

Episode 1: Broadening Our Perspective: Diabetes in Sub-Saharan Africa

KEYWORDS

malaria, diabetes, tanzania, non-communicable diseases, gestational diabetes, policy, children, pregnancy, infectious diseases, mothers

SPEAKERS

Gretchen Repasky

Line Hjort

David Beran

TRANSCRIPT

Gretchen Repasky 00:06

Malaria is a life threatening infectious disease caused by parasites transmitted to people through the bites of infected mosquitoes. And although malaria can be deadly illness and death can usually be prevented if treated quickly. But are there long term consequences? Could malaria infection during pregnancy cause diabetes in the child later in life? In this episode, we're going to delve into this intriguing question with the help of two experts. Line Hjort is a postdoctoral researcher, at the Obstetrics Department of Rigshospitalet and the Novo Nordisk Foundation Center for Basic Metabolic Research at the University of Copenhagen in Denmark. And David Beran is an assistant professor at the Geneva University Hospital and Division of Tropical and Humanitarian Medicine at the University of Geneva in Switzerland. David studies health systems in relation to the management of chronic diseases, such as diabetes, and is currently looking at barriers to insulin access. I'm your host, Gretchen Repasky. And you're listening to Postdocs Talking a podcast with a spotlight on diabetes and metabolism research and how it connects to society. Welcome to you both Line and David.

Line Hjort 01:23

thank you so much. Happy to be here.

David Beran 01:23

Thank you.



Gretchen Repasky 01:27

It's really great to have you here today because I think you're going to open the eyes of our listeners to both the challenges as well as perhaps the rapid changes that are taking place in developing nations. Line, let's begin just by maybe taking a step back from your research and taking a step back from the study population and the data. And could you tell us what is the real life problem that your research deals with?

Line Hjort 01:55

It's a big question, because it's a big problem, I think. Overall, it's the early life determinants of later development of cardiovascular disease and diabetes. And it's focusing on this double burden of diseases, so that this double burden of non-communicable diseases like diabetes and cardiovascular disease, anemia, but also the infectious diseases, like malaria, pneumonia, COVID. Yeah, you name it. And some parts of the world, like Tanzania, where I have worked, but also many countries in Sub Saharan Africa, in South America and Asia, all over the world. There's a double burden. People are suffering from both communicable diseases, the infectious diseases, and the non-communicable diseases. So they are having huge - What do you say - struggles?

Gretchen Repasky 03:08

I see. Let's get in a little bit into your specific research questions that deal with this double burden and in particularly these vulnerable populations. Tell us more about what you're actually working on.

Line Hjort 03:24

Yes, so we are working on a preconception, pregnancy, birth and childhood cohort in rural Tanzania. So it's a population study that takes place in a rural part of Tanzania. Where, yeah, it is, there's really no access to the health care we're used to in this part of the world. It's very basic, and the people here are suffering a lot from malaria, but also anemia. And also there is increased prevalence of cardiovascular diseases, primarily because they have hypertension. So this is a study area where we have focused our work because we have fantastic collaborators there. It's yeah, it's an old collaboration, starting with malaria research 20 years ago. And, and today, we are taking advantage of having such a good setting there with good collaborators where we can actually really well study these early life determinants by following a mother even before she becomes pregnant, and then now following the child.

Gretchen Repasky 04:44

So with this population study with this, the cohorts from preconception all the way through childhood, what are your specific research questions?

Line Hjort 04:53

So that is to investigate if malaria and pregnancy or anemia and pregnancy, and now also GDM and pregnancy affects the development of the child we have. First of all, before the child even was born, the development like the growth, we measured it by ultrasound, and then following up the child's health after being born, of course. So the early, important years after birth, this window of opportunity to where really the future health of a child is established these early important years.

Gretchen Repasky 05:36

For how many years are you following up?

