



GNCPC Webinar Exploring the Anemia Ecology Transcription

Yaritza Rodriguez

Thank you so much, everyone, for joining today's webinar. My name is Yaritza Rodriguez. I'm a Communications Officer with USAID Advancing Nutrition, and I'm happy to welcome you to this second part in our webinar series on exploring the anemia ecology. Today's webinar will be on the application of the ecological approach to assess and address anemia with experiences from the field. Thanks so much for joining this webinar on behalf of the US Global Coordination Plan - Ecology of Parent, Infant, and Child Nutrition Subgroup. Next slide, please.

Before we begin today's webinar, I have a few reminders for everyone that's joined. If at any point during the webinar you're unable to hear the speakers, please make sure you connected your audio by selecting the headphones icon. Should you drop off and rejoin, please make sure you've connected audio. Please send a message to everyone in the chat box to introduce yourself. Send in your comments, or ask for support during today's webinar. Finally, please note this webinar is being recorded. Next slide, please.

During today's webinar, we'll be collecting questions from our audience in the question and answer box. Please submit your questions there. Panelists will either reply back to you via text in the Q&A box, or will answer your question during the discussion portion of the webinar. Next slide, please.

Now I'm pleased to introduce our moderator for today, Lindy Fenlason, Senior Nutrition and Capacity Building Advisor in the Bureau for Global Health at USAID. She's also the co-chair of the Ecology of Parent, Infant, and Child Nutrition Subgroup. Over to you, Lindy.

Lindy Fenlason

Thank you, Yaritza. We've got a few things to walk through as we get started here, and thank you for that initial intro and those instructions, Yaritza. I want to say welcome to you all and thank you so much for joining us today for the second webinar of the USAID Advancing Nutrition Anemia Task Force.

As a quick recap, the first webinar in September, during that, we described the anemia task force or the ATF, its composition, and also the overall content of the report that they developed. The USAID Advancing Nutrition Anemia Task Force is a panel of nutrition experts from various fields of study that are related to anemia. They gathered at the request of the project to develop an ecological approach to anemia that starts with a content-specific assessment of anemia and ends with the appropriate interventions. Underpinning all of this are the biological mechanisms that influence anemia, because it is such a multi-dimensional issue and condition involving iron deficiency and numerous other etiologies.

In case you're curious about what we mean by ecology in this particular instance, it's referring to the mechanistic aspects of the nutrients, the health status of individuals, their interactions with other individual and population factors such as their physical, economic, social, behavioral, demographic, and environmental conditions. The ecological approach is based on an understanding of systems biology and which is exquisitely important again, to this topic of anemia because it's a result of such complex systemic interactions.

In today's webinar, it's going to be focused on that assessment piece of the anemia task force work, including experiences from the field. In this session, Anne Williams will speak more to the details of our approach to assessing anemia, both from a clinical and a public health perspective. While the

anemia task force approach is recent, its work is complementary to other work that's been ongoing in the field. Many organizations have been carrying out micronutrient surveys for years, a few of whom are with us today. The results of their work have been used to develop and redesign micronutrient delivery programs by country experts, again, some of whom we have with us today. We believe that it's important for us to hear from these voices, to hear these voices in the field about what they're doing, how they're doing it, and most importantly, how the results are being interpreted and used. These form the core of the anemia task force approach to going forward.

We are lucky to be joined by a few of the recognized experts in micronutrient survey and analysis who have dealt with questions like, what indicators and biomarkers should I measure? How much will these cost? What is the laboratory capacity? How do I interpret these results? What should I be doing now based on the results that we've found? Among other questions.

We'll begin the presentation on the anemia task force approach to assessing the etiology of anemia and then hear from two panels. The first panel on carrying out micronutrient surveys, and then the second panel on using micronutrient survey data results. Before we begin this presentation, one more thing to touch on is that we want to provide a brief background about who's sponsoring this webinar. That's the US Global Nutrition Coordination Plan or the GNCP, which is the whole of US government approach to addressing malnutrition through interagency coordination and collaboration. It was initially launched in 2016 and renewed after five years of implementation. The GNCP is comprised of technical working groups, one of which is the Ecology, there's our friend again, of Parent, Infant, and Child Nutrition, or EPIC Nutrition Subgroup which is co-led by Dan Raiten, who we'll hear from later on today, of the NIH, and myself.

Now, without further ado, I'm going to hand this over to Anne Williams. She's an Adjunct Assistant Professor at Emory University, and her research focuses on optimising nutritional assessment and improving maternal nutrition. Anne is the first author of the anemia task force paper on assessment of anemia and its causes. Now over to you, Anne.

Anne Williams

Thank you for that kind introduction, Lindy, and thank you for the invitation to share our work on trying to take an ecological approach to assess and therefore be able to address anaemia. Next slide, please. I'm presenting this work on behalf of others that has a compilation of a couple of years of thinking and bringing together information within this EPIC Nutrition Subgroup, Anemia Task Force Assessment Work Group. Next slide, please.

We want to introduce this ecology of anemia to the nutrition and broader community, because so often we've thought of anemia as primarily a nutritional condition, and primarily when we're thinking about a single micronutrient, or predominantly iron. This slide is really just to bring forward the reality that hemoglobin is a condition with the diverse and overlapping causes that have been discussed, in addition to nutrition, the broader health context that we're pointing to, infection and inflammation, but can be much broader than that, as well as genetics. Since we're focused on measurement here, having hemoglobin alone has not been beneficial at really reducing the anemia burden. We really need to understand this context or the ecology surrounding what's leading to a low hemoglobin concentration in individuals. Next slide, please.

We keep coming back to this same theme of, if you cannot measure it, you can't improve it. This is, again, to reiterate that although we've been relatively successful, and we have prevalence estimates for anemia, we're not seeing a large improvement in anemia prevalences. Therefore, it's really drawing us to think more about, what are the underlying causes? What's the ecology or the environment that's surrounding this? In the report, for the task force, we also compared hemoglobin almost to stunting. Instead of just thinking that stunting requires a single thing to change, hemoglobin being a single thing to change of improving iron deficiency, we've seen that that has not really been the case. We really want to broaden our thinking. That was a primary objective of the working group that I'm presenting on behalf of. Next slide, please.

