poor health,[38,39] but programs that address income independently of other variables are ineffective at improving childhood health status.[40,41]. Among which populations (e.g., Western or non-Western) have these patterns been discovered? Also, what types of "other variables" are the authors referencing here? Please be more explicit.

R/ We have clarified the populations and other variables.

8) Page 14, Line 40: "Consumption of quinoa...". A transition sentence would be helpful here (e.g., This study further demonstrated that consumption of quinoa...).

R/ A transition sentence has been added.

9) Page 15, Line 3: "Several factors may drive the loss of traditional knowledge...". It would be helpful if the authors provided examples of the "factors" discussed here; currently, this statement is vague.

R/ Examples have been added.

"Several factors, including perceived usefulness or convenience of alternatives, may drive the loss of traditional knowledge in cultural transition, and this loss may have costs associated with poorer childhood health outcomes like growth potential, stunting, and excessive immunostimulation."

10) Page 15, Line 10: "Our analysis was limited...". It would be helpful if the authors provided a transition into their limitations section (e.g., The present study faced several limitations. For example,...).

R/ A transition sentence has been added.

11) General Comments on Discussion Section: In general, the discussion section could be strengthened if the authors elaborated on their conclusions and supported their ideas with cultural and behavioral evidence from the study population. The ideas presented in the discussion section are vague and not interpreted in association with ethnographic data from the study population. Also, it would be helpful to modify how previous studies and results are presented in the Discussion; only presenting the lead author's last name is confusing and reduces the readability of this section.

R/ We hope the changes we have made have strengthened our discussion overall. We have additionally added et al. to the lead authors name.

Conclusion

1) Page 15, Line 41: "ways adopting and improving more". The phrasing of this statement is confusing and should be modified for clarity.

R/ This has been clarified.

"Important factors for discussion include ways to maintain and grow traditional knowledge and resources, and ways to adopt and improve upon Western resources like irrigation, primary health education, gender equality, and income."

2) General Comments on Conclusion Section: The Conclusion statement is vague and should be modified to end the manuscript on a strong note. For example, the authors ambiguously mention that "many complex variables affect these processes" but do not provide examples. Furthermore, the authors suggest that "some deleterious effects could be minimized"; however, they do not discuss the specific deleterious effects. Finally, the authors do not discuss the significance of this research for the study population and other indigenous populations.

R/ We have clarified for concreteness, including some examples. A sentence has been added regarding significance.

"This study is significant because it provides the community with information to guide future health interventions, and data to support the path towards those interventions (for example, funding, regional governmental support, community engagement)."

VERSION 2 – REVIEW

REVIEWER	Melissa A. Liebert Assistant Professor, Department of Anthropology, Northern Arizona University, USA
REVIEW RETURNED	19-Mar-2018