Line Hjort 05:39

So we have just completed the first follow up. And this is when the child are five to six years after they were born, but I wish to be able to follow the children until they are adults. So in three years, I hope to be able to do one more follow up.

Gretchen Repasky 05:57

What is it that you would need in order to be able to continue those follow ups?

Line Hjort 06:01

Oh, that's funding. Yeah, we all there. All the people who would like to work on this there, so we will definitely do our best. And there's a great willingness in the local community to participate. So I can say that out of all the women that we found, the women that were part of our pregnancy study, and we did now try to find again, when we did the follow up study, only one refused. Yeah, so it's a little bit different numbers than what we know from our part of the world where we are busy, and maybe don't have time to participate in all these research projects that we are offered. But only one mother said no.

Gretchen Repasky 06:48

Wow, that's really impressive

Line Hjort 06:50

out of 580 mothers and 634 children.

Gretchen Repasky 06:53

What would you speculate would be the that rate if you were doing a study here in Denmark?

Line Hjort 06:59

Oh, if we will have lucky 50% I think, yeah. But that's because you know, we give them healthcare. So that's why, yeah.

Gretchen Repasky 07:09

David, I know you're joining us from Switzerland. And we're happy to have you here online with us. You're coming from a wider perspective. And so I'm wondering if you maybe could reflect a bit and tell us your take on Line's work as she's just described to us?

David Beran 07:25

Yeah, first of all, thanks for having me. And congratulations to Line for some really exciting and interesting work. I think listening to Line and look, having read some of her work, I think it raises a lot of issues around a whole variety of factors around our understanding of diabetes from a more global perspective, and maybe moving away from a Western understanding of the risk factors of diabetes and the double burden that she presents. And looking at this double burden, I think we need to look at the risk factors in terms of the causes. Are we looking at different risk factors in populations like Line studying, you know? If we look at traditional risk factors of lifestyle and dietary habits, from a Western perspective in context, like Tanzania, do we need to look at these infectious diseases as risk factors for diabetes and other non-communicable diseases? But also, I think it raises an interesting question around the double burden and health system responses to this double burden, both in terms of prevention and care. What we see from malaria is large funding from global donors to address this global health problem. Whereas for diabetes and other non-communicable diseases that funding isn't there. That's from the prevention side, if we look at from a care perspective, again, management of malaria is complex, and I'm not taking away from that complexity. But at the end of the day, it's an acute episode where you know, a sick child is sick individual will go to the health system, get their tablets, and then hopefully be cured. Whereas with diabetes, with other non-communicable diseases, we're dealing with a chronic condition and how does the health system need to adapt to this chronicity and these frequent visits and frequent needs that the individuals have? Just to focus in on this on this risk factor and against this important contribution of Line's work is - we do have a Western view of diabetes and a lot of studies a lot of information on diabetes in non-Western settings is missing. And I think really, what Line's work does is highlight, you know, what role do infections play as a risk factor for the development of diabetes or other non-communicable diseases? Are they are they a risk factor? Do they protect and both for the individual so the mother, but also I think this this element of the fetal origins of adult disease is really exciting, and opens up potentially new approaches to prevention. So should we should we should we be preventing malaria in mothers to ensure that 40-50 years later their children, their offspring are not

developing diabetes or non-communicable diseases, but also in terms of treatment in terms of ensuring that people are treated early on for these communicable diseases such as malaria, or even anemia, or gestational diabetes, not only for their benefit, but also for the benefit of their children. So again, amazing work and really exciting and opens up a whole wide range of issues that need to be addressed at a global level.

Gretchen Repasky 10:46

Thanks, David. Line, let's see what your thoughts are first about what David is saying about looking at the risk factors differently when we're leaving the Western context?

Line Hjort 10:59

Oh, I think it's a very important point because the risk factors, I think, are completely different in...I have only worked in Tanzania, but thinking about Tanzania and the high number of infections that the mothers have during pregnancy, and the children have in the first early important years, to a different degree than we have seen infections here. Of course, people in Denmark, children, they have all these colds and whatever, of course, children are sick and have infections in Denmark. But I think we need to realize that it's not completely...what do you say...you cannot compare directly at all to the high load that you get in Tanzania.