Today, we're going to really focus on two objectives of this work group, and that's numbers two and three, to really think about, although anemia is defined as and diagnosed as low hemoglobin, we're going to really be thinking about assessment of the etiologic factors and the causal factors of low hemoglobin. We'd like to propose a framework of how to systematically think about or approach assessment of anemia ecology within population-based surveys, because that's the experiences that we were drawing from as we were preparing this report. Next slide, please.

Here, just right away, if you're thinking about assessment, it might be pretty daunting to see all of the non-nutritional and nutrition-specific causes of anemia. If you pay attention to the footnotes, which a lot of us are drawn to, you'll also see that there's the caveat that not all potential causes of anemia are even listed here. There's a lot more than just single micronutrient deficiencies within the nutrition-specific realm of etiology of anemia. We really wanted to draw the community to thinking about the non-nutritional causes of anemia. Just reading left to right, we have blood loss that may be common in communities, or increased hemolysis, very commonly or often due to infections such as malaria. We also have a myriad of other infections that are bacterial, or other parasites to consider, as well as viruses that have surveillance systems in certain settings that maybe the anemia community could tap into, or maybe anemia could be a way to combine forces across different sectors.

Just to move forward, we have the red iron deficiency highlighted here as one single cause, but again, the emphasis of really taking this ecologic approach and thinking about multiple causes and really the non-nutritional causes that have traditionally not gotten as much attention when we think about assessment. Next slide, please.

This ecologic approach for assessing and addressing anemia can be done both in an individual or a clinical setting, and also in a public health or population-based survey setting. As I mentioned earlier, a lot of the examples and experiences that we've pulled from were more from the population-based survey, and we're going to share an example from a Malawi micronutrient survey. Then I'll just pause there for a moment because as was mentioned in the introduction, micronutrient surveys have been common, and that brings the thinking around anemia to nutrition based, but it's pulling in those non-nutritional causes of anemia into surveys and doing measurement of them alongside nutritional causes. They're going to be able to help us move forward in making a difference or a dent in the anemia prevalence. Next slide, please.

Some considerations when you're thinking about population-based assessment of anemia. This information was pulled from a really rich resource that's listed at the bottom of the slide that's available online, the Micronutrient Survey Manual & Toolkit. It really starts with thinking collectively, having that round table meeting of the minds of really, what are the data that exist? What are the gaps in our knowledge? How can we prioritize the biomarkers and characteristics that we need to include to better understand this ecology of what's surrounding anemia? That could include underlying disease status, as well as characteristics that might not commonly be included in surveys like women's health characteristics, especially around women of reproductive age and children being the two population groups that are most affected by hemoglobin or low hemoglobin. Thinking about what physiologic practices, if hormonal contraceptive is common, that could prevent excess blood loss on a monthly basis, et cetera, how those could be integrated into surveys. This all has to be done within financial resources and technical capacity lens, so thinking about what requirements might there be for a cold chain. Are all the lab analyses that are proposed going to be done in-country? What's it all going to cost? Who could we partner with to make it a possibility? Next slide, please.

A lot of this information, this is all pretty high-level highlights. If you want to dive a little bit deeper, I had to give a quick shout-out to the Micronutrient Survey Manual & Toolkit. The URL is listed here. There was a lot of work and collaboration by great groups. Next slide, please.

Here's the framework that we really, honestly, split a lot of hairs trying to come up with. It would be nice to also get some feedback because science is an ever-correcting and iterative process in general. If you've been following the work of the task force, you might have noticed that this has been referred to as an algorithm in the past or a decision tree. In general, what we're proposing here is

something to really start conversations about what data are available, and at the end of a survey, what data would be needed to respond to either a high or low prevalence of anemia. Although we're really trying to emphasize non-nutritional causes of anemia, we start the conversation beyond just reviewing the anemia situation, at can we answer the question of what proportion of anemia is iron deficiency anemia? So often, hemoglobin exists without a marker of iron status, and iron is pretty complicated to measure in the sense that you also need an inflammatory protein as well. WHO recommends ferritin, but alongside inflammatory proteins. If those data aren't available, then it's recommended to measure characteristics so you could calculate what proportion of anemia is iron deficiency anemia. Then the next step is really contextualizing that iron deficiency anemia. To understand if it is a high prevalence or a low prevalence, why might iron interventions be successful or might have not been successful in the past? This could be program coverage data, a lot on infectious disease burden, as well as some chronic diseases. Really, this is where you need to have that understanding of context.

Next we bring forward the reality of understanding that anemia is also due to blood loss. How common are helminths infections, or as was mentioned before, heavy menses among women, or interventions to maybe reduce that? If they're common, that's important to know. If not, then we need to include in a survey characteristics that influence blood loss in populations.

Finally, we put as our final step, the nutrition-specific thinking about other micronutrients that influence anemia, or a causal to anemia, as well as nutrition-specific causes such as dietary intake. Not only would food security be important, but components of diets such as phytate. Next slide please.

I'm going to basically skip over this one because I basically went through a lot of these points on the prior slide, except for the first one, which is, again, to re-emphasize context. You might be working in a area that has a large contribution of groundwater iron. This is why it was hard for us as a working group to come up with a one-size-fits-all solution. It seemed like what was needed was a broader discussion because the local expertise and understanding of context is critical. Next slide, please.

We're going to just discuss the clinical assessment of anemia very quickly, because it can modify our thinking about public health assessment as well.

Yaritza Rodriguez

Anne.

Anne Williams

Yes?

Yaritza Rodriguez

I'm sorry to interrupt, but we have about two minutes remaining, if you could please wrap up, so we can move on to the next speaker. Thank you.

Anne Williams

I'm going to go ahead and skip the clinical assessment of anemia for that point right there, so we can go through our example from Malawi. Next slide. We're going to move one more forward. Here, just focusing again on the public health piece and programmatic decision-making from survey data. We're going to use the example from a Malawi national survey data that is beneficial because it was a public data set that measured multiple micronutrients as well as inherited blood disorders and

infectious diseases. We looked at prevalence estimates for these risk factors, looked at univariate associations between the risk factors and anemia, built the multivariable models, and then came up with some metrics to do an illustrative example to think through how reducing certain characteristics or controlling them would influence anemia. Next slide, please.