GENERAL COMMENTS	<p>The comments below are also provided in the attached file.</p> <p>General Feedback:</p> <p>Using a mixed-methods and participatory approach, this article examines factors associated with childhood stunting, overweight, and food insecurity among four Andean indigenous communities in Ecuador, a population undergoing rapid cultural and economic changes. Specifically, this study focuses on the effects of demographics, dietary patterns, and agricultural practices on childhood overweight, stunting, and food insecurity. Overall, this study provides insights into the effects of lifestyle change and economic development on childhood nutrition in the Andean region of Ecuador.</p> <p>I believe that substantial improvements have been made in the resubmission of this manuscript, particularly in the organization of the abstract, description of data collection procedures, and interpretation of results. I recommend that this manuscript should be accepted with minor revisions.</p> <p>Specific Feedback by Section:</p> <p>Abstract</p> <p>1) Page 2, Line 20: "The study involved four Andean indigenous</p>
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	<p>communities transitioning from traditional to Western lifestyle". This sentence could be improved by using "lifestyles" rather than "lifestyle".</p> <p>2) Page 2, Line 24: "Data was collected". This sentence should read "Data were collected...".</p> <p>3) Page 2, Line 24 "298 children from 139 households in four communities". Did all 139 households complete the questionnaire? It would be helpful to provide these details in the abstract. For example, "Anthropometric data were collected from 298 children from 139 households in four communities; all households completed the questionnaire".</p> <p>Introduction</p> <p>1) Page 4, Line 10: "The Andean Kichwa are one of the largest indigenous groups in the country.[2] Some 42% of indigenous Ecuadorian children under five years of age are stunted...". The transition between these two sentences is abrupt. It would be helpful to connect the broad information on indigenous Ecuadorian populations to indigenous children's stunting patterns by emphasizing existing health disparities among indigenous Ecuadorian populations, whereby stunting is an example.</p> <p>2) Page 4, Line 22: "where there are additional physiologic and agricultural stresses related to living at high altitude.[7]". In the Methods section, the authors expand on the agricultural stressors associated with living at high altitude (e.g., rugged and mountainous terrain); however, the authors do not acknowledge the physiological stressors associated with living at high altitude (e.g., hypoxia), which are important to consider when examining stunting among high altitude populations.</p> <p>3) Page 4, Line 38: "Because of their smaller stature, children who grow up with malnutrition are at a greater risk of overweight...". For clarity, should this sentence state "Because of their smaller stature, children who grow up with malnutrition are at a greater risk of BEING overweight..."? </p> <p>4) Page 4, Line 45: "The prevalence of overweight is possibly related to nutritional and epidemiological transitions associated with globalization and urbanization.[11] Market integration is defined by Liebert et al. as "the suite of social and cultural changes that occur with economic development", specifically as communities have increased participation in and dependence on markets for food resources.[12]". There are a few issues with these sentences. First, the authors state that the prevalence of overweight is "possibly" related to nutritional and epidemiological transitions; however, there is significant evidence to suggest that the prevalence of overweight is indeed related to nutritional and epidemiological transitions. Is the word "possibly" appropriate here? Furthermore, the definition of market integration provided by the authors should include additional citations and should focus on the degree of production for and consumption from a market-based economy. For example, these sentences could be revised as: "Recent evidence indicates that the prevalence of overweight is related to nutritional and epidemiological transitions associated with market integration, defined here as the degree of production for and consumption from a market-based economy, whereby communities have increased participation in and dependence on markets for food resources". In addition to the Liebert et al. (2013) study, the authors may want to cite some of the following resources: Lu F. 2007. Integration in the market among indigenous peoples. <i>Curr Anthropol</i> 48:593-602.; Godoy R, Cardenas M. 2000. Markets and the health of indigenous people: A</p>
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	<p>methodological contribution. Hum Organ 59:117-124.; Godoy R, Reyes-García V, Byron E, Leonard WR, Vadez V. 2005. The effect of market economies on the well-being of indigenous people and on their use of renewable natural resources. Annu Rev Anthropol 34:121-138.; McDade TW, Nyberg CH. 2010. Acculturation and health. In: Muehlenbein MP, editor. Human evolutionary biology. New York: Cambridge University Press. p 581-601.; Urlacher SS, Liebert MA, Snodgrass JJ, Blackwell AD, Cepon-Robins TJ, Gildner TE, Madimenos FC, Amir D, Bribiescas RG, Sugiyama LS. 2016a. Heterogeneous effects of market integration on subadult body size and nutritional status among the Shuar of Amazonian Ecuador. Ann Hum Biol 43:316-329.</p> <p>Methods</p> <p>1) Page 6, Line 3: “CHW”. Sentences should not start with acronyms. 2) Page 7, Line 51: “United Sates”. Typo; should read “United States”.</p> <p>Results</p> <p>1) Page 14, Table 3 Footnote: Should the footnote for Table 3 indicate that “variables were significant at $p < 0.05$”? Currently, the footnote states “$p > 0.05$”.</p> <p>Discussion</p> <p>1) Page 15, Line 27: First paragraph, First sentence. It would be helpful to rephrase the first sentence of this paragraph for clarity. For example, “There was an association between socioeconomic factors and children’s growth status and household food insecurity among indigenous Andean Kichwa in Ecuador”. In its current form, this sentence suggests socioeconomic factors affect food insecurity among children. 2) Page 15, Line 29: First paragraph, Second sentence. It would be helpful to add that household income below minimum wage correlated with food insecurity. 3) Page 15, Line 32: “household income was significantly associated with food insecurity...”. These results were described in the previous sentence and appear repetitive. 4) Page 16, Line 32: “It may be attributable to variations in activity levels...”. It would be helpful for the authors to elaborate on “it” here. Does “it” refer to sex differences here?</p> <p>Conclusion</p> <p>1) Page 18, Line 17: “local to world economy”. This phrase is vague, and it would be helpful for the authors to elaborate here.</p>
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VERSION 2 – AUTHOR RESPONSE

R// Thank you very much. We have addressed all the comments. You will find the changes highlighted in the manuscript.

Abstract

1) Page 2, Line 20: "The study involved four Andean indigenous communities transitioning from traditional to Western lifestyle". This sentence could be improved by using "lifestyles" rather than "lifestyle".

R// This has been corrected.

2) Page 2, Line 24: "Data was collected". This sentence should read "Data were collected...".

R// This has been corrected.

3) Page 2, Line 24 "298 children from 139 households in four communities". Did all 139 households complete the questionnaire? It would be helpful to provide these details in the abstract. For example, "Anthropometric data were collected from 298 children from 139 households in four communities; all households completed the questionnaire".

R// This has been clarified.

Introduction

1) Page 4, Line 10: "The Andean Kichwa are one of the largest indigenous groups in the country.[2] Some 42% of indigenous Ecuadorian children under five years of age are stunted...". The transition between these two sentences is abrupt. It would be helpful to connect the broad information on indigenous Ecuadorian populations to indigenous children's stunting patterns by emphasizing existing health disparities among indigenous Ecuadorian populations, whereby stunting is an example.