Gretchen Repasky 11:51

Can you give us an idea of the numbers? So in your cohort, for example, what percentage of the women had been infected with malaria?

Line Hjort 11:59

So 34% had malaria at least one time during the pregnancy. That were, we of course treated it. We had one mother who we treated five times, I think, yeah, she had it, where she lost malaria and got it again five times during her pregnancy. Yeah, so it's massive. And a lot of these women who has malaria in pregnancy, it actually, we could see in serology samples from the placentas that we collected at birth, that the malaria parasites were completely all over the placenta. So you can imagine that malaria parasites there take all the good nutrients, and it really affects the placental function. So it's these children, they are small, because they haven't had enough nutrient supply. There's also the vascularization of the placenta that affects the growth of the baby. We have no idea or the complex changes the molecular mechanisms as well, that has been going on during those nine months. But coming back to the risk factors, as you ask, it's I think it's a really good point that David has, because the risk factors are different. And we cannot - like the risk factors we use in our part of the world are not probably not the ones that would be most useful in Tanzania to identify patients or future patients. So I can I can say that in our study, as well as 34% had had malaria during pregnancy. We set out during our study, actually, it was not a plan from the beginning. But we thought, hmm, because I've been working with GDM in

Denmark, shouldn't we try to do and OGTT of these women as well during the pregnancy as we do in Denmark? But we just did it for all of our participants and not the ones with risk factors at all. Because actually, they didn't have risk factors.

Gretchen Repasky 14:14

Can I just back up for one second? The acronym you use the OG...

Line Hjort 14:17

TT? Or I'm sorry, that's an oral glucose tolerance test. Yeah. Pregnant women at risk of GDM they would know what it's a very sugary

Gretchen Repasky 14:36

OGTT.

Line Hjort 14:37

Yeah. Very sugary drink. Yeah. But we found that 39% of the women in our study had GDM. And they had none or very few of the risk factors like obesity because the women there they are slim and they are healthy. They're very they're physical active. They're young, and the babies are not big. So the risk factors that we use here to choose who we screen for GDM would not be. If we put those down there, we wouldn't have to screen a lot. So it was a big surprise that 39% had GDM. But then we can maybe discuss if they had GDM. That's a whole different question. But using the criteria that we use, they did.

Gretchen Repasky 15:31

Which is WHO criteria.

Line Hjort 15:33

That most of the world use.

Gretchen Repasky 15:35

And then the women that you identified us as having gestational diabetes, were you able to then facilitate treatment for them?



Line Hjort 15:45

Yeah, that's it was a surprise, as I said that so many, actually, such a big part of our population actually would need care. And we had, of course, our ethical obligations to take care of these women. That was one of the reasons, or one of the requirements, actually, for us to be able to do this study was that if we discovered any disease, we would offer treatment. And so we had to come up with some dietary treatment, because that's basically what would be possible to apply in that setting. So, guidance on the diet. Medicine, there's no insulin in that part of Tanzania, where we were working, and Metformin is also expensive. So we could offer them medicine, the tablets, during the time the study that took place, if we consider that their diabetes was so bad, but when we left, they wouldn't have the money to continue using it to pay for the medicine. So dietary interventions were what we aimed at.

Gretchen Repasky 17:08

Maybe the ethical implications of this, we can come back to a little bit more, we're towards the end of our, our time together, our interview. Just for so we have the numbers all straight right now, though. So 39% were identified in your cohort. And give us an idea of how that might compare to Denmark, since you've also studied gestational diabetes here in Denmark.

Line Hjort 17:29

So in Denmark, it's 4 to 5%. Yeah, we're using the same criteria. Yeah. So that's huge.