The metrics we have are three listed. The maximum expected effect is a clear overestimation of effect. It's really thinking, if half of the prevalence of anemia that I have is from a condition, say iron deficiency, and we believe we can remove all iron deficiency in the population, then half of my anemia would go away. The final metric that we really look at and will be discussed among the panelists, I believe, is the attributable fraction. Here we're applying a prevalence ratio that's adjusted for the overlapping conditions. Not just iron, but also say inherited blood disorders or malaria or inflammation. Looking at maybe a more true effect of what could be attained if that characteristic were removed from a population. Next slide, please.

This is a condensed summary of what was found in that micronutrient survey among children in 2015-16 in Malawi. The red bars here on the top are looking at what that maximum estimated effect would be and seeing the clear overestimation of the effect of reducing iron deficiency, compared to the gray, adjusted prevalence ratio, attributable fractions that were calculated, that are lower for iron deficiency, malaria. Malaria actually has the lowest differential effect between the maximum estimated effect in red and the gray. Whereas we see the largest differential in inflammation in the third bar. You might notice, why are only these five characteristics listed? Some characteristics like helminths were measured, or urinary schistosomiasis, and those were not found to be significant and so they were removed from the model. These five risk factors are highlighted, but many more were measured. Next slide, please.

Just to summarize how important it is to measure so many of the multiple causes of anemia in surveys, surveillance, and program monitoring. Clearly, this is an expensive undertaking and so there needs to be more thinking about the best way to do that and the analytic methods to measure the relative contributions of multiple anemia causes in population. Hopefully, that's some of the discussion we'll have today. What can we do with statistics using cross-sectional data to really understand causal factors? We need to improve or have some research on what are the best practices to assess structural determinants of anemia in order to be able to respond to them. Next slide, please.

I'll just conclude with reiterating that anemia is not itself a disease, but a condition with the diverse and overlapping causes. That, hopefully, broadening the focus from predominantly iron to a better understanding of the multiple factors underlying anemia can help inform clinical and public health anemia programs. We hope that adopting a practical systematic approach will improve on addressing data gaps and make progress on reducing the global burden of anemia more within reach. Thank you again for your time. Next slide.

Lindy Fenlason

Okay. Thank you, Anne, for your presentation and for setting that background for us. Now we're going to move on to our first panel, which is our panel of researchers. These researchers are representing those who design, conduct, and analyze surveys, that untangle those causes of anemia that we've been referencing. These involve studying micronutrients and much more. We're lucky to be joined by an expert group who've experienced the challenges involved in this and have spent many years carrying out micronutrient surveys all over the world.

James Wirth is the Managing Director at GroundWork Health and an international nutrition specialist focusing on the design and implementation of national public health and nutrition surveys. Dr. Maria Elena Jefferds is a Team Lead of the IMMPaCT program at CDC with broad expertise in population-based surveys and monitoring and evaluation. Dr. Yi-An Ko is a Research Assistant Professor at Emory University, developing novel analytical strategies to understand the etiology and the pathogenesis of complex diseases.

For our panel, we have three questions for you each to respond to, and I think you have about eight minutes to do so. What I'll do is I will read off these questions and then you guys can each take turns walking through those and hand over one to the other. Question number one, what are your experiences in why and how countries request your assistance in conducting micronutrient surveys? Question number two, from a statistical perspective, how confident can we be about various approaches to assigning causality, or more commonly, association of various biomarker results to anemia and when should we exercise caution? Question number three, what are the opportunities and challenges inherent in following the anemia task force suggested approach to assessing anemia etiology in surveys? Again, to walk through those, number one, talking about your experiences in why and how countries request assistance for this. Question number two, from a statistical perspective, how confident can we be about the approaches and the assigning causality or association to biomarkers and anemia? Then question number three, opportunities and challenges in the anemia task force approach that was put forward.

I'll go ahead and we can start just in the order that I introduced. We'll go from James to Maria Elena and then on to Yi-An. I'll go ahead and hand it over to James.

James Wirth

Okay, great. Thanks so much. To address your first point, I think the reason why countries start to request the assistance to do a national micronutrient survey is because frequently they're getting the same or very similar results from other public health surveys such as DHS or **[unintelligible 00:25:24]** that are telling them that there is a problem. They're seeing anemia prevalence that's quite elevated, but there is not enough information from those surveys which just tell you what's happening to give you an idea of why it's happening. I think that that to me is what I've seen is the motivation for many governments or UN agencies working in-country to request the support for a national micronutrient survey, to look at their etiology of anemia. As far as the statistics or the associations that we find in our surveys, I think that you have to be careful about the causality issue. Association is not equal to causality, but many times we go from clinical research, the typical direction is that the causality path is-- When you see an association, you can infer that the causality goes in a certain direction.

When it comes to the association statistically, I think there's still room to expand on really how we measure the association if you're looking at the prevalence ratios, looking at the population attributable fraction. That's getting more and more used. That's, I think, a really good metric to help us look at not just the association, but the proportion of the anemia burden that we're seeing that isn't **[inaudible 00:26:57]** to an intervention. I think that that's really a great initiative that's been pushed forward and we use that metric honestly as well.

I think the real opportunity, and I like the framework that was laid out, is that basically looking at existing research in the country to understand, that would extend, what are the factors that could be contributing to anemia. Sometimes, even very old literature can give the hint that maybe there is some genetic hemoglobinopathies that could be causing a proportion of the anemia, and understanding that is key. In a few countries where we've worked, we found some very old research, nothing on a population representative survey, but in more localized research, that showed there was large amounts of alpha thalassemia or beta thalassemia. Being able to explore that on a population level give insights into what proportion of anemia is genetic, and thus what proportion of anemia could you actually reduce through other interventions. That's my take on those three points that you raised, but I can pass it over to Maria Elena if she has other causes.

