



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

Innovative Metrics of Diet Quality in Low- and Middle-Income Settings

Webinar Transcript

Katie Appel

Good morning, afternoon, and evening, thank you all for joining today's webinar to learn more about innovative metrics of diet quality in low- and middle-income settings. My name is Katie Appel and I'm an assistant researcher for the Feed the Future Innovation Lab for Nutrition and will be your MC for this webinar today. As attendees are joining, I'll begin by going over some housekeeping items. I'd like to direct all attendees to a few functions on this Zoom webinar. At the bottom of your screen, you should see a chat icon and a Q & A icon. Use the chat feature to engage in relevant conversation with other attendees. If you have a question for one of the panelists, please use the Q&A feature. Panelists will respond to questions in the Q&A box throughout the webinar and we have allotted the final 20 minutes of this webinar for Q&A. If you're experiencing any technical difficulties, send a message in the chat box to all panelists so our technical support staff can work with you to resolve them.

This webinar is being recorded and will be made available on the Innovation Lab for Nutrition website and the USAID Advancing Nutrition website. There you can also view recordings and slide decks of previous webinars. We will repeat these technical housekeeping items in the chat throughout the webinar as people may join at later times.

Before I introduce today's moderator, I'll give a brief introduction to the Nutrition Innovation Lab and our webinar series. We are a Feed the Future Innovation Lab supported by USAID Bureau for Resilience and Food Security. And we are active in supporting research and capacity building, to build the evidence base around critical questions linked to agriculture, nutrition and health. As you can see from this map, we are active in sub-Saharan Africa and South Asia. More information can be found on our website at nutritioninnovationlab.org. Next slide.

The Nutrition Innovation Lab is a consortium led by the Friedman School of Nutrition Science and Policy at Tufts University. With US university partners, including Purdue, Harvard TH Chan School of Public Health, Johns Hopkins School of Public Health, and Tuskegee University. In addition, we partner with government agencies in our host countries, UN agencies, local and international NGOs, as well as universities across the globe. Next slide.

It's now my pleasure to introduce the moderator for today's webinar, Lindsey Anna. Lindsey is a public health and international development professional with over 10 years of experience designing, implementing, and monitoring multi sectoral development programs. As a nutrition analytics advisor for USAID's Bureau for Resilience and Food Security, Lindsey provides analytic technical support to Bureau, Mission, and Agency staff to improve strategy, design, and performance measurement, with an emphasis on multisectoral nutrition. Lindsey, over to you.

Lindsey Anna

Thank you so much Katie, and good morning, good afternoon, and evening everyone. I'm so honored and excited to be part of today's webinar. And as Katie mentioned, I will be moderating most of today's

discussion as we listen and digest the brilliant content of our panelists presentations. As Katie mentioned, we are going to be taking comments and questions at the end of this webinar and the Q&A box. So, we'll be happy to address questions at the end.

Today we are joined by Dr. Anne Swindle, a senior monitoring, evaluation and analytics advisor in the analytics and learning division at USAID's Resilience and Food Security Bureau. We also have Dr. Isabel Madzorera, a postdoctoral researcher with Harvard University. Dr. Rumana Akter, a senior nutrition advisor with Save the Children Bangladesh, and Dr. William Masters, a professor at the Friedman School of Nutrition and Department of Economics at Tufts University.

I'm very excited to hear from our panelists today and again will be moderating today's discussion. This topic on innovative dietary metrics has gained a lot of attention in the last decade. And our attention continues to grow as economies and dietary patterns globally change. With it, a rising burden of overweight and obesity and non-communicable diseases, particularly in low and low to middle income countries, also continues to grow. As the nutrition landscape changes, we know we must adapt current metrics to fully capture these emerging trends.

While also looking to new metrics that improve our contextual understanding of dietary patterns and also help us refine our programming at critical intervention points. And ultimately that's what we want to do, is create programs that address the issue and the problems. At the same time, we must also acknowledge the heavy cost and complexity of collecting dietary data. And look at ways in which we can use existing information to inform diet quality measurement. So, I think we'll hear from our panelists today on a range of topics covering these areas. And I'm very excited to hear what everyone has to say and how much I know I can learn from each and every one of these panelists.

So, on that note I'm honored to pass the mic to our first panelist, my colleague and mentor Dr. Anne Swindale, a PhD economist, with more than 30 years of experience in technical assistance, research and project management in agriculture, food security and nutrition strategy and program assessment design, monitoring and evaluation. She is a senior monitoring, evaluation and analytics advisor in the Analytics and Learning Division in the USAID Resilience of Food Security Bureau. Thank you, Anne and the floor is all yours. Next slide, I think.

Anne Swindale

Well, thank you very much Lindsey and good morning afternoon and evening everyone, I am delighted to be here to kick off what is sure to be a very interesting webinar. Next slide please. I'm going to start my brief introduction with information of which many in the audience may already have been aware, and to which Lindsey already referred.

While undernutrition among women and children is currently a far greater burden in low and lower middle-income countries, the burden of overweight, obesity and poor diets is rising. Adding substantial cost to the already overburdened health care systems. Data from the Institute of Health Metrics and Evaluation, which is presented here, and presents information, the burden measured by disability adjusted life years, shows that if current trends continue the burden of high BMI and dietary risks, the purple line, is likely to overtake that of child and maternal undernutrition, the orange line, by 2030. Which may be much sooner than you may have thought.

And to emphasize, this is not in upper middle- and high-income countries. This is in the low and low middle-income countries where USAID focuses our efforts. But USAID's focus on undernutrition remains critical in the current global context. There's a risk that the most vulnerable will be left behind if we lose our focus on those countries and populations with the highest burden of undernutrition, where children are not realizing their full potential to survive and thrive. However, the evolving context in the world's poorest countries does suggest that an explicit conversation on of overweight, obesity and poor diets, and the role of our work in addressing these issues, is needed. Next slide please.

Under the global food security strategy, Feed the Future has increased its focus on the food systems level and on integrating a food systems focus across sectors to sustainably ensure the local availability of affordable, safe, nutritious, healthy and diverse foods year round. These efforts are aimed squarely at increasing consumption of diverse and healthy diets in the population, especially among women and children, in the areas where we work. The risks of both under and overweight and of diet-related non-communicable diseases highlight the need to improve, to both improve and to move beyond simple indicators of diet diversities developed as proxies for nutrient adequacy, to measures that also capture consumption of the unhealthy foods that are the drivers of increased overweight and non-communicable diseases. The lack of widespread availability, and as Lindsey referenced, the cost and complexity of collecting individual quantitative dietary data, also highlight the need to develop measures that take advantage of existing data to provide more frequent and geographically granular information that can diagnose challenges to and help track progress towards the two important objectives listed on this slide.

Because a poor diet contributes to malnutrition in all of its forms, you say it is investing in better tools to collect data and measure diet quality, particularly in low resource settings, to inform policies, design interventions and programs, and improve nutrition and health outcomes. Within the Bureau for Resilience and Food Security, we are working to improve metrics and measurements for our technical approaches. We know we need analytic tools to move into a data driven and very tangible implementation approach for our food systems work. So, we're working with partners, including Advancing Nutrition, Eat Safe, the Nutrition and the Food Safety Innovation Labs, business drivers for food safety, and the upcoming innovative lab for Food Systems for Nutrition to focus on methods, tools, and measures to help us better understand the food environment overall and consumer demand while developing, testing, and validating new and existing metrics to better measure impacts on dietary quality and food safety. And we're working to strengthen the ability of countries, missions, and our implementing partners to measure the food environment, to measure incremental steps on the pathway to build consumer demand and to better measure diet quality as the intersectoral collaboration to combine food systems and specific nutrition interventions in the most effective and efficient manner.