Gretchen Repasky 17:38

David, what are your thoughts on these some of these findings that that are coming out of Line's study in Tanzania? How do they compare with other countries, either in regard to the maternal health care aspect, or the disease management aspect? Where does Tanzania fall?

David Beran 17:57

I think it's interesting, because I think we still lack a lot of information around gestational diabetes or diabetes in general in many of these settings. So clearly, Lines work contributes to a better understanding. And also, I think it's interesting that this is done in a rural area. Because a lot of studies do focus more on urban areas or hospital based cohorts. So I think it's truly, truly interesting. I'm very surprised by the high numbers that Line found. And I mean, not to get into a discussion around, you know, the diagnostic criteria, the use of the oral glucose tolerance test versus fasting samples. But I think it's beyond any limitations that a study might have, I think it's, it opens up our eyes to that this is a global problem affecting even poor populations, you would say, you know, in a poor rural area, would you really find diabetes, given that these are traditionally populations that are still physically active, given that they need to, you know, walk long distances to get water, have more manual or physical labor in fields. Their diet remains more

traditional than in urban areas. But what we've seen in other studies, so for example, I've done a lot of work in Mozambique, is over the past 10 years, a dramatic increase, even in obesity, sort of a traditional risk factor for diabetes in rural populations. And again, you know, what is causing this, this change? Is it changes in diet and the changes in physical activity? Are there other factors that are that are underlying this, you know, again, coming back to Line's work, sort of these fetal origins. So, you know, a lot of the populations that we now see having diabetes in Sub-Saharan Africa, Southeast Asia, when they were a fetus, when they were children, they were probably exposed to malnutrition. So what does that mean? You know, 40, 50, even 60 years later when they're adults, in terms of developing you know, obesity or diabetes- So I would say that's one element. And then again, I think as Line highlights this challenge of access to care and the impact it has on diabetes management, but overall in terms of management of all conditions, and how we still are faced in many of these contexts especially in rural areas with a lack of access to medicines to insulin and to healthcare in general, that impact the well-being of populations, be it for malaria, diabetes, or you know, giving birth.

Gretchen Repasky 20:39

in Sub Saharan Africa, early childhood is characterized by repeated infections. Despite being treatable, malaria, pneumonia, and diarrhea, were responsible for nearly 30% of global deaths among children under the age of five in the year 2020. Cardiovascular disease is the leading cause of death globally, with a disproportionately high incidence in low and middle income countries such as Tanzania, a region that also has a high burden of infectious diseases, like malaria. There is strong epidemiological evidence showing an association between acute infections, chronic inflammation and the occurrence of cardiovascular disease. The trajectories that lead to chronic inflammation begin early in life. Therefore, understanding the early determinants in children exposed to infections, or maternal inflammation may expose opportunities for early intervention to prevent non-communicable diseases across generations. In a recent study of pregnant women in Tanzania, **Line Hjort** and colleagues observed that 67% had anemia during pregnancy. 34% had at least one malaria infection during their pregnancy, and surprisingly, 39% were diagnosed with gestational diabetes. However, a question remained about the high number of gestational diabetes cases. Should Tanzania implement regular screening? Or do the WHO criteria used for diagnosis simply not fit for this population?

Gretchen Repasky 22:23

Line, let's go a little bit deeper into how your studies are actually conducted. Tell us a little bit more about the place that your cohort is in or who you're working with, like help set the scene for us.

Line Hjort 22:37

Yes. So the study is taking place in the district of north eastern Tanzania called Korogwe. And it's a rural area. It's farming country, and it's a very green, lush area. There's a lot of fruits, lots of

veggies. Yeah, most people live by being farmers, or at least they produce a lot of their own food. And, yeah, it's rural. It's basic living. You go to the well to get your water, and you maybe have a generator, if you're lucky to produce electricity. People are genuinely okay there. They are having enough food most of them. Then if we go and focus a little bit in the smaller villages around in