Maria Elena

Thanks, James, that was really helpful. I think just to build on what James has already said, micronutrient surveys are expensive. I think that when we are asked to provide technical assistance to help design these surveys, countries are delivering a lot of micronutrient delivering interventions,

and I think they're savvy and want to know what's going on with those interventions. They're interested in both status, they're interested in coverage of large-scale nutrition-specific, micronutrient-specific interventions, and they want to know how the intersection of status and coverage and performance of those interventions are happening. I do think that this is relevant, especially for interventions that maybe there are not really other data sources for. Especially looking at large-scale food fortification is of particular interest. I do think that that is a primary interest of the partners in-country when we have these discussions, and that's a main reason why we're asked. We're asked when people are thinking about studying for baselines, as well as just ongoing programs that have been in place for a while. They want to see the status and performance of those programs are.

My experience is that once countries start getting micronutrient status data, they want more data. It's not like they're happy with it once every 20 years. They want to know. They want to know, "Okay, we did this five years ago. Where are we now?" I do think that there's an appetite for micronutrient status data, and definitely interest-- There's a lot of different biomarkers. Oftentimes, we can't do everything, so there's interest in looking at various biomarkers. I do think that there definitely is an appetite. From what I can tell, people need it for advocacy, they need it for fundraising, they need it for lots of different reasons. While they're expensive, we cannot meet the need, I would say. There's a lot of requests. These are complex surveys. They can be challenging to do, depending on how complex they are, but there's definitely an appetite. I think countries want to know what are the modifiable causes of anemia, and then what are the non-modifiable causes of anemia, as well as what is the burden. Even if something's not causing anemia, they want to know what is the deficiency prevalence. This is definitely of interest, I would say.

In terms of the statistical, I agree with James. These are cross-sectional surveys, so there's a lot of limitations to how you can interpret attributable fractions or any other kind of analyses that are going on. Sometimes, the modeling leaves people going, "Okay, what do I do with this now?" It's complex and can be challenging to interpret and translate into policy or action. I do think that there's more work that needs to be done in that sense, and recognizing the limitations of how you can interpret the results.

Moving to that third question about the opportunities and challenges inherent in following anemia task force suggestions. When I see the algorithm and I see this, I think a couple things jumped to my mind. I think, first of all, whole blood is really hard to collect and keep cold and analyze in a very short period of time, which is what's needed. I think logistically, it's challenging. It's expensive to be able to move the specimens that quickly to get a CDC done. I think that there's a logistical issue there in general, for any large-scale population-based survey.

The other thought I had was that there's a lot of considerations that go into what labs are used for different analyses. Among the many considerations are how many splits you have. What is the cost? Where are they located? When you're dealing with multiple labs, potentially in different countries, the idea of trying to track down a given specimen and say, "Well, let's do this test first," and then seeing this stepwise progression whether you proceed to other analysis, would be challenging, I think. I think in a clinical setting, you have different opportunities. I'm not really sure how easy it will be to operationalize it, so that would be something I would suggest the authors take into consideration, the many factors that go into the labs that are used. Maybe you're saving money by not doing every test, but logistically, maybe you're saving hundreds of thousands of dollars by going to a lab in a different country. I think there's trade-offs either way.

The other thing is, when you're doing modeling, you need the analysis for every person, not just some. I think that that's another difference in terms of thinking through if you're really getting an etiology, what the proposed fiscal analysis is later, and what specimens you might want.

The other thought I had was that, some tests you would do at the household, right? You can do a malaria rapid test kit right there. You're not going to not do a rapid test kit. You're going to do it regardless. Some of these labs, you're going to have anyway. That was some of the other thoughts I had. It depends on what the test is, how you do it. Is it done at the household? Is it done in the lab?

Where's the lab? It gets really complicated. Those are some of the thoughts I had about the algorithm.

I guess the last thought I had was, if you're in a malaria endemic area, for example, we would say do iron and malaria regardless. You should do that on all the specimens just because those are the likely causes. There's also just a practicality about decision-making and simplifying survey procedures to take into consideration, and they're most likely causes. Those are just some reflections, and I will pass this over to Yi-An.

Yi-An Ko

Thanks, Maria and James. I think they've raised several good points and do address these questions. I think for the rest of the time, I'll just focus from the statistical point of view, how confident can we be from these estimates? How are we confident, and then how do we draw a causal conclusion based on the results? I think, first of all, most of us know that in order to be able to estimate risk, a cohort study design is required. Based on the study design and long-term follow up, or even lifetime follow up, we can estimate the risk of a disease, but many times, it's just too expensive and it's not very efficient. Most of the surveys that I have been working on are cross-sectional data. That's why this connects back to what Anne presented about the prevalence ratio. Most of the time, we can only use the cross-sectional survey data to estimate prevalence ratio based on the prevalence estimates, and then we try to analyze the data and then try to draw conclusion.

One useful measure that people commonly used is this population attributable fraction. The interpretation is, what proportion of the risk of anemia, for example, in a given population, is attributable to a risk factor? Which could be inflammation, could be micronutrient deficiency. The other interpretation is, what proportion of anemia risk could be eliminated if the exposure were eliminated? There's another assumption that holding like nothing else changed. That's when we do analysis, when we do adjusted attributable fraction that we adjust for multiple covariates in the model, and then that's how we interpret the data. There are just numerous assumptions that we need to keep in mind when we actually interpret the data, and then we can evaluate how confident we are about the results.

The first thing is that we all know that the risk factor should be causal. This should be something that has been established, and it's a causal factor just because this parameter, attributable fraction, has a causal interpretation. We have to keep that in mind. This is established based on prior studies, evidence. Otherwise, if we cannot be sure about this, the calculation of attributable fraction is meaningless. We need to make sure that this has a causal mechanism.

The second assumption is that our study design is appropriate to address this question. The data are valid, the data quality is high, and everything is accurately measured. The ideal situation, like I said, we want to have long-term follow up to estimate the disease risk, anemia risk among the exposed versus non-exposed cohorts. Again, most of the time, we don't have the luxury to have those type of data. At least we should be able to minimize the bias in our estimate in terms of prevalence ratio and the prevalence of exposure. Those estimates should be available in our target population. Any selection bias, things like that, potential confounding, we should also keep in mind when we design the study, when we analyze the data, so that we can be more confident about the results.