We're very cognizant that we have to strike the right balance between the burden of reporting, while being able to inform and to capture all of the good work that we're doing. And we're continually looking for ways to improve. Today's webinar will present research on some innovative metrics and approaches that definitely contribute to these very important objectives. So, thank you very much and I'm looking forward to hearing what our colleagues have to say. Back over to you Lindsey.

Lindsey Anna

Thanks so much, Anne. I think it deserves just reiterating that the valuable work and data our USAID partners, some which are on this call, really contributed to improving metrics and measurement in this space. And so, you know we really look to our partners to really help us in this area, improve metrics and lead the research that's paving the way for, you know, new innovations and new ways of thinking about this important topic. So again, thank you Anne. I'd like now, I'd like now to introduce Isabel Madzorera, a postdoctoral researcher at the Harvard School of Public Health.

Isabel has a doctoral degree in nutritional epidemiology from Harvard University, a master's degree from Tufts university and a bachelor of science degree in Nutrition from the University of Zimbabwe. Her interests are in the intersection of agriculture, nutrition and sustainable diets, and her work experience includes with Save the Children, UNICEF, World Bank, and the Zimbabwe Ministry of Health. She will be focusing her presentation today on some of her own research. Isabel we're ready when you are.

Isabel Madzorera

Great, thank you so much Lindsey and everyone. Good morning, good afternoon, good evening. Oh, I hear some background noise.

Sorry, okay I'll proceed. So good morning, good afternoon, good evening everyone. Today I'll be talking about some of the innovative metrics for measuring diet quality focusing on women, mostly in low- and middle-income countries. Next slide please.

We know that globally food systems are failing to deliver nutritious diets and as has been described by previous speakers, we know that this has resulted in increasing our occurrence of micronutrient deficiencies, such as anemia, as well as still prevalent problems such as stunting and increasing overweight and obesity, not only in children, but also in adults. Next slide please.

There are three factors that have a role in some of these observations. To start off, we can talk about how women and children, particularly low- and middle-income countries, have really poor diets that tend to be monotonous with limited availability of animal source foods, fruits, and vegetables. In addition, there's also increasing diet transition, which has been also mentioned by the previous speakers in which increased consumption of refined grains such as refined maize meal, white rice white bread, etc., has also increased along the consumption of processed and ultra-processed foods and added sugars. And then, finally, the nutrition transition that has already been mentioned by Anne, which has also been associated with increased overweight and obesity related diseases, as well as the related low physical activity primarily for those people that are residing in urban areas, and all these factors have a role to play in poor nutrition outcomes. Next slide please.

Globally, we know that at least 11 million people die each year due to dietary risk factors and sub optimal diets. And we also know that sub optimal diets are now the number one risk factor for mortality, increasingly higher than even the risk attributed to smoking. Next slide please.

In this figure, which is from the global burden of disease, we see on the right-hand side the number of deaths at a global level that can be attributed to diet measures of dietary intake, quality and different nutrients. And in the middle, for example, we have diets that are high in sodium and low in whole grains, fruits, and vegetables, and how they contribute to mortality from different disease outcomes. The red color on the right indicates cardiovascular disease, the next color shows diabetes, and then light pink color shows mortality due to cancers and other related diseases. And as you can see, diet in effect is responsible for a lot of cardiovascular diseases, type two diabetes, and so forth.

And then on the left the panel show the different regions of the world where this mortality is based. And you can see the orange represents the high-income countries. And the blues represent the low- and middle-income countries. And as you can tell mortality due to nutritional factors is prevalent, both in high income countries, as well as in the low- and middle-income countries. Therefore, we ought to put more effort to addressing this issue. Next slide please.

When we think about the measurement of diets and diet quality, one of the issues that constantly arises is that diet quality itself is hard to define and hard to measure. We know that diet quality is composed of at least four different dimensions. We can think of nutritional adequacy, which assesses whether diets provide both macronutrients and micronutrients to meet the recommended daily allowances. Meaning that someone is able to meet the nutritional requirements based on the diet. Then secondly, diets also have to consider the issue of moderation, where we want to limit consumption of sodium, processed foods, and saturated fats, and other things that we know are related with poor nutrition outcomes.

In addition, healthy diet should also be diverse, providing a different variety of fruits and vegetables in order to meet the required requirements. And then, lastly, the issue of balance, where the contribution of different macronutrients is important and has to be balanced. For example, the carbohydrates, the fat and the protein intake need to optimize nutritional health. And all these factors are quite important in low- and middle-income countries, primarily within the context of the global dietary transition. Next slide please.

So, we know that diet diversity is the most prevalent way in which will be measuring diet quality. And I'll give an example of the FAO minimum dietary diversity score for women, which is composed of the 10 food groups that are shown on the right. We know that this has been used, because we know that diversity is associated with micronutrient adequacy, primarily with a vitamin A, iron, and multiple other micronutrients.

However, there's a limitation in that we know that the MDDW only assesses one aspect of diet quality, which is micronutrient adequacy. It does not capture dietary transitions in low- and middle-income countries, as well as the consumption of unhealthy foods such as processed and refined foods that are increasing across the globe. Next slide please.

As a way to address sort of the deficiencies in our current ways of measuring diet, we've been exploring a measure of overall diet quality for the prime diet quality score. The prime diet quality score assesses the consumption of healthy food groups and unhealthy food groups. It is composed of 14 healthy food groups that include an array of fruits and vegetables, poultry, nuts, etc. And then the unhealthy food groups that you track in this index include red meat consumption, processed meats, refined grains, and sugar sweetened beverages, among other things.

The scoring for the PDQS is as follows. For the healthy food groups, if someone consumes four or more servings a week, they get two points, which is the maximum. And if they have one serving or none, each week they get zero points. And the scoring is reversed for the unhealthy food groups where we give, we penalize consumption of four more servings per week of any other different groups. The score itself is a sum of scores across the different foods. We are trying to assess the PDQS, because we believe that the PDQS has been associated with cardiovascular diseases, as well as gestational diabetes and other poor outcomes during pregnancy. Next slide please.

When we look, we wanted to understand sort of the role of overall diet diversity and diet quantity and how they relate with poor birth outcomes in Tanzania, as a way to understand the use of these indices in a setting in sub-Saharan Africa. And this work was recently published in the journal, American Journal of Clinical Nutrition. Next slide please.

In this study, we conducted a study in about 8,000 pregnant women, the data was collected from 2001 to 2004 in Dar es Salaam which is urban in Tanzania. And the inclusion criteria for the study included that women be between 12 and 27 weeks of gestational age. The study collected dietary recall data at multiple times during pregnancy, starting the second trimester. Next slide.

I'll start off by describing the dietary intake that we observed in these women in urban Tanzania.

First of all, I'll talk about the consumption of the healthy prime diet quality food groups. So just to orient us to this figure here, the blue color indicates one serving or less per week of the food group, and then two to three servings are indicated by the Green color. And then for more servings are indicated by the Red color.

