Author's response to reviews

Title: The rise in stunting in relation to avian influenza and food consumption patterns in Lower Egypt in comparison to Upper Egypt: results from 2005 and 2008 Demographic and Health Surveys

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Author's response to reviews:

Kavle et al, response to Reviewer 1 and 2 comments – for major, minor and discretionary revisions, submitted on February 16, 2015

Reviewer's report (Reviewer #1)
Title: The rise in stunting in relation to avian influenza: a comparison of the 2005 and 2008 Egypt Demographic and Health Surveys
Version: 2
Date: 24 December 2014
Reviewer: Caroline Hird

Reviewer's report:
Major comments
1. This study uses the results of the Egyptian Demographic and Health Surveys to explore possible associations between determinants of stunting (based on WHO framework of childhood stunting) and stunting in Egypt, in the context of an avian influenza outbreak and associated culling of poultry. The findings are very different for the two areas of Egypt: in Upper Egypt stunting significantly decreased whilst in Lower Egypt stunting significantly increased (as stated in lines 262 and 263). Different factors were associated with an increased risk of stunting in Upper Egypt than Lower Egypt, in both univariate and multivariate analysis.

Major Compulsory Revisions
2. Lines 373-375 states that the events which contributed to a rise in stunting in Lower Egypt between 2005-2008 were likely to be different from the events in Upper Egypt that protected children from stunting over the same time period.
However, the discussion of these different events is difficult to follow. Introduction of results not previously presented (i.e. in line 441-441) does not help, nor does inclusion of quoted narrative from other studies (lines 411-417 and 418-412). From the discussion it would appear that the mass reduction of chickens and eggs associated with the avian influenza outbreak was in Lower not Upper Egypt. This needs to be more explicit it this was indeed the case. We believe the addition of qualitative information relaying personal experiences of families, collected by our team, supports the demonstrated decline in reduced dietary diversity, shown in the quantitative survey data. We have added language to clarify the findings presented and feel it strongly supports our case, and should not be deleted from the discussion. The following language has been added to lines 405-424 on pages 18-19:

“...This decline in reduced dietary diversity is supported by families’ personal experiences of economic loss and changes in dietary habits, in response to fear of illness during the AI outbreak, especially for children. [32] Adults were often consuming “store-bought” frozen meat or previously frozen chicken, although with less frequency than prior to the AI outbreak. Yet, children were fed different, less nutritive foods than elders and were not fed chicken or meat. As relayed by one father from Lower Egypt, “The family started replacing birds with meat and fish ….our budget was affected and instead of having [animal] protein every day we started having it only once or twice a week. During avian influenza we were eating [frozen] birds they were buying and the children’s diet was affected like the whole family. Every day each family member used to have a piece of chicken accompanying the food, this was replaced by fish and meat and we cannot bear the price of these foods to be included in the diet so we served [meat] only once or twice a week and sometimes…replaced chicken with eggs.” [32]

Families relayed that meat and fish are very expensive — evidence of growing food insecurity in the face of economic crises. One father lamented “we started replacing these foods with rice, cooked vegetables and beans for a year and a half...the food for children was totally different from the elders. The children’s diet included yogurt, milk, and [sugary] biscuits... elder members had rice and vegetables.” Replacement of animal-source foods, with beans, lentils, and chickpeas, and an overreliance on cereals and tubers have been documented previously. [31, 32, 35, 36] Families expressed fears of animal source foods (i.e. chicken, eggs) as a source of indigestion and illness for young children, and often withheld these foods, as a response to fear of AI in Lower Egypt. [32]

3. Figure 1 has been slightly corrupted so that text is not correctly within textboxs. We have made this correction to Figure 1 – so that the text fits correctly within the text boxes.