The third assumption is critical because based on this attributable factor, we're assuming that there's an intervention which is effective and timely, that will allow us to eliminate the exposure. Also, at the same time, we're not affecting all the other factors like socioeconomic status, age, blah, blah, blah. A lot of other things that we try to control for. These assumptions sometimes are very strong assumptions and then they may not be realistic in practice.

After we run the analysis, then we come to the interpretation. Again, we need to know that when we do the analysis, when we start trying to estimate the association, a lot of times the result depends on, for example, how we define anemia, how we define the exposure. All of the results would be different if we define our risk factor differently, for example, using different threshold that

would affect the prevalence, then that would affect the disease risk, and eventually, it will affect the estimate of attributable fraction. We also need to keep in mind that a lot of times these estimate depends on a mechanism which can be shared by multiple exposure variables. For example, anemia is a very complex disease and a lot of factors can explain part of it. When we estimate this risk, when we estimate this attributable fraction, it can consist of multiple variable of exposures in this mechanism. Then we're actually trying to estimate this whole, for example, iron deficiency mechanism, but it can involve other things in the pathway. We just have to keep in mind. Also, many times, we're unable to account for multiple factors, including genes, environment exposures, and even their interactions in our analysis. A lot of uncertainty actually is out there that we haven't been able to consider all of them at the same time.

Lastly, I wanted to point out that the high attributable fraction to a risk factor doesn't mean that the rest of them are not that important. It's still a useful measure that we can use if people wanted to prioritize interventions, but at the same time, we need to keep what interventions are available and what costs more, what is cheaper, what is more effective at that time. This attributable fraction can be useful for policymakers, for public health implications, but at the same time, we also need to consider our actions. What are feasible? What has the highest impact at the time? It may not be necessarily consistent with the actual association estimate magnitude at that time, but it may depend on whatever is available and is feasible and actionable at the time.

Overall, we've talked about when we interpret the data, we need to think about the causal mechanism, our hypothesis, the causal pathway, whether our data are valid and appropriate for this type of analysis and whether it's appropriate to address our research question. Then the study design, we need to consider all of the factors. We need to collect necessary data and then at the same time, we also need to take, for example, survey design into the analysis into consideration. We need to think about uncertainty measurements like confidence interval, credible interval, using different approaches, sensitivity analysis, whether the results change in different subgroups, and then finally, the interpretations. I feel like after all, we don't feel that confident about the associations, but we do what we can and we do our best and try to interpret the data and then try to utilize the data to inform the subsequent actions. That's my take for this question. Thank you.

Lindy Fenlason

Thank you all so much. I just want to circle back to James. Did you have another point that you wanted to make on this?

James Wirth

Yes. I just was reading through the chats and I've been seeing a few comments about costs and logistical challenges, and I just wanted to-- I see a lot of attendees are joining from countries where they'd be interested in doing a survey like this. I think an important thing to remember is that, for national survey, a large driver of the cost is actually just getting to a household. Just having the interviewers and phlebotomists to get to a household and just actually getting there. That's one of the largest costs. There's lots of other ways to save costs on the laboratories. Really, you touched on that. You said looking for laboratories that are able to do the analysis affordably, and globally, there's lots of different laboratories. I think there's sometimes a desire to keep everything in-country, which is a totally natural desire. Unfortunately, sometimes there's higher costs because those laboratories are not getting a lot of throughput from samples from a bunch of different places. There are laboratories out there that receive samples from around the world and they can process lots of different micronutrients at a fairly affordable price. That's something for folks to consider. If anyone is really concerned about logistical complexities, there's been micronutrient surveys done in lots of challenging settings. You can establish your own cold chain mobile freezers, which really the prices have gone down considerably over the past five years. There's lots of different logistical

options out there that can make a survey work well even in a challenging setting without breaking the budget. Just for folks to consider all that.

Lindy Fenlason

Thank you so much for those points as well and for keeping your eye on the chat and what was popping up there. Thank you, panel. We really appreciate everything that you've been able to share with us this morning or this afternoon, evening, depending on where everyone is joining from. Now we'll go ahead and move to our second panel with our country perspectives. Great. We'll let these guys get settled. As they do, I'll go ahead and give a little bit of an introduction here.

Again, our second panel is admitted by the speakers that are representing country program managers who utilize the survey information to make programmatic decisions around anemia. Any proposed approach needs to be validated through their eyes and their experience. We're honored to be joined by three distinguished experts from Guatemala, Sierra Leone, and Nepal.

Mireya Palmieri Santisteban is the director of the Health and Nutrition of-- Give me one second, Health and Nutrition Epidemiological Surveillance System, sorry, SIVESNU, and has led national and regional efforts in nutrition at the Institute of Nutrition of Central America in Panama, or INCAP, in Guatemala. Aminata Koroma is the director of Food and Nutrition at the Ministry of Health and Sanitation in the government of Sierra Leone, and she has led nutrition efforts for many years in that position.

Naveen Paudyal is the nutrition officer in UNICEF Nepal, with over two decades of experience in design and implementation of survey efforts in Nepal. For our panel, with your vast experience in anemia programs, we do have actually three questions for you as well that we'd love for you to respond to. Similar format to the previous panels, you'll have about eight minutes to respond to these three questions.

What I'll do is I'll walk through those three questions, and then, again, we'll go in order of introduction. You guys can hand over one to the other. The three questions are these. The first one, what are your experiences in using micronutrient and other survey data in your country to inform anemia programming? Number two, how do you translate the results into program activities? Is there a system for prioritizing activities based on micronutrient data?

Then number three, from a country manager's perspective, what do you see are the opportunities and the challenges inherent in following the anemia task force suggested approach to assessing anemia ideology in surveys? A bit of a twist on the earlier questions, but some similarities there. Again, number one, if you can tell us about your experiences using micronutrient and other survey data to inform programming. Number two, translating those results into program activities, what does that look like, how do you prioritize? Then number three, could you talk to us about the opportunities and the challenges within the approach that the anemia taskforce is recommending? I'll hand it over to Mireya to start.

Mireya Palmieri

Good morning, and thank you very much for inviting us. I'm very pleased to be here and try to explain and share with all of you our experiences at INCAP. I'm going to talk about the role that INCAP has played in dealing with topics related to micronutrient deficiencies, but specifically to anemia. In order to answer the first question, I would have to talk about INCAP's history regarding research and technical assistance in the area of micronutrient deficiencies.