And as you can see, on the X axis, we have the prevalence of individuals consuming at the different frequencies of the different food groups. And as we can see from this, we found low consumption of the majority of healthy foods in this urban population. We found, for example, that consumption of nuts and seeds, as well as a whole grains. And, as well as eggs and poultry was quite limited in this study population. Next slide please.

When we looked at the consumption of the unhealthy food groups, we found the following. Remember the blue indicates one serving or less in this study population, and two to three servings are indicated by green, and the red indicates four or more servings. So, we found that consumption, we found high consumption of refined grains, modest consumption of red meat which was at a level that was higher than we expected, as well as consumption of some desserts and ice creams. Next slide please.

Just to indicate that that prime data quality scores in the study population were quite low, with a median of about 19 out of 42, indicating that that diet quality was known among the women. Next, we wanted to understand how diet quality is related to the risk of poor pregnancy outcomes for these women. And so, in this study we looked at different outcomes, including preterm birth, small for gestational age, low birth weight, and fetal loss. Next slide please.

In this current study, we found that pregnant women with highest diet quality, that is women that were quintile 5 of the PDQS, had up to 45% lower risk of preterm birth. Next slide please.

And women with the most, the highest diet quality, also had a lower risk of low birth weight by about 47%. Next slide please. And the same occurred for fetal loss. So by and large, we found that a higher diet quality was associated with lower risk for the three outcomes. Just to highlight that both preterm and SGA were affecting more than 15% of the study population, and low birth weight was slightly lower at around 7%. Next slide please.

When we looked at the diet diversity scores as one of the indicators that has been used, we found that consumption of starchy staples in the population was high, as was consumption of flesh foods and meats and vitamin A-rich fruits and vegetables. However, the median diet diversity score was low at three out of a maximum of 10. Next slide.

When we looked at now the diversity scores, and how that relates with risk of the poor pregnancy outcomes we were concerned with, we found that women with the most diverse diets, that is women that were in quintile five of the diet diversity score, had up to 26% lower risk of small for gestational age. And we found no associations between DDS and other pregnancy outcomes. Next slide please.

And just to summarize the key findings, we found that maternal dietary diversity and quality during pregnancy were important risk factors for pregnancy outcomes in urban mothers in Tanzania. However, we found that the PDQS performed better as a predictor of poor pregnancy outcomes compared to the diet diversity score. Therefore, we think moving forward we should consider overall diet quality as an important factor in poor birth outcomes. Next slide please.

Because we had seen this association in an urban location, we wondered whether diet quality could be measured in a rural location. Was it important? And what were some of the factors that could be associated with diet quality? Next slide.

So, we conducted a study in Rufiji district in rural Tanzania. In this study wanted to evaluate associations between food crop diversity, women's access to income as well as access to food markets, and how that relates to women's diet quality in rural Tanzania. We also evaluated for effect modification by distance to market. In this study, which was within a homestead food production intervention, women had access to vegetables and vegetable seeds as they were running vegetable gardens. And they also received behavior change communication. This analysis is based on a midline analysis, conducted in about 880 women. Next slide please.

Also, now just to recap some of the key findings in terms of the prime diet quality score in this rural population, we found overall that there was low consumption of some healthy food groups such as eggs, nuts, and poultry. And this is similar to what we've observed in the urban population. We, however, found in this rural population that consumption of whole grains was higher, as well as consumption of other vegetables, fish, and legumes. Next slide.

When we looked at the consumption of unhealthy foods, we found that there was also a high consumption of refined grains as well as potatoes, roots, and tubers. We however found modest consumption of desserts and ice cream, as well as sugar sweetened beverages. We, however, found low consumption of meat which is different from what we'd observed in the urban population. Next slide.

Now, when we wanted to see what factors based on food systems were associated with diet quality, this is what we found. Next slide please. We looked at food crop diversity, which is a number of food crops, the number of food crops produced by household in the previous year. Out of a maximum of

seven. And we found that growing an additional food crop was associated with an increase in the maternal diet quality scores by about .47 points. Next slide please.

When we looked at women that were participating in wage and salaried employment, we found that they tended to have at least an increase in the PDQS by almost one point. Next slide. When we looked at distance to market, we however found that for women that who were living further away from markets, on average, the PDQS was lower. Next slide please.

Just also to recap, that in this current study, we know that previous studies had looked at food crop diversity and how that it related to diet diversity scores. We also did it in the study and we found a smaller estimate, with about an estimate of about point one four, which was lower than the association with the diet quality. And then in this current figure we show the results stratified by distance to market. Remember we said that we found that women living further away from market overall tended to have lower prime diet quality scores. We stratify the study population by the median distance to market, which was about 1.1 kilometer. And we found that for those that lived within, within a kilometer of markets, that the association between food crop diversity and the PDQS was stronger, with an estimate of about .67. And when we looked at, we made that leap like further away from markets, we found that the association wasn't, had an estimate of about .40, indicating a weaker association between these two. Next slide please.

In conclusion, we found that household food production interacts with markets, as well as access to non-farm income to affect women's diet quality. Therefore, we believe that programs and interventions to address women's diet quality should consider these two, as well as other aspects, particularly in rural areas. We also believe that it is imperative for programs, even in rural areas of low- and middle-income countries to start thinking beyond diet diversity but also look at the quality of overall diet. Next slide.

So, the key takeaways from our work so far indicate that diets are changing in both urban and rural low- and middle-income countries, with increasing consumption of unhealthy foods. And we also think that it is now imperative to move towards over diet quality as a measure, not only in programs, but also in evaluations. In terms of future directions, we think that collection of additional data on overall diet quality. Of course, the food system in different contexts, regions and populations would be helpful. In addition, the validation of key measures of diet quality, for example, the prime diet quality score, the PDQS, as well as other indices and assessing them for associations with poor nutrition and health outcomes will provide more information that can aid the development of programs. Finally, we need to move from research to practice by promoting the translation of these findings into nutrition programs and interventions. Next slide please.

So, I'd like to end by thanking our participants in the two projects, as well as key researchers from our partnering institutions, as well as many others in the room and beyond that contributed to this work. Thank you.

Lindsey Anna

Thank you, Isabel, that was very interesting. And I'm intrigued to hear more about how you might think we can measure diet quality across the food system. And what that might entail, but for now, we do have a couple questions, and I know we said we would save most of the questions for the end and I do want to do that, but there were a couple questions just about red meat being considered an unhealthy food. I don't know if there's a quick answer for that, as well as roots and tubers were considered unhealthy. I don't know if you want to wait to the end to address that if it's a long explanation, we can, but if you think there's a quick answer just because we have your presentation up, it might be helpful just to answer some of those quick questions we've been getting.

Isabel Madzorera

Perfect, no I'm happy to answer this quickly. So, for red meat consumption, we know that for the unhealthy food groups we're penalizing, the over consumption of red meat. Meaning if you eat red meat four times in a week. This is associated with poor nutrition outcomes. And this is based on studies that have shown associations for red and processed meats with cardiovascular diseases, as well as mortality. But you do see that if you're consuming smaller quantities of red meat, although the points are fewer, we're not penalizing you for low eating. And then for the roots and tubers, similar, we know that, for example, in some countries, if the main roots and tubers consumed are potatoes, for example, they've been associated based on how they are processed and cooked with increased risk of some chronic diseases. However, in this study, because we're aware on some of these issues, we did a lot of sensitivity analysis. So, for example, we tried to see if we classified red meats in the opposite way, as a healthy food group, would this change outcomes. We also looked at roots and tubers, and really what we found is that even with the sensitivity analysis, our key findings primarily for the pregnancy outcomes, were not changed. Thanks.