R// We reorganized the sentence to make the transition smoother and included a reference to explain the geographical variation among indigenous communities in Ecuador.

2) Page 4, Line 22: "where there are additional physiologic and agricultural stresses related to living at high altitude.[7]". In the Methods section, the authors expand on the agricultural stressors associated with living at high altitude (e.g., rugged and mountainous terrain); however, the authors do not acknowledge the physiological stressors associated with living at high altitude (e.g., hypoxia), which are important to consider when examining stunting among high altitude populations.

R// The physiological stressors are important factors indeed. We did not specify these factors in the methods section because our study did not aim to and was not equipped to evaluate them.

3) Page 4, Line 38: "Because of their smaller stature, children who grow up with malnutrition are at a greater risk of overweight...". For clarity, should this sentence state "Because of their smaller stature, children who grow up with malnutrition are at a greater risk of BEING overweight..."?

R// We have clarified the sentence following the suggestion of the reviewer.

4) Page 4, Line 45: "The prevalence of overweight is possibly related to nutritional and epidemiological transitions associated with globalization and urbanization.[11] Market integration is defined by Liebert et al. as "the suite of social and cultural changes that occur with economic development", specifically as communities have increased participation in and dependence on markets for food resources.[12]". There are a few issues with these sentences. First, the authors state that the prevalence of overweight is "possibly" related to nutritional and epidemiological transitions; however, there is significant evidence to suggest that the prevalence of overweight is indeed related to nutritional and epidemiological transitions. Is the word "possibly" appropriate here? Furthermore, the definition of market integration provided by the authors should include additional citations and should focus on the degree of production for and consumption from a market-based economy. For example, these sentences could be revised as: "Recent evidence indicates that the prevalence of overweight is related to nutritional and epidemiological transitions associated with market integration, defined here as the degree of production for and consumption from a market-based economy, whereby communities have increased participation in and dependence on markets for food resources". In addition to the Liebert et al. (2013) study, the authors may want to cite some of the following resources: Lu F. 2007. Integration in the market among indigenous peoples. *Curr Anthropol* 48:593-602.; Godoy R, Cardenas M. 2000. Markets and the health of indigenous people: A methodological contribution. *Hum Organ* 59:117-124.; Godoy R, Reyes-García V, Byron E, Leonard WR, Vadez V. 2005. The effect of market economies on the well-being of indigenous people and on their use of renewable natural resources. *Annu Rev Anthropol* 34:121-138.; McDade TW, Nyberg CH. 2010. Acculturation and health. In: Muehlenbein MP, editor. *Human evolutionary biology*. New York: Cambridge University Press. p 581-601.; Urlacher SS, Liebert MA, Snodgrass JJ, Blackwell AD, Cepon-Robins TJ, Gildner TE, Madimenos FC, Amir D, Bribiescas RG, Sugiyama LS. 2016a. Heterogeneous effects of market integration on subadult body size and nutritional status among the Shuar of Amazonian Ecuador. *Ann Hum Biol* 43:316-329.

R// The suggested text enhances the quality of the manuscript and adds clarity to the idea that we wanted to convey. Therefore, we have incorporated the suggestion and included an additional reference to support this statement.

Methods

1) Page 6, Line 3: "CHW". Sentences should not start with acronyms.

R// This has been corrected.

2) Page 7, Line 51: "United Sates". Typo; should read "United States".

R// This has been corrected.

Results

1) Page 14, Table 3 Footnote: Should the footnote for Table 3 indicate that "variables were significant at $p < 0.05$ "? Currently, the footnote states " $p > 0.05$ ".

R// This has been corrected.

Discussion

1) Page 15, Line 27: First paragraph, First sentence. It would be helpful to rephrase the first sentence of this paragraph for clarity. For example, "There was an association between socioeconomic factors and children's growth status and household food insecurity among indigenous Andean Kichwa in Ecuador". In its current form, this sentence suggests socioeconomic factors affect food insecurity among children.

R// This has been corrected.

2) Page 15, Line 29: First paragraph, Second sentence. It would be helpful to add that household income below minimum wage correlated with food insecurity.

R// This has been corrected.

3) Page 15, Line 32: "household income was significantly associated with food insecurity...". These results were described in the previous sentence and appear repetitive.

R// This has been removed.

4) Page 16, Line 32: "It may be attributable to variations in activity levels...". It would be helpful for the authors to elaborate on "it" here. Does "it" refer to sex differences here?

R// We have clarified this point

Conclusion

1) Page 18, Line 17: "local to world economy". This phrase is vague, and it would be helpful for the authors to elaborate here.

R// We have used the concept of market integration to describe the changes in the economy of these communities. This concept has been defined in the background and will allow the reader a better understanding of the idea.

VERSION 3 – REVIEW

REVIEWER	Melissa A. Liebert Northern Arizona University, Flagstaff, AZ, USA
REVIEW RETURNED	27-Apr-2018
GENERAL COMMENTS	I believe that substantial improvements have been made in the resubmission of this manuscript and recommend that it should be accepted for publication.