Anemia was studied since the 1950s at INCAP. We did the assessment of the size of the problem in the country and in throughout Central America. We detected which were the most vulnerable groups. This allowed us to propose and test different interventions regarding both food fortification and some supplementation and allowed us, these basic surveys since the 1950s and then the big

survey in the 1960s, allowed us to prepare four broad mandates in full fortification of four staple foods: sugar, salt, maize flour, and wheat flour.

It also allowed us in the 1990s to prepare a general law of food enrichment issued in order to include the monitoring of the regulatory framework for these fortification programs. Now, INCAP has engaged in a more broader system of surveillance to help the country, the public sector, to monitor the anemia situation, and to also monitor the quality of food fortification programs.

That's more or less in a nutshell our experience in both producing data and also using data in order to reinforce and strengthen the political framework for nutrition in Guatemala. Regarding the second question, how do we translate results of these surveys and research activities to programs at the national level, we would have to understand INCAP's various functions in the country and throughout the region in Central America.

We have a role in terms of basic applied and operational research.

However, we also do technical assistance to the different countries and basic public institutions in order to design and carry out interventions that focus on the main nutritional problems in Central America. We do that. We help doing research or we do the research. We provide technical assistance and training to the ministries of health, specifically to the Ministry of Health of Guatemala.

We also work with the private sector, specifically in the food fortification strategies. We also work with institutions that deal in the enforcement of regulations, basically the monitoring of fortification programs in Guatemala. This is, broadly speaking, my answer to question number two. Regarding opportunities and challenges, I would say that in terms of opportunities, I would definitely need to mention one opportunity is having an institution like INCAP that has been working throughout the regions in the last 74 years.

That's definitely an opportunity and that has allowed us to have continuity and to have institutional memory as well in terms of our support of national institutions. Another great opportunity we have is that we have established throughout our history, and specifically in the last 12 years, some enduring and very important international alliances. Here I want to mention specifically the CDC.

We have been implementing this surveillance system in the country, and we have received the valuable input support, technical support, financial support from the CDC to carry out this national surveillance system. Those are the big opportunities that I can mention regarding our experience. Then in terms of the challenges, perhaps given my background, I'm a sociologist. Regarding the challenges, I would have to mention definitely institutional problems, institutional problems which do not allow our public sector to be efficient, to have the coverage that the situation deserves.

Definitely, these inefficiencies do not allow for good information to be produced at the institutional level. This is a very important challenge because this does not allow for a culture of monitoring and evaluation and surveillance to flourish. If the institutions are weak, then there is a tendency to be afraid of data, there is a tendency not to focus on measuring the problems. This is definitely a challenge for all of us who work in the nutrition area. I would leave it at that. Then, if there are any questions regarding my intervention, I'm very pleased to be able to answer them. Thank you very much. **[pause 00:57:14]**

Naveen Paudyal:

Good morning and good evening to all the colleagues. This is Naveen Paudyal from Nepal. Basically, there are three questions that **[unintelligible 00:57:44]** to the content panel. The first question's, what is our experiences? I have mixed experiences. Actually, in Nepal, with our global partnership with the CDC, we have been able to organize two small-scale micronutrient survey and one large-scale survey.

In terms of use of data, we have been used so many datas for the paper publications, also supporting some implementing sciences on the NMP **[unintelligible 00:58:17]** because of that provided some kind of evidence. The NMP works, so the program has been scaled up to national level. That is a

great achievement for us. Also, because we had the small-scale and large-scale survey data, we have been able to tabulate data and supported the policy decision for programmatic scale down, for example, we have determined distribution program.

Also, we have been able to publish some papers, some etiology of anemia. We have the complete pictures regarding why anemia is prevalent in the country. Also, we understand why anemia exists in the country. It is not only the policymakers, even the policymaker they understand this is not only the iron deficiency, there are non-nutrition factors as well. Government is now more focused on the multi-sector approach rather than only the iron deficiency prevention.

Government is moving with some new approaches, like multiple mechanism supplementation. They are thinking to implement this implementation [unintelligible 00:59:30] on the NMS. Also, this knowledge contribute to the global level as well. For example, WHO is reviving the cut-off points for the [unintelligible 00:59:42] and [unintelligible 00:59:44]. Somewhere, our data also contributed. In terms of from national level to global level, the National Micronutrient Survey data supported.

There is very keen appetite from government side to continue this kind of data collection system. Of course, most of data are cross-sectional, and we also have to strengthen this regular system by our institutional mechanism to collect data. That there is opportunity to work on that area, but there is a great value from the government side, and they are willing to implement this survey in future, in the second National Micronutrient Survey. That's the kind of thoughts in the government side that we are advocating, and we are discussing that.

In terms of the regional translation into the program action, as I already mentioned, some of the new intervention has been supported, for example, weekly Iron Intensification Program that was initiated after National Micronutrient Survey because they are realizing it is not only the children, even the second decade of life are also suffering from anemia.

When the Micronutrient Survey data that came in the notice, the policymaker become aware, they also thought [unintelligible 01:01:06] nutrition program. This is the kind of new development in the country, and that program is also going on. Micronutrient Survey data really helps to government to prioritize our intervention. The platform that we are using, there is [unintelligible 01:01:24] committee in the government system, which discuss-- especially the Ministry of Health side. All the experts from the different area, they sit together and they discuss and they prioritize, in one hand.

There is also another process that is a multi-sector nutrition plan formulation that is-- We are one of the early [unintelligible 01:01:43] in this area. That platform also discussed about the ecology for part of the anemia. These are two platform we are discussing about all these things, and prioritizing even our-- From the UNICEF perspective, we have the multiple CPD process as well. Here also we discussed a lot about the contributing factor and that help to develop our next country program document.

Obviously, we are working with the government. That means some of these priorities will also translated into the government system by advocacy. In terms of institutional mechanism, I already mentioned, in the health system, there is some bodies are there and in the planning level. The most important is that we have the technical collaboration with CDC. Countries like Nepal, low-middle income country, because of limited capacity and the resources, and in terms of data analysis, all the things. It is very hard to really use data without the global collaborations.