Lindsey Anna

Great. Thank you so much Isabel. If there are further questions on any of that explanation, we'll hold on till the end and dive into that a little bit in more detail. But for now, we're going to turn to Dr. Rumana Akter, who is a senior nutrition advisor at Save the Children Bangladesh. She has been working with international development organizations including UN agencies for more than 12 years. Her research broadly focuses on nutrition sensitive agriculture, social behavior change communication, and water and sanitation hygiene for improving diet quality and nutrition in rural Bangladesh. Thank you Rumana and please proceed when you are ready.

Rumana Akter

Thanks, Lindsey, for introducing me. Actually, my previous colleague Isabel presented some of the interesting studies, where she has talked about some of the metrics and how and why we need to think differently actually. To move farther that we can answer some of the very emerging issues globally. And, specifically in the low- and middle-income countries. Today actually I'll be talking about some of the research that I had conducted during my PhD research on diet quality and most of the data set is from Bangladesh. Next please.

Let me give you a brief background of the studies. You know micronutrient malnutrition is of global concern. And the scale of problem is much greater in low- and middle-income countries, a slow pace in undernutrition reduction, but a sharp increase in overweight, obesity, and related diseases are critical public health challenges, especially in low- and middle-income countries. So, what this graph is showing here that double burden of malnutrition, is one of the emerging public health problems in Bangladesh in recent years. And if you look at the bar diagram on the right-hand corner, this is unpublished data from Bangladesh integrated household survey. You can see that prevalence of overweight and obesity in reproductive age adolescent and adult women is even higher than underweight in rural Bangladesh.

And studies have shown that poor diet quality is one of the contributing factors associated with this very complex situation. However, various you know, various metrics, studies, MDDW, the MAR and so many others are used globally in measuring diet quality. Next please.

I'm going to talk about some of the metrics that we have used in our study to assess diet quality at the household and individual level in rural Bangladesh. And, before going to the metrics, let me briefly talk about the studies we have conducted to that. Bangladesh Aquaculture Horticulture for Nutrition Research Study was conducted by the Feed the Future Innovation Lab for Nutrition and studying unions, which we call the smallest administrative divisions were divided into three groups. Group one was exposed to at least one intervention project, and group two was exposed to two or more intervention

projects, and group three was not exposed to any intervention. And a sample size was representative to the USAID Feed the Future zone of influence, as well as each age group. Dietary data collected preceding seven days household level dietary intake data were collected in order to get intra-household allocation of household level food intake of individuals. And age, in order to negate an intra-household, individual household level dietary intakes, we have used age and sex specific adult male equivalent ratios. Intake of each nutrient was computed for a seven-day period and standardized to opt in a daily intake per household and individual.

Nutrient adequacy ratio was calculated in order to get the individuals' intake of a specific nutrient, and mean adequacy ratio was calculated as an overall measure of diet quality. And nutrients of interest for this study were iron, calcium, zinc, vitamin A, thiamine, riboflavin, niacin, vitamin B6, folic acid, vitamin B12, and vitamin C. Next please.

And just briefly to give you an idea of results and what we have found. That diet quality was significantly better in households who have engagement with aquaculture and horticulture compared to other types of households. And diet quality means where we have shown MAR, which is mean adequacy ratio, was assessed as an overall assessment of diet quality. Next please.

And now I'll be briefly talking about the study where we assessed diet quality in women of reproductive age using Bangladesh Integrated Household Survey 2015. Household and intra-household-level dietary intake data were collected using 24-hour dietary recall, and micronutrient intake of women was considered. I have shown here of the equation actually pretty easily understanding how the dietary intake was assessed from that 24 hours dietary recall. And the micronutrient intake of women was compared with the age and sex specific estimated average requirements to get the nutrient adequacy ratio of a given nutrient. Like as previous studies, mean adequacy ratio was calculated as an overall measure of diet quality. Next, please.

If you see, look at the table, you can see that although average intake of, average energy intake of women was more than the requirement by about 27% of women of reproductive age. Women did not have adequate energy. And about one quarter of the women were energy deficient. And two thirds of the women did not have adequate intake of calcium, vitamin A, folic acid, and vitamin B-12. If you see, iron deficiency also was like, about 26%- more than 26% of women did not have sufficient dietary intake of iron, and 40% women did not have sufficient dietary intake of vitamin C, and some other nutrients like vitamin B6, niacin, [inaudible]. Next, please.

So, the key takeaway is that double burden of malnutrition is an emerging public health challenge in Bangladesh and subsequent diseases also. And therefore, appropriate measures with adequate monitoring systems need to be in place, and you know acquisition of nutrient intake data through dietary assessment using the existing metrics are relatively expensive and time consuming, especially for low- and middle-income countries due to limited resources. So, I mean we would urge donors such as USAID to invest more to develop innovative dietary metrics that require limited resources and time. And particularly for the countries, for low- and middle-income countries to assess diet quality. Because Isabel was showing that if we use minimum diversity for women, it is so popular indicator, especially to assess like a qualitative intake of diet quality. But it does not capture many of the aspects, and many of them, diet quality assessment metrics, do not. I mean these do not have the scope of assessing many of the aspects that currently emerging globally, especially in low- and middle-income countries. So maybe we all need to think a little bit differently and together, that how we can reach out to the most of the emerging public health problems in the coming years, thank you everyone.

[Lindsey Anna](#)

Great. Again, we have some questions coming in for you Rumana. So, I'll hold off to the end just to give everyone a chance to... but just so you know, there will be some questions coming back to you in the discussion and Q&A period of the webinar. But thank you so much, super interesting as well. And I'd

like to turn our attention now and introduce our final presenter, Dr. Will Masters, professor in the Friedman School of Nutrition and the Department of Economics at Tufts University. He is the co-author of an undergraduate textbook "Economics of Agriculture Development, World Food Systems, and Resource Use."

He's also an elected fellow of the Agriculture and Applied Economics Association. Dr. Masters' presentation today will focus on measuring diet costs and affordability. Thank you so much we're ready when you are.

William Masters

Yes, thanks Lindsey and thanks to everyone for joining. It's really a privilege to build on the amazing work from Rumana from Isabel so many others on diet quality measurement. As Lindsey said, I'm an economist, so what we're doing here is using these diet quality metrics in the Nutrition Innovation Lab and others in this broader effort we're calling Food Prices for Nutrition, you can see the logo at the bottom of the slide there. To think about the cost for consumers looking over all the food groups, that you see on the right of the slide. So, if we look over all of the food groups, and photos I took in markets, I work mainly in Africa, and think about the least cost, the most affordable items in each market location, every time. To think whether food systems are delivering the proportions that are needed for healthy diets as Rumana and Isabel and Anne described. And whether there are specific policy interventions that we can identify that answer directly USAID's agenda through the Nutrition Innovation Lab and address other donors as well. So in the next slide you'll see what we do here is to think about the retail prices, so as opposed to when we talk about world food prices, usually it's a wholesale commodity price for 10,000 pounds or 10,000 kilos of wheat on a boat in the ocean, we're looking at retail prices for a 100 gram loaf of bread or one mango to measure the overall diet cost and the proportions needed by people relative to income, to reach each level of diet quality.