Minor Essential Revisions

4. Line 66 Lannotti needs capital L The author’s last name begins with an “i” not an “L” — so therefore no change has been made — as the author’s last name is – Iannotti, with a capital “I”, as shown in Line 68, page 4.
5. Line 105-111 The description of how Egypt is divided into smaller units for the purposes of the survey is difficult to follow if unfamiliar with the terminology used. Three distinct areas identified in the EDHS are described: shiakhas, villages and medinas (major towns). How these relate back to kisms and marquezes is not essential to understand and suggest removing reference to these and so lines 105-107 reads: Egypt is divided into 27 administrative units, known as governorates. Each governorate is divided into shiakhas (urban areas), villages (rural areas) and medinas (major towns). We have removed the language referring to kisms and marquezes from lines 109-111 on page 6, and we have added the language: “Each governorate is divided into shiakhas (urban areas), villages (rural areas) and medinas (major towns)” to the existing language of Egypt is divided into 27 administrative units, known as governorates, as suggested by the reviewers, to lines 108-109, on page 6.

6. Line 112 not really sure how this sentence fits with earlier definitions/description of shiakhas, villages and medinas. Suggest removing comma and text, if this revision reflects the true meaning, so reads shiakhas and villages were the primary sample units. We have made this change from “For 2005 and 2008 data collection, shiakhas defined, as towns and villages were the primary sample units” to the following “Shiakhas and villages were defined as primary sample units.”, as shown in Lines 114 on page 6.

7. Line 200-204 in Table 1 only three variables are listed as maternal level nutrition-related factors (education, age and BMI); consumption of food groups does not appear and the other factors are listed as child level factors. This discrepancy needs to be corrected. We have provided edits to Table 1 – to include consumption of food groups for both mother and child, we have also edited the language in table 1 – so the word “maternal” is removed under “maternal level nutrition-related factors”, given the language is redundant.

8. Line 287 check p-value (p=0.44). In Table 2 the p-value is given as 0.044. This discrepancy has been corrected in Line 283, page 13. The correct p-value is 0.044.

9. Line 287 add was to sentence so reads: In 2008, the stunting was lowest in the poorest wealth quintile This change was made and the word “was” was added so the sentence “In 2008, the stunting was lowest in the poorest wealth quintile” in Line 283, on page 13.

10. Line 517 change evidenced to suggested – the limitations of the study as described by the authors in lines 503-505 mean that it is difficult to conclude that there is evidence for reduced dietary diversity. Although the limitations of the study described “blunt the associations” of diet in our statistical modeling, our data do show evidence of reduced dietary diversity through decreased
consumption of food groups, declining variety of foods fed to young children and
the lack of poultry raised and owned by households which was associated with
stunting. We do not think adding the language “it is difficult to conclude there is
evidence for reduced dietary diversity” is warranted and therefore, have not
included it.

Discretionary Revisions – these revisions have been incorporated into the
manuscript as described below:

11. Line 34 suggest adding referred to as to this sentence so reads
known as the “first 1000 days” and referred to as “the window of opportunity to
prevent nutrition”. In line 36, page 3, we have added the underlined wording to
existing wording: ‘known as the first 100 days and referred to as the window of
opportunity to prevent malnutrition.’ The word malnutrition rather than nutrition,
as suggested by the reviewer, was retained. During this period of time of rapid
growth and development, evidence suggests that the probability of reversing
stunting is low, so the first 1000 days is the opportunity to prevent chronic
malnutrition or stunting in the first 2 years of life, which mitigates further insults
into adulthood.

12. Line 57 change animal source foods to chickens so reads
Therefore, by removing chickens, as sources of household income and food for
the family diet, We changed the wording ‘animal source foods’ to ‘chickens’ in
Line 55, page 4.

13. Line 57 suggest removing d from decreased so reads decrease In Line 61,
page 4, we have removed the d from decreased in the sentence.

14. Line 60-62 (Raising animals…income and expenditure) suggest moving this
up to line 48, so this sentence occurs before sentence starting Since 2005. We
have moved the lines 60-62 to lines 50-52, page 4 – so it occurs before the
sentence starting with “Since 2005.”

15. Line 407 apostrophe before personal is superfluous The apostrophe in line
407 has been removed from the word “families”.