The knowledge generation parts in this area, this mechanism are helping a lot. Of course, there are areas to improve. For example, central data ecosystem is not existing here, so there is kind of fear in future whether we'll lose this data as well. The protection data is also on the area for us to think about for the long run.

In terms of opportunity, as I mentioned, the National Micronutrient Survey has collected the maximum information that following this pipe steps of framework to inform measurement of anemia. That means all the information are on hand. The requirements now, the opportunity is there, there was a kind of SPRING's tool on the discussing on determinant of anemia in country level. This data

can be used for country-level dialogue, especially in the context where we are heavily decentralized from federal to local level.

Local level is more convergent from the sectoral perspective. If we wish to address the non-nutritional aspect of this determinant of the anemia, the best platform is the political level where they can reexamine all the determinants, and they can take the decision. That is one of the opportunities, I think that, but after the SPRING's own level of dialogue at the country level, there is discontinuation. Somewhere we need to rethink this kind of the dialogues should be continued at a country level. That is the opportunity I'm thinking about. Also, because there is very big appetite for the data, and especially after the COVID 2019, if you don't know, if there is changing in the anemia **[unintelligible 01:05:00]** of course, DHS has given some indications. There is a real stagnate position anemia. There is no specific story from Micronutrient.

I think that if we could support from technical and finance angle, especially low and middle income has difficulties in terms of handling the survey because there are a lot of challenges. Personally, I experience a lot from logistic angle, from even some kind of the global public health regulations that really restrict the transfer of the specimen from the one country to another. That is also barrier because people look on biosafety side. There are some challenges.

The National Laboratory's capacity is not at optimum level to really support this kind of complex survey. In one hand, we have to develop the country level to capacity, and at the same time, we also have to think about how this specimen can easily transfer for analysis and also get informations. We hope our organizations and your task force can contribute in this area in future. These are a few of the things I am thinking about.

Basically, we have a plan to organize, implement the resource on NMS that will also give some more ideas about whether it works or not. Also, one of the thing regarding this different components, the lack of data in food system because this discussion started after the COVID. We still do not have information how food system is contributing in anemia. Of course, we know the biologic biomarkers are there, public data are there, but to take the full spectrum of decision, we need to also understand how food system is contributing in the anemia.

This is the area we also have to strengthen in terms of resource, in terms data, all the things. With my conclusion and my expectations over the support, I would like to hand over to my next colleague, Aminata, for the **[unintelligible 01:07:43]** experiences. Thank you.

Aminata Shamit

Good afternoon, everybody. This is Aminata speaking from Sierra Leone. Sorry, I'm trying to minimize disruption. I put my camera off. For civilian, we needed to do the micronutrient survey. Even though it's a very expensive survey, but it's a worthwhile one because we've been battling with very high anemia prevalence and also estimating the vitamin A prevalence in the country. I'm happy to say James is in the panel because we worked with groundwork on this.

We commenced work just before Ebola. The survey was done in 2013. It's a multi-sectoral effort. We had financial, technical, and logistics support from our donors, UN partner, international NGOs, and national NGOs, and a strong leadership and collaboration from government and all stakeholders. We needed to do this because what we found out when the data came out was really shocking, and it was very useful for us to go back to the drawing board and see how we can again restructure the interventions that we want to go on with.

For example, the prevalence for anemia in children was 76% and malaria was 53%. Acute and chronic inflammation was 73%. These are all very high. When it came to vitamin A, it was only 17% for children, and that is moderate. Iron deficiency was 5%. Iron deficiency anemia, 4%. For non-pregnant women, anemia and malaria inflammation were 45%, 35%, and 24% respectively. The prevalence for iron deficiency was 8%, iron deficiency anemia was 6%, vitamin A deficiency 2%, and B12 deficiency was 1%. All along we've been going on with the assumptions that vitamin A efficiency is also very high based on the estimates that we had done in 2005. That was based on the high level of under-

five mortality from National Survey, but now to find out that it is moderate, it is not that high, so we needed to go back to the drawing board. The most valuable information for us was the low-level iron deficiency anemia, which was very low for the children and non-pregnant women, less than 8%.

That, in itself, was something that was shocking for us. Then we started asking questions. People started to dive into questions, but then it's been known for nearly a century that, for Sierra Leone, that soil is very rich in iron deposit, but this was not having any significant impact on iron availability in the diets or the water. Again, SCDI VUCA did some study with groundwater and found out that iron level in groundwater was also very, very high.

We went further, it came out that the agricultural sector had been battling with iron toxicity for arable farming, especially in rice. All of these started coming out. Now that after the Soviet, these are things that started coming out, and then we need to start again to see how we can revise our intervention because, before the implementation, we were planning on using the micronutrient powder, but after the data came out, we had to pause, and we cannot do this right now because of the data we have uncovered.

Because we know that also, WHO recommendation advised that for iron and folic acid supplementation, it's to be targeted to those that are anemic and at least of iron deficiency. They should receive concurrent malaria and other infectious diseases because in SL the prevalences are very high, so this will also work with us, and also through prevention and effective case management.

This now brings us to the fact that anemia requires a multisectoral approach, and this should be done through an integrated intervention. We should approach this through integrated approach to address the various factors for malaria, helminth infections, other chronic infections, and also TB, HIV/AIDS, as well as other nutritional deficiencies that are in the country. We should also look at it from a public health perspective.

That's why for us it was very important to get the data, and we use this data to maximize the effectiveness of the interventions that we are now implementing. I'll go now to the second question, how do we translate the results into program? After that, we decided to have a multisectoral strategy to prevent and control anemia. In that case, what we first did, we worked with SPRING, and we had to do a landscape analysis of anemia, an anemia program in the country, and then also former National Anemia Working Group, it's a multisectoral, that was the first time we had that group.

It's a multisectoral body with most of the entities in the country, government, health, education, agriculture, trade, **[unintelligible 01:14:20]**, gender, our UN partners, donors, private sectors, and other NGOs. Then we started the strategy formulation. From this strategy, we developed six priority objectives with several strategies to go with this priority objective based upon the micronutrient data that we had received.