So, on the left, what you have is this kind of staircase metaphor. Where the first step is just daily energy to make it through the day, then nutrient adequacy, the lower bound and upper bounds on 23 different nutrients are the data I'll show you, and then overall food group balance in terms of diversity and quantity in terms of what's been discussed in the Q&A and the presentation so far. And then I'll also share some results on sustainability. And this has led to a rich research set of results that you'll see on the right, especially that SOFI 2020 set of numbers that I'll talk about in a moment. So next slide show the specific criteria, so the next advance tells you we begin with dietary energy and nutrient adequacy.

The next advance. Then move on to food groups, and the food groups that we use here, because we're aiming to guide government policy, build on the dietary guidelines that have been introduced in many countries around the world, as you know. And in a number of those, so far 10 countries in all regions of the world, in their official national dietary guidelines specify quantities of particular food groups in a way that we can compute the least cost way of meeting those national government policies. And then the next advance moves on to sustainability, where, as you might know, the EAT Lancet diet and so much of the Q&A discussion focuses on flesh foods, on meats especially, and that's what's highlighted in the in The EAT Lancet icon, the EAT Lancet method. And then the next slide, next advance, says that we include a lot of information about income distribution, and the non-food needs of people in the results I'll share in a moment. So, advance to the next slide.

Is the big, big question that economics offers, which is how do we know how much people have to pay? If you want to go to a marketplace near you and acquire some foods or grow in a local place and produce some foods, what would it cost. So national statistical agencies around the world collect retail food prices every month of every year in many market locations around their country. This is all part of the UN system of national accounts, so a lot of food prices are collected, the problem is these underlying data are typically confidential. They publish only the averages, and the averages are in proportion to how much people actually spend. So, we sometimes use those data, but the data I'm going

to show you, real time show you in a moment, use a slightly different set of data. Next slide, advance, shows you another kind of data that you might be familiar with.

The map on the right shows you the World Food Programme's vulnerability assessment and mapping dashboards that are typical of what's done by the USAID-funded FEWS NET done by the FAO's Global Information Early Warning System, and those clearly targeted places at risk of undernutrition because they're aimed to guide agricultural intervention and nutrition assistance programs. So, it's really only low- and middle-income countries. And the next advanced shows you the kind of data we'll actually talk about today, so our studies use all of those types of data.

But the results I'm about to show you used a set of data that are collected through the World Bank, through regional development banks, and national social agencies to collect prices for similar items around the world. So, it's the same thing, for example, a dried small fish, silver fish, or similar would be the same one in Uganda, Kenya, Tanzania, and so forth. So, there's through 2017, I'll show you there's about 800 such items, every country would report about 100 different items in their country. And this is an ongoing project that we're working closely with in this effort. So, the next slide shows you our basic results.

The staircase idea begins with the cost of survival in blue, something like 75 cents a day when you compare it in terms of prices for all the things that people would need in a given country. The Red shows the step up to cost of nutrient adequacy, about \$2 a day, and the Green shows you cost of recommended diets, typically above \$3 and 50 cents a day in internationally comparable monetary terms. So, the next advance points to the fact that the reason why prices are pretty similar in poor and rich countries is because poor people have to, in some sense, compete to buy the food from, with richer people. So richer people come to marketplace too, and they have to pay the same price unless it's a nutrition assistance program that serves, especially the needy. But there is an interesting step down, the next advance shows how in high income countries it's actually significantly cheaper to buy some food groups, because of the high resource intensity and especially capital and technology intensity, for example, especially dairy.

Also, eggs, it turns out, are significantly less expensive in rich countries because of the highly technologically advanced, in a sense, nature of the dairy sector, and it turns out, also the egg sector. Next slide.

So, these are the total number of people who cannot afford, when you compared to incomes. At the top left you see about 185 million people cannot afford daily energy. And this, of course, is much higher-- this uses data for 2017-- much higher in 2020 and 2021 because of the income loss from COVID. And then on a nutrient adequate diet, that we see some much larger number, 1.5 billion, and the 3 billion number of people who cannot afford a healthy diet in terms of national dietary guidelines is the headline number from the SOFI 2020 report. And the next advance shows you the way this headline kind of compares to other numbers. You know it's about 38% of the whole world's population that cannot afford a healthy diet in terms of dietary guidelines. And, and you see how that compares to the other ways of thinking about poverty and food insecurity. So that's 690 million people in 2017 could not afford the World Bank's poverty line of \$1.90 day and purchasing power of everything in the in the economy.

The FAO's estimate of undernourishment, the prevalence of undernourishment metric, was about 653 million in 2017. Of course, much higher now because of COVID. And 1.9 billion could not-- had food insecurity in the sense of the food insecurity experience scale of skipping a meal or not knowing where food would come from because of having inadequate income. So, you can advance the next slide.

Clearly, we're complementing other ways of thinking about food systems to guide intervention, and many, many people are very concerned about adding sustainability dimension. So, here's the individual country observations for 2017. You can see at the bottom; the calorie adequacy costs around 70 cents in the dotted line. And then the nutrient adequate diets in light blue, and then the meeting the food-based dietary guidelines in the purple. And then, if you advance, you'll see adding the sustainability

criteria, and the Green dotted line, you can see if you advance one more, is exactly the same as the purple. And the reason is that the EAT Lancet diet assigns food groups in roughly the same proportion, so if you choose the least cost items you actually get to a pretty similar cost but somewhat higher variance in the Lancet, but similar average. So, the next advanced gives a clear answer, no, because in the least cost healthy diets, there's very few animal foods, as you can imagine.

So, the next slide begins the conclusions, what's the point of these? When we look at diet quality metrics through the lens of affordability and ask what's the least cost item available at each place, we see that, above all, our headline most important finding is that healthy diet remains beyond reach for most people. So, for 38% of people, 3 billion people, most people in in Africa, for example. And then advance.

You know this tells you why. The reason why is because food prices are broadly similar, there is a lot of food system difference, but it's drowned out by the income differences. And so, it's true that fruits and vegetables, fish eggs, all these nutrient-dense healthy food groups are just more expensive. They're more expensive to produce, they're more expensive to transport and to provide in retail. But there's also a lot of variance, in them and so lots of room for food system improvement. And the next advance emphasizes the importance of the dairy and eggs sector as a sector where innovation and technology plays a particularly large role in differences across places. Advance.

It shows you that the really key difference between people, is how much income they have, and so the rising use of cash transfers, voucher programs targeting, and overall healthy diet is really central to the food system transformation. The food system transformation agenda, if one is concerned with access to healthy diets and delivering on the promise of food security for all and all people at all times, definitely kind of begins with affordability. Because that's what varies so much more around the world and within countries. And the next advance points to this other finding, that this is not about added cost for sustainability. The reason is clear from the bullet point, and the next advance emphasizes that the unsustainability of many dietary choices, as well as the unhealthiness of many dietary choices, are clearly driven by factors other than price. The more we understand about price, the more we understand its crucial but limited role. This is similar to other discoveries in science.

The next advance points to what those, what those are, right. So, for 4.9 billion people, roughly 60% of the world's population, healthy diets are already affordable, but are not what people actually eat. Why is that? Next advance.

You know it's because other factors are driving choice. So, the next advance gives you, you know, what we have understood, for a long time. Which is food culture mattering a lot, biology of taste and satiation matters a lot. People really have foods that they physically want and need, and culturally you want and need. Next advance.