Reviewer’s report (Reviewer 2)
Title: The rise in stunting in relation to avian influenza: a comparison of the 2005
and 2008 Egypt Demographic and Health Surveys
Version:2 Date:29 January 2015
Reviewer: Anjali Pai

Reviewer’s report:
Summary
This is a secondary analysis of the effects of the avian influenza outbreak in
Egypt, leading to lack of availability of poultry and changes in nutritional intake, on stunting in childhood. It compares cross-sectional data from the Egyptian Demographic and Health surveys in 2005 and 2008 between Lower and Upper Egypt. According to the authors’ analysis, it can be concluded that the avian influenza outbreak in Lower Egypt led to reduced nutritional food intake in children, which was one of the factors that contributed to stunting. Poor nutrition in childhood and stunting are important public health issues as they can affect the health of children into adulthood, which can in turn lead to reduced productivity for individuals, their families and societies. The authors recognize the public health problems associated with stunting and the significance of this in Egypt. They have completed a comprehensive literature review which provides a good context to the study, and have mostly appropriately acknowledged their sources of reference. The objective of the paper is clear. Statistical tests used - chi square and t-tests for unadjusted analysis, and logistic regression for multivariable analysis - are appropriate and fairly well described but require clarification (see comments below). Permission to use data was obtained. Suggestions for improvement/clarification on the results and discussion sections are included in comments below. Overall, this paper has been written well with a reasonably good structure and formatting (except for comments mentioned below); however several essential and compulsory revisions are required. The manuscript may be re-considered for publishing after revisions have been made.

Discretionary Revisions: We have addressed the discretionary revisions to the paper as follows:

1. The abstract provides a reasonably accurate summary of the paper. Consistency in displaying results in the abstract in terms of mentioning confidence intervals and p values is advisable for clarity. We have added the confidence intervals and p-values for clarity and consistency in presenting our statistical modeling results in the results of the abstract, lines 14-21 page 2.

2. The term ‘avian influenza’ and its abbreviation (AI) are both used throughout the paper. Suggest using only one for consistency. The avian influenza abbreviation is first cited in lines 55, page 4 and thereafter, the abbreviation is used throughout the body of the manuscript. The only exception where avian influenza is not abbreviated is when a quote is cited by families affected by the avian influenza Line 412, page 19.

3. ‘Figure 1’ is repeated twice in paragraph for ‘Conceptual framework’ (lines 84-91). The repeated wording of Figure 1 was removed from page 5. Currently, Figure 1 is cited only once in this paragraph.

4. The full form of PSU is repeated twice before using the abbreviation (lines 112 – 115). The full form of PSU, defined as primary sampling unit, was used once in
line 106, on page 6. The abbreviation (PSU) was used subsequently in the paper.

5. It is advisable to use full form for Length for age Z score (line168). The full form of Length for Age Z score was used to replace LAZ in Line 170, page 9.

6. The list of abbreviations than the authors have included will be more useful if in the initial part of the document (if acceptable as per journal rules). Thank you for your comment on the list of abbreviations. We will leave the decision up to the journal (BMC Public Health) as to the placement of the list of abbreviations, whether in the initial part of the document or in the latter part of the document, as acceptable per journal rules. We would prefer to have it in the initial part, as the reviewer suggests.

7. Water and sanitation variables are mentioned in the text but not shown in the tables. Water and sanitation variables were not found to have a statistically significant relationship with child stunting in both bivariate and multivariate regression analyses in both 2005 and 2008 data, which is why they were not included in the tables.

Minor Essential Revisions: these minor essential revisions have been addressed, point by point, as shown below.

1. Consistent spacing between paragraphs and different sections of the paper, indentation of the first line of new paragraphs, and reconsideration of certain sub-headings (italics/bold, etc) is advisable to differentiate between sections (e.g. lines 187-189). We have used the spacing recommended by the journal, and also double checked the indentation of the first line of new paragraphs. We have added any indentations that were missing. In the Methods section of the paper, on pages 6-12, we have subheadings in italics font, including the following: Sample size, Assessment of nutritional status, Study instruments, Description of variables, Outcome variable, Independent variables and Statistical data analyses. Additional subheadings are provided in the results section. We have also added Strengths and Limitations subheading to the discussion section, per the other reviewer’s comments. We feel these subheadings are sufficient and clearly marked, and additional subheadings are not necessary.

2. Two of the author affiliations have been marked as ‘2’ and ‘4’ has been missed. The changes to the author’s affiliations have been made on page 1 (Cover Page). The 2nd affiliation is with PATH, the 3rd affiliation with El-Zanaty and Associates and the 4th affiliation is with George Washington University, Milken Institute School of Public Health, Department of Prevention and Community Health, Washington DC, USA.

3. The word ‘surveys’ is missing in line 71: “....Lower Egypt between the 2005 and 2008 Egypt Demographic and Health [6]....” We added the word ‘surveys’ to Line 73, page 5.
4. Clarification is required for the full form of EDHS and whether the ‘E’ of EDHS stands for Egypt or Egyptian? It is advisable to remain consistent and state abbreviation of a term when it is first used in the paper (and only use abbreviated form there on) The full form of EDHS is Egypt Demographic and Health Surveys. The definition of EDHS has been first described on line 6 in the abstract on Page 2 and also line 97, Page 6 in the Methods section. We changed the definition of EDHS from Egyptian Demographic and Health Surveys to Egypt Demographic and Health Surveys. Thereafter, the abbreviation of the term is used.

5. Figure 1 needs to be re-formatted so that the outlines of boxes do not overlap with the words. The formatting issues with Figure 1 have been fixed so the outlines of the boxes do not overlap with the words.

6. The definition of ‘shiakas’ is repeated three times (lines 106, 112, 118). Using a different phrase to ‘defined as’ may clarify this. We have added the sentence “Each governorate is divided into shiakhas (urban areas), villages (rural areas) and medinas (major towns)” in Lines 108-109 on page 6 to provide definition and clarity to the word shiakhas.

7. Tables 2 and 3 require re-formatting. Suggest consistent line spacing/ column width/landscape layout and avoidance of splitting tables over two pages which can be a deterrent to the reader. In addition, re-ordering variables by child, maternal and household factors is advised to improve continuity for the reader. We have reordered the variables in Tables 2 and 3 by child, maternal and household factors. We also reordered the variables for Table 1. Per guidelines by BMC Public Health journal, the tables were submitted in portrait layout and not landscape layout. In addition, tables within 2 pages (A4 format), are considered acceptable for submission of the manuscript.

8. The term ‘unadjusted analysis’ should replace ‘bivariate analysis’, and ‘multivariable’ should replace ‘multivariate’. This change from ‘unadjusted analyses’ to ‘bivariate analyses’ has been made in Line 266, page 13 and Line 301 page 14. The word “multivariable” was not found in the manuscript, the existing wording “multivariate” has been used throughout the manuscript, where appropriate.

9. The statistical software package should be ‘Stata’ and not ‘STATA’ as it is not an abbreviation. The change has been made from STATA to Stata, as reflected in Line 100, on page 6.

10. Line 276 needs to be amended: Stunting in greater proportion of males than females in 2005 is not significant (p=0.510). We have edited the language in 276, to read “ In Lower Egypt, a significantly greater proportion of males were stunted (34.4%) than females in 2008 (p=0.002) than 2005 (17.1%) (p=0.510).” We feel
adding the p-values associated with different survey years will add to the understanding of this sentence, shown in Lines 271-273 on page 13.

11. There is no mentioned of analyses between mother’s BMI and stunting (tables 2&3) in the paper. We have presented the results on maternal BMI and stunting in Lines 286-288, page 14 and included the following” In Lower and Upper Egypt, in 2005, stunted children were more likely to have a mother that was thin, normal or overweight than obese (p<0.001). Yet, in 2008, stunting by maternal BMI was evenly distributed across thin and normal, overweight and obese mothers. “

12. The statement “Declining dietary diversity....figure 3” should include mention of the years 2005 and 2008 to give the term ‘respectively’ meaning, and clarity to the sentence. The wording of 2005 and 2008 was added to in Lines 320 and 321 on page 15.

13. Grammatical corrections:
   a.Lines 382-383, ‘was reported’ should be deleted We have deleted the language ‘was reported’.
   b.Lines 395-396 should be revised to “.....with large and significant decreases found in Lower Egypt and Upper Egypt.” We have changed the following “Dietary diversity decreased across all regions of Egypt between 2005 and 2008 EDHS, with a large and significant decreases were found in Lower Egypt and Upper Egypt” to “Dietary diversity decreased across all regions of Egypt between 2005 and 2008 EDHS, with large and significant decreases found in Lower Egypt and Upper Egypt.” The change in wording is underlined and the changes are found in Lines 392-393 on page 18.

14. The paper would benefit from a subtitle of ‘Strengths and limitations’ under the discussion section. This subtitle has been added to the Discussion section in Line 495, page 22.

Major Compulsory Revisions:
1. Although the main aim of the paper (lines 80 to 83) is well defined, the title of the paper is not as focused as it does not specify the population of interest i.e. children aged between 6 and 59 months, or nutritional variables. Also the ‘rise’ in stunting was in Lower Egypt only, but the study is a comparison between Lower and Upper Egypt.
For e.g. ‘Stunting in relation to avian influenza and nutrition in children under five years: a comparison of the 2005 and 2008 Egypt Demographic and Health Surveys’ addresses these points and is suggested as an alternative.
We changed the title to “The rise in stunting in relation to avian influenza and food consumption patterns in Lower Egypt in comparison to Upper Egypt: results
from 2005 and 2008 Demographic and Health Surveys.” This title captures the food consumption and reduced dietary diversity of both children and mothers. The rise in stunting in Lower Egypt in comparison to Upper Egypt is also captured IN THIS REVISED TITLE, since the results presented VARY GREATLY, BY REGION, AND THE AVIAN INFLUENZA OUTBREAK OCCURRED IN LOWER EGYPT. Given stunting is often described in children and collected ROUTINELY as an indicator of CHILD nutritional status by Demographic and Health Surveys, we do not tHINK IT IS NECESSARY TO SPECIFY the ages of the children IN THE TITLE OF THE MANUSCRIPT.

2. The maternal level factors mentioned under methods (lines 199-204) do not tally with the variables in table 1. Only 6 maternal variables are mentioned although the author states ‘seven’. We have changed the number of variables to 6 in Line 200, page 10. We also added the consumption of food groups to Table 1 to ensure consistency between text and table.

3. In table 1, ‘birth interval’ and ‘size at birth’ are mentioned as child level factors rather than ‘maternal level’ as stated in lines 202-203. ‘Consumption of food groups’ is not included in table 1 as a variable, but has been stated in line 204. We made the corrections and included birth interval and size at birth factors as maternal level factors. We also included the consumption of food groups in table 1.

4. The authors mention using Pearson’s chi square and t-tests (line 239) for unadjusted analysis. However it is unclear which results are represented by these tests in Tables 2 and 3. Chi-square is commonly used to test differences in frequencies in categorical data and t-tests are for comparisons of means of continuous variables. We have added the following text (underlined): Bivariate analyses were performed using Pearson’s chi-square, to test differences in frequencies of categorical variables and t-tests, for differences in means of continuous variables in lines 237-239, page 11.

5. In the penultimate paragraph of the methods section, the authors mention that bivariate (unadjusted) and multivariate (multivariable) model analysis is presented for 2008 only in Lower Egypt. However tables 2 and 4 represent analysis for both 2005 and 2008 in Lower Egypt. We removed the sentence “No variables were found to be significant in bi-variate and multivariate models for Lower Egypt in 2005, therefore analyses is presented for 2008 only” from lines 248-250. This sentence was after the following sentence: “Descriptive and bi-variate associations of dietary variables and stunting analyses are discussed in these analyses” on page 12.

6. It would have been useful if the term ‘variance inflation factor’ was explained in detail for better understanding (last paragraph of methods section). We added /modified wording (underlined) to the existing explanation in the manuscript to
All variables in the final logistic regression model were tested for multicollinearity using the variance inflation factor test. Variance inflation factor values greater than five were considered to be a collinear and were removed from the final model. Maternal educational level and household wealth were specifically checked for multicollinearity (i.e. given wealth often increases with education), and not found to be collinear.” We feel the explanation is sufficient in explaining why and how multicollinearity was checked.

7. In the results section, the authors state “Mothers with birth intervals less than 24 months since a previous birth were significantly associated with increased stunting in Lower Egypt for 2008 (p=0.035) and 2005 (p =0.087)”. However from table 2 it is clear that for 2005 this is only true if comparing birth intervals less than 24 months to >48 months (all others are similar ~ 17%). In Lines 307 – 309, page 14, we have added the underlined wording to the sentence reviewers are referring to, to clarify that the comparison of less than 24 months to 48+ months in Lower Egypt, 2005: ‘Mothers with birth intervals less than 24 months since a previous birth were significantly associated with increased stunting in Lower Egypt for 2008 (P = .035) and 2005 (P = 0.087, compared to 48+ months only) and for Upper Egypt in 2005 (P = 0.046) (Table 2). ‘

8. The authors fail to mention the other strength of using EDHS data which is it had a representative sample, including oversampling in remote areas. In Lines 496-498, page 22, we provided additional information on the strength of the EDHS, as denoted in the underlined portions of the sentence– “It is based on data from nationally representative demographic and health surveys that used internationally validated questionnaires, with high response rates (>98%), and provide oversampling in remote areas.” These edits incorporate the language suggested by the reviewer.

9. The authors also do not mention the disadvantages of data collection through questionnaires (memory bias, incomplete data). Also, there is no mention of missing data and how this was adjusted in the analysis. In Lines 503- 504, page 23 we provide additional information on memory bias “Participants must also rely on memory to recall information collected by questionnaires, which may contribute to possible memory bias.” Regarding missing data, we have provided information on how many children were measured and that complete data were available for 97.2% of the sample. Data excluded were due to outliers or no data for child age in the DHS dataset. The data was restricted to available data - which only excluded 2.8% of the sample - and did not change the outcome of our results presented in this manuscript. The following explanation in the Methods section of the manuscript in Lines 146-152, page 8, discusses these points: “The nutritional status of children was determined by measuring the height/length and weight of all children less than six years of age living in households selected in the EDHS sample, where 99% of children were measured. Six (2005) and ten percent (2008) of the data were considered implausible due to outliers or no data
for child age in months was available. Thus, the data were restricted to 12,131 and 9,103 children, 6-59 months of age, in 2005 and 2008, respectively, with credible anthropometric data and to children that were breastfed, which included the majority of the sample (97.2%).” Analyses was then restricted to last-born children with credible anthropometric data.

10. The authors have found a difference in the prevalence of stunting in two populations across two time periods. They claim that the rise in stunting in Lower Egypt is attributable to the avian influenza outbreak despite clearly stating in lines 263-264 that stunting coincided with the outbreak. Also only household ownership of poultry rather than avian influenza on an independent level has been measured. Changes in diet (apart from reduced consumption of poultry), reduced diversity of diet, and feeding practices could have happened despite the avian influenza outbreak. These in turn could be due to reasons such as lack of dietary education and health promotion (such as consumption of other animal products), increased availability and affordability of non-nutritious food in Lower Egypt can all be attributed to a rise in stunting (supported by evidence). In addition the impact of maternal and child health project in Upper Egypt may have contributed to better feeding practices and reduced stunting there. All this has been acknowledged in the paper (lines 444-468). The conclusion therefore that stunting in children under five years in Lower Egypt can be attributed to the avian influenza outbreak has been overstated. In this manuscript, we have pointed to several reasons for the rise in stunting, not only the avian influenza outbreak. In the abstract our conclusions on page 2 state:” Decreased dietary diversity, reduced poultry consumption, substitution of nutritious foods with sugary foods paralleled a reduction in household raising of birds, following the AI outbreak in Lower Egypt and not Upper Egypt. Increased feeding of sugary foods due to fear of illness or greater penetration of these sugary foods may be related to stunting.” We concede that growing availability of these foods, greater food insecurity, and affordability, all play a role in stunting, and therefore have not singled one reason, but rather discuss that the rise in stunting coincided with all of these events. This is also discussed in detail in the Discussion section.

11. It would be useful if the authors could mention the relevance of their findings applicable to other populations, and the usefulness of their research in the discussion/conclusion sections. We have added the following language to address applicability and usefulness – in the conclusion section in lines 531-536, page 24: “Intake of sugary foods and junk foods should be monitored in other countries as well, given the growing frequency in use and demand for these foods[57, 58]. Mothers need advice on infant and young child feeding to improve children’s dietary intake and reduce intake of sugary foods. Mothers in Egypt and elsewhere should be counselled, to feed the nutritious foods they are consuming
to children and on birth spacing for two years for optimal growth and development and to prevent stunting.

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:
I declare that I have no competing interests