We had objectives to improve prevention and control of infection, improve prevention and chronic infection of specialized condition, which is screening, counseling, management of sickle cell disease, prevention of-- management TB and HIV, improve reproductive health and delivery care, improve micronutrient intake and diet quality, that is food production, improve maternal infant and young child feeding, improve intake of iron, folic acid, and transition.

Currently, with transitioning to MMS in country, and also improve education of girls and women, which improve the access and quality of school for girls and women. The last one is to improve the integrated platform to deliver anemia intervention. This work batters together to say we need to work in a multi-sectoral approach. We all need to come together to make sure-- We had over 80 partners' input into this strategy.

Thanks to SPRING, who were the technical consultant for the strategy, it's from 2018 to 2025. We are right now planning to do another micronutrient survey. Yes, it is very expensive. Our plan was to do it every 5 years because it's expensive. We're going to now do it after 10 years, and we are going to also-- we started talking to groundwork because we want to continue to work with them and see because it was very easy working with them, even though it was challenging.

Like James said, we had the challenge to get into the homes, the samples for **[unintelligible 01:16:45]**, we had to export all the samples to other country, to other labs because we did not have adequate labs in the country. We're going to do this again because we need now further to know what really is going on and how we can also format all the policies to improve anemia prevention and control in the country.

If we say whether there are opportunities, yes. For us, the task force approach will work because that's the approach we had used, we explained, so it had worked with us. We reviewed our data, engaged with stakeholders to identify the gaps. The data was available to assess the proportion of anemia, anemia that was due to iron deficiency. Data were available for infection, brought in malaria, hookworm, schistosomiasis, ARI, diarrhea, and inherited blood disorder. Data available on anemia due to helminths and heavy menses, data available on other micronutrient deficiency, vitamin A, and phytate-rich diets.

We had started using this approach. We think it's a very good approach, and this is something countries should use, and because it's a step-by-step, and it's also bringing the issues to the table, not just the issues, it also provide the forum for better understanding of the anemia prevalences in the country and all the contributing factors. Now, all partners need to come together and work as a team in a multi-sectoral approach if we have to make sure we control and reduce the anemia. Any contribute is very, very high.

Yaritza Rodriguez

Aminata-

Aminata Shamit

Yes, please.

Yaritza Rodriguez

I'm sorry to interrupt, but we will need to wrap up and move to the next speaker, please.

Aminata Shamit

Okay. Our take-home message here is for us to see we need new definition for anemia in malaria-endemic settings, thresholds need to be redefined. As some degree of anemia, moderate, for example, is protective against malaria, and trying to correct that will be a waste of resources. That is our take-home. With all of this work going on, I'm sure for countries that's malaria-endemic, will have to go back and revise the definition and also the threshold. Thank you.

Lindy Fenlason

Thank you all for sharing those experiences and examples to us. As typically happens, we run short of time. I'm very grateful to those who have had a chance to respond to the questions that have been popping up in the chat. They've been excellent questions. We're trying to address as many of them as we can right now. At this point, I'm going to hand it over to our final speaker. This is Dr. Dan Raiten. Dan is my co-lead for the EPIC Nutrition Group, and he's also the program director for nutrition at the Eunice Kennedy Shriver National Institute of Child Health and Human Development, or NICHD, and the National Institutes of Health. As I mentioned, he's the co-chair in the subgroup of the US Government's Global Nutrition Coordination Plan and has played an integral role in the anemia task force. Over to Dan.

Dan Raiten

Thank you, everybody. What a wonderful session. I want to first recognize the work that was done by the advancing nutrition team, Denise, and a silent partner who's not with us today, Laura Hackle, who played an integral role in this, and Omar Dary, who really stimulated this work at USAID. I want to thank all the panelists for their presentations. I think that the presentations that we heard today really focused on the core principles that drove us in this effort to develop anemia task force report.

That is this ecological approach, recognizing that hemoglobin represents a complex biological system that interacts with an internal, biological, and external environment. The task force report, in addition to the assessment section, had an extensive section on the biology and etiology, which I will encourage all of you to read as soon as it's published. I hope that if we do another one of these series, the next in the series will be focused on issues of translation and implementation that we heard about today.

I think the value of doing these kinds of webinars is that we're not just reinforcing the notion of this ecology, but we're really reinforcing a notion of our ability to do things. The mantra of evidence-based programs and policies really represents another type of ecology that reflects a continuum of effort. We heard that continuum of effort today represented by the research community.

Those folks that are involved in surveillance, translation of new data into programs, policies, and the engagement of an enabling environment and the challenges that are involved in systems and institutions within countries that may be risk averse and resistant to new data. I think this is a really important continuum that we need to continually reinforce. I want to thank everybody for your involvement here.

We are not done with the anemia task force. There's a lot of work that's going on. We've been interacting with WHO and Alliance for Anemia Action and other activities. The work will be published shortly, I hope, in the Journal of Nutrition as a supplement. It'll be available and open access to everybody. We want to continue this conversation. Like I said, we will hope to have another one of these webinars focusing on some of these issues around translation and implementation.

It isn't one size fits all, but hopefully, this ecological approach can be a framework that will be applicable irrespective of the context. We really are reinforcing the need to be context-specific. I also wanted to just quickly reinforce the notion that Mary Elena raised and came up in several other comments, and that is that we're not just talking about etiology here, we're also talking about responses to interventions.

That this continuum of activity really is a loop, a continuous feedback loop that needs to exist so that we're continually getting new data and in a position to respond to it in an effective way to address our constituencies. With that, I'll end my comments and turn it over back to Lindy and the team. Thank you very much, everybody.

Lindy Fenlason

Dan, thank you for that. It looks like we're nearing time. We're going to bypass that initial Q&A that was in the agenda because we've been able to address a lot of those questions in the chat. We want to thank you all again for participating in this webinar. Just your presence, your questions, your engagement has been so valuable in this process. What we'll do is we'll have the webinar recording and the slides available at a later date, actually fairly shortly. That'll be available to you all.

If you know of anyone else who wanted to participate and wasn't able to, we'll have those available for you as well. Thank you again for your presence, for your work in this field, and for your interest in this--

[01:24:52] [END OF AUDIO]



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