But we're beginning to work on the challenge of meal preparation. On the cost of that, especially the time burden of meal preparation, especially for vulnerable people within households. Everyone, I think, knows the profoundly gendered nature of food preparation, it is women, especially young women, and the burden of time that meal preparation costs is real and it's huge. And, in addition to that, there's all the fuel, cooking fuel issues and kitchen equipment issues.

And then there's the matter of predictability. And whether foods are available in a predictable way, so that meal preparation can be anticipated and arranged for. And then the next slide gets to the heart of the story of nutrition transition in the modern food system, since, you know, the past recent decades. And that is the enormous magnitude of the marketing effort, the advertising, the availability, the widespread transformation of the retail landscape. Even in relatively low-income countries where we've been we've been working.

So, the next advance closes out to say this work is in collaboration with many, many people. So, through the Nutrition Innovation Lab, reaching deeply into Malawi, to dramatically improve the food composition data and the analysis of household survey data in Malawi through the Nutrition Innovation Lab reaching out in many other countries. And you can see the specific collaborators that have been

working on this, we've been leveraging this work with support from many other donors as well, and above all, especially country governments. So really appreciate your attention to this aspect of using diet quality metrics to inform food policy and to inform the kinds of intervention that can finally deliver on access and potentially use, eventually use for a healthy diet for all people, at all times. Thanks so much.

Lindsey Anna

Thank you, Dr. Masters, that was excellent. I do have, I have a question for you. I can see how food prices are full of surprises. If you go back to your slide, your conclusion slide, just for maybe other people have the same... just the conclusion. So that first bullet point you said a healthy diet remains beyond reach for about 3 billion people, but healthy diets are already affordable.

So, are you saying that healthy diets are already affordable, but the choices that people are making, it still remains... because of those choices, the healthy diet is beyond reach? Or... I'm trying to correlate the two bullet points.

William Masters

Yes, so I think it's very important to say already and affordable in terms of the monetary cost of the ingredients. Okay, you could hypothetically go to a market location, a wet market or an open market or in an industrialized setting go to a supermarket, and you could acquire the ingredients for a very healthy diet within the financial cost of the available funds. And that that is our everyday experience, I think people understand that.

But they're not affordable in other senses, right. The predictability, the ease of meal preparation, as well as the desirability factors. So, we're beginning to expand our definitions of affordability, but first we have to understand just the cash affordability.

Lindsey Anna

Okay, great that's helpful, thank you. With that we've definitely concluded our panelists presentations, and now we're going to open up the webinar to the discussion and Q&A portion. So let me check the Q&A box here and give our participants a moment to put in their questions. And then we'll dive right in.

Let's see here. I saw a question come in earlier about food fortification and what USAID is currently doing in food fortification. I'm having trouble finding the question, but I did see it earlier. I just wanted to quickly give an answer on that, that USAID it is working and looking at additional ways to work at the national level on food fortification and refocusing on large scale food fortification. So, trying to develop a mechanism within our current structures and potentially new activities that are working with food information systems to better understand the micronutrient deficiencies within the populations and foods that would be most open or best utilized for food fortification purposes. And how we can address the need, at a much larger scale within the national spectrum. So, we are still in a preliminary stage of getting this work up and going, but there's definitely a recognition of the role that food fortification plays in diet quality. And we're working to tackle and implement programs that are addressing the need.

Let me see what else is here. So, there was a question, I'll go back to Dr. Madzorera, Isabel. There was a question on your presentation about the difference between the PDQS and the GDQS. Perhaps you answered this, but there were several questions, maybe for everyone's knowledge you could just briefly summarize the written response you gave.

Isabel Madzorera

Yes, I'm happy to. I think it's actually quite a good question. So, the GDQS, we can think of it as a federal refinement of the PDQS. So, the early studies that I presented here used the PDQS, and this was our first attempt to even measure diet quality within the context of nutrition. And we've also noticed that there are some things that vary from context, so the GDQS, first of all, tries to address the issue of using the food frequency questionnaire, which is the basis for the PDQS. Because most studies in agriculture and nutrition generally use the 24-hour dietary recall to the GDQS tries to come up with a classification that also accounts for the use of the 24-hour dietary recall, but the food and food groups generally remain the same.

The only other difference is that for some of the food groups they are split more in the PDQS. So, for example, in the current study we classified dairy, and we classified everyone with having low intake of dairy, because the original PDQS only rates as healthy consumption of low-fat dairy. But in many of the context in which we work people do not produce that. So, in the PDQS, for example, low fat dairy is included as healthy and then some penalizes the full fat dairy, something like that. And also, for some of the roots and tubers we tried to disentangle. I also had a related question I think on sweet potatoes.

You have the orange sweet potatoes, but also, just to clarify that, even in our current study the sweet potatoes were classified as under the other vitamin A roots and vegetables. Now in the GDQS I think they just split it out just for ease of administering the questionnaire. But the general construct and the competence are the same and it's also within the same research group. So, we are very much working hand in hand and also learning from the GDQS.

Lindsey Anna

Thank you, Dr. Madzorera. There's a couple questions as well for Dr. Akter. The first one is, let's see here, make sure I have it correct. Measuring household intakes and applying AMEs assumes equitable intakes as per dietary needs and households. Yet evidence from South Asia suggest that intra-household allocation of foods is often inequitable with pregnant women and adolescents. How might you account for this in your analyses.

Rumana Akter

Thank you, Lindsey, yes, that is actually participant and was asking me actually mentioned that AME factors it doesn't consider intra-household food allocation, this is one of the limitations of these. Verses, we had household level data only for that study, so I had to use that metric. As I was mentioning in my presentation that many of the actual diet quality access metrics have many of the limitations. So maybe we, I mean, we can we can compare using some of the metrics of diet quality with each other.

But, I totally agree that we were unable to identify that intra-household allocation on diet quality. Thank you. And Lindsey, if can I answer also another question that someone was asking me why I specifically looked at nutrient, at diet quality at nutrient level rather than food groups level. Actually, as you know that in my presentation, I also mentioned that assessing diet quality, I mean, nutrient intake, assessing nutrient intake is not like... I mean those studies are so much time consuming, it requires so much technical skills, time, and is expensive. So, I just took the opportunity, using the Bangladesh Integrated Household Survey Data that in my knowledge, there was no study conducted at nutrient level for the national representative data.

So, yes intentionally I was trying to see actually not only the nutrient but also to look at the energy intake, because I mean, in recent years the double burden of malnutrition is a big issue. And some of them, small, small studies in Bangladesh, also show that this is an emerging issue. So, I tried to take the opportunity and look into that women of reproductive age, and about the energy consumption as well as that nutrient intake. Thank you.

Lindsey Anna

Thank you, Dr. Akter. If there are additional questions related to her response, or to Dr. Madzorera's response, please make sure to put them in the Q&A box. I see there's also some questions coming in through the chat, I'll try to get to those as well, but for now I'm going to focus on the Q&A. So please, please put them in the Q&A, just a friendly reminder if you can.

Dr. Masters, there's a couple questions for you. In your work in India, did you find that or wait, maybe this is... I think it's addressed to you; it might be Dr. Akter's presentation... Dr. Masters, in your work in India, did you find that access to public food nutrition provisions helped to improve or diversify food consumption.

William Masters

Yeah, I would definitely defer to Rumana, or even to Shibani Ghosh, you know people who have worked a lot more in India on that. It's a very important question, though the Indian public distribution system and the current political conflicts in India around these foreign policy reforms are very much of the moment, so it's a great question.

But I'm really an African specialist, eastern and southern Africa at that, so I cannot speak to all issues.

Lindsey Anna

Dr. Akter, do you have a response, or I know your work with focused in Bangladesh so maybe that's not a fair question to put towards you.

Okay well, we'll move on. There's a couple other questions for you, Dr. Masters. Some of these questions... I'm... Will, thanks for this interesting talk on the Herforth, etc. FAO slide. Has anyone estimated the health benefit of moving from a nutrient adequate diet to a recommended diet, perhaps in terms of DALYs. It seems that this might be weighed against the cost.

William Masters

Yeah, that's a great question from Felicia, and, of course, Felicia would be in a better place to answer it than I would be. Understanding really the epidemiological evidence on this, but it is a great, great question. And the problem is that the baseline of a fully nutrient adequate diet that we're modeling here is not what people actually eat. So, our research program is about the food system and the policy levers that can change what's at the marketplace and the relative availability of healthy versus unhealthy foods.

Going that next step to the household and the household's behavior is hugely challenging of course. And then, and then getting at the added epidemiological evidence about whether going from nutrient adequacy to an overall healthy diet, what that really would add, is I think something that is very, very hard to pin down. Because it's not that what we observe observationally in the data.

Lindsey Anna

I think there's an additional question, Dr. Masters, why is it important to invest efforts in developing and scaling up price-base cost of the diet if prices are not what matters.

William Masters

Oh, prices are absolutely what matters, if you're a low-income person. So, we're looking at most people in Africa and most people in low-income parts of Asia. Prices are absolutely prohibitive, there is no

behavior change that could bring them into ability to access these foods. Absent programs, without programs, they are not able to acquire the basic combination of foods that the health community agrees is a basic healthy diet. And that is the least cost healthy diet. So, we're referring to the very lowest cost items are out of reach. So, food prices are absolutely fundamental for about 38% of the world's population. And more than 38 in the current COVID era, right. So, we did these data analysis in 2017, so prices are absolutely fundamental. Prices are the thing which is keeping healthy diet out of reach for the 40%.

Lindsey Anna

That actually, that question actually came from Anne, one of our panelists. So, but if, Anne, if you wanted to ask any clarifying questions on that I'm happy to let you speak.

Anne Swindale

Yes, I do and clearly Will I may have taken away the wrong, the wrong message from your presentation. Because I did sort of takeaway, towards the end when you said the focus needs to be on increasing incomes, and I totally understand that. But I thought it was sort of like increasing incomes, not decreasing prices. And is... So, if that... if I didn't misunderstand that message, I still am trying to wrap my head around the importance of focusing on prices, if it's not prices that matters, it's people having the income to afford the foods at those prices.

William Masters

Yes, this is a very, very important question. And it's so great to surface it, you know, so clearly, as you have. So, the way I would address it is that there is clearly room for public policy interventions, government actions that can be sparked by USAID support and sparked by many other outside interventions, but ultimately are the responsibility of national governments to do things that can lower prices and bring foods within reach.

Also, to increase availability, because a lot of our results are driven not by the price of what's in the market, but by the fact that low-cost alternatives are not available at all. So, there's both making sure there's year-round availability of the healthy, nutritious foods and also that they have prices that are as low as possible. Our finding is simply that even when that is accomplished, even when the food interventions are as robust and successful as they can be, food prices are still out of reach because, for the simple reason that, out of reach for the poor, for the simple reason that low-income people have to compete against high income people for the same food.

And that healthy, nutritious food groups are expensive to make and to distribute, even if there is the public policy support for them. So, it's definitely both edges of the scissors are needed, both blades of the scissors. It's both that are needed. That is to say, both the full throated efforts in agriculture to increase productivity, improve access to markets, including international markets to diversify sources of production so that year round as low as possible prices can be realized in the places where poor people live, and then also, so both blades of the scissors, and then also ensure that the lowest income people who would otherwise have to bid for that same food against high income people, and where healthy and nutritious foods are just simply expensive to make, they have enough income to get above that stair level, the stair step in our metaphor. So, can bring the stair steps down, but also need to give income support for the poorest to reach those basic steps.

Anne Swindale

Excellent. Thank you very much that's very helpful.

Lindsey Anna

Just a follow up question, Dr. Masters, from another participant in the webinar, do measures of affordability take into account the localness and source of foods. So as to avoid the cycle that low- and middle-income countries with low purchasing power face every time there are any disruptions in the global food chain.

William Masters

Yes. Yes, absolutely we do. Very, very important question. So, it is certainly true that many times of the year and in many places, the local food is by far the least expensive. And then there's other times of the year and other locations where it isn't. So, clearly, the world is very patchy in an agricultural, agroecological sense, in that the resources for fruits or vegetables or legumes or grains are distributed unevenly around the world. In contrast, people's human biology is the same everywhere.

And so, meeting human dietary needs has relied on storage and trade to move food around from the places where it's easier to grow or raise than, and to where it's needed. And so, we absolutely pay very, very close attention to exactly that point. At sometimes and places local is absolutely the lowest cost. And we use that and then other costs other times. Access to the food from elsewhere is absolutely crucial for sustainable nutritious diets.

Lindsey Anna

I also have a question related to the healthy diets and situations where you said there were only 10 countries to your knowledge, or in the in your presentation, that had national guidelines for healthy diets, correct?

William Masters

Yes, and that's, dietary guidelines that have, that specify quantities up to a total overall healthy diet. So, the World Health Organization has not yet done such a dietary guideline. They instead have more limited guidelines on which there is agreement. So, when you go to a country where the national authorities, in United States it's a joint between the Department of Agriculture and Health and Human Services, and those cabinet secretaries, those ministers, those ministries, agree that national US policy specifies what we call the My Plate balance between food groups. And then we do the same for the other countries that have done that. So, it's only 10, but it's an increasing number of countries. And what we found is that they're actually pretty similar. Similar cost to meet them, because they're all singing from the same song book. Right, they're all looking at the same evidence.

And weighing it slightly differently, especially big differences in how the dietary guidelines are presented. So, the differences in the imagery and the language and the specific foods that are discussed, all that differs a lot. But when we're looking just at the most affordable ways of meeting those guidelines, it turns out that pretty similar whether it's Argentina or Oman or the United States or India or China. Obviously, food looks very different in those places. The language and the content of a plate is very different. But in terms of food groups, it's astonishingly similar because it's using the same epidemiological data.

Lindsey Anna

Great. Thank you. So, looks like we still have some questions for Dr. Madzorera. There's still quite a bit, I have to say, on the red meat discussion. And I don't know if Dr. Madzorera, you have the Q&A.

There's a couple just questions, comments about, you know, red meat requiring a much more nuanced characterization than how it's presented. There's also a question about the reasoning behind separating citrus fruits from other fruits in the PDQS, so I don't know if you want to address, um you know, perhaps the red meat discussion is quite a lengthy discussion at this point, but if you want to talk about the reasoning behind the citrus fruits.

And then I think there's another question here about talking more about the links, linkages between household crop diversity, distance to market, and diet diversity. And specifically, in your study, household production... is household production more important for people close to market or far from market? Regarding impacts on diet diversity. Okay that's a lot, that's a lot I put on you so if you need me to repeat...

Isabel Madzorera

All right, and I might come back to you, so thank you so much for quickly summarizing all the key discussions going on in the Q&A section. I think the question of red meat is, I'm happy to come back to it because I think it's quite important. So, I think just to start off with, we know that studies conducted in many high-income countries here in the United States and Europe and so forth, have found that red meats, as well as processed meats, either together or separately are associated with cardiovascular diseases, as well as mortality related to cardiovascular diseases. That's why to start off with, we consider red meat is unhealthy in the score. And also, just to reiterate that we're not saying any red meat intake is not recommended. What we're saying, however, is that we're dissuading people from consuming large servings, large quantities of red meat. For example, in the score we penalized consumption of four or more servings, but you do see that if you have two to three servings you have more points for that. And also, if you have one serving or less for the week you also have more points for that. So basically, we do realize that we do need the micronutrients that come from red meat. But we need, this is an aspect of diet quality that addresses moderation. We believe moderation is key. And that's why we classify red meats as unhealthy in this analysis. Also know that for red meats, for all the different foods and food groups, we're clumping together- for example in red meats we have pork, we have beef, we have lamb. Not all of them might carry the same risk, but when we're doing a study for simplicity will clump those together. But also, generally, even if we're talking about lamb, or other maybe healthier forms of red meat, we cannot say, we cannot recommend that you eat it daily and that it is healthy. So broadly when we have all the red meats that are part of this group, we believe that we need to include moderation as a key aspect. Of course, we do agree that the impact of diets depends on environments and context, and there are many different factors within each different environment. But also, this is also an attempt to look at dietary patterns overall. So, someone might have really high intake of red meat but also very high intake of fruits and vegetables that might counterbalance that. So, let's always think that this is within the context of an overall score, that assesses both red meats, and some of the food groups we're calling unhealthy, as well as the healthy food groups and they can balance out. But, however, if you're predominantly eating the foods that are linked with chronic diseases, the chances are that on a population level, these people are more likely to have the outcomes. It doesn't mean that even at an individual level, you know, all of these maps out the same way.

Coming back to your question on citrus fruits, why we separated those out from the other fruits. So basically, we know that citrus fruits are a source of antioxidants, and based on associations with the protective role of antioxidants, I think they were separated out, but you also notice that we didn't only separate out the citrus fruits, but we also put aside the vitamin A weak fruits, as well as vegetables. So basically, we are trying to optimize the role of, sort of the weights that is given to fruits and vegetables. And I don't think in any case, it can be detrimental. More fruits and vegetables, in any case, are always healthier. And then the last question on whether crop production was more important for those

people, gentle influence in diet. In this study, just to recap sort of my main findings, we found that for those that lived closer to market, crop production was more influential for their diet diversity, as well as the diet quality. Meaning that if you live closer to market, you are more likely to have diverse diets, if you produce more food crops. It could be that you produce more food crops and then you sell them at a nearby market and then you put aside the healthy foods, but that's what we found. I know that other studies, they found a somewhat different finding, but that was the key finding from us, that if you were closer this was more helpful, there was an association between production and consumption.

Lindsey Anna

Thank you, Dr. Madzorera. We have one, I think we have time for one last question. This is for Dr Akter, did you apply the new standards for Asian BMI for your BMI calculations in Bangladesh. As you know, the new BMI is two BMI units below the Caucasian BMI standard.

Rumana Akter

Yes.

Lindsey Anna

The answer is yes. Okay, I just want to confirm.

Lindsey Anna

Thank you. Okay, great. Well, again I wanted to thank you all, thank you to our panelists Dr. Madzorera, Dr. Anne Swindale, Dr. Akter and Dr. Masters. Thank you so much for these wonderful presentations. We did not get through all of the Q&As, so I would ask the panelists, to the extent that they're able, to answer any questions that are open to type an answer. You should be able to do that fairly easy, I think. If not, I think there is probably a way we can follow up individually with our participants if necessary. And again, I think this was quite a lively discussion and a lot to talk about in terms of the research and the methods and various questions that have been posed to our panelists. Just want to say thank you, and I think there's much work to be done, and we're moving on a path forward, both as USAID and our partners. And I'll let our panelists have an opportunity to share one last closing thought on the webinar. Dr. Masters, if you'd like to go first, I will turn to you.

William Masters

Absolutely, yeah. The main point I wanted to make is that this is a living area, the chat and the Q&A and the interaction between the presenters really demonstrates what a vibrant field this is. And you know, Anne really drove a lot of this in the USAID context. And this group has done just amazing things. So, stay tuned because there's a lot more discovery to come in this domain.

Lindsey Anna

Great. Dr. Madzorera?

Isabel Madzorera

Great, thanks. I guess, I would like to end by thanking everyone for taking part in this panel, as well as being quite engaged in the Q&A section. And I do agree, a lot of the points, these are points for future

research. Has the need for continued research and validation of the different tools that we come up with in different locations for different populations. Men, women, children, adolescents, etc. So, I think that there's a call for those of us that are involved in researching programs, to check out the different tools and also to try them out in different locations and see if we can further refine the tools. But I think the future really belongs to us, considering overall diet quality. Because diets are changing and we should not miss this boat, thank you.

Lindsey Anna

Dr. Akter?

Rumana Akter

Yeah, I would like to first thank everyone, all the participants for their time and staying like more than one hour. It reflects that everyone is very much interested about the diet quality and so on, because we have to think about it. We have to have a healthy life. And we know that there are still so many more to go. And we are also looking for like donors, and to the donors, especially to the USAID for investing more on assessing more easy, and easy measurable dietary assessment metrics that would cover every aspect of diet quality and also determine intersecting those and food prices and so on. The we can, like, using one single tool so we can holistically assess some of the some of the multisectoral components of one households, one person that... [inaudible]

Lindsey Anna

Oh, no.

Rumana Akter

...into housing, food, innovation, and also validate some of the indicators. Thank you.

Lindsey Anna

Oh, I think we lost her, Oh sorry Dr. Akter. But thank you so, thank you so much for your time. That's okay. And Dr. Anne Swindale, would you like to close with any remarks.

Anne Swindale

Sure, um. This is a joke- it's not surprising that our research colleagues highlighted the importance of more research. But I, in this case I absolutely agree. That it is, there are still... there's still lots of room to do more research in a lot of these areas. I also really appreciated our research colleagues highlighting the importance of the application of the data that we are able to gather. To thinking about what this means programmatically and what this means for our interventions.

There were, I mean, I think we probably could have had another hour of questions because there were a number of real questions that still came up in my mind just on the results that were being presented. And then the... I think Will's presentation highlighted it, but others did too, that the solution is not a single solution. The solution is a complicated multisectoral, multifaceted solution. And figuring out how to balance different issues that don't- sometimes they don't necessarily all move in the same direction. Addressing one, for example, increasing convenience of food may lead to much more hyper-processing of food. So, balancing the different needs, the different objectives to ensure that together they're all taking us to the place we're all trying to go is also something I think we really need to keep in mind. And

just with echoing, thanks to the Innovation Lab, to all of the panelists, and to all of the attendees for participating so actively. And to you Lindsey for your very, very excellent moderation and facilitation. So.

Lindsey Anna

Thank you. Thank you, I see we're at time. So, Katie, I don't know if you have any technical closing things you need to do, but I think this concludes our webinar. Thank you so much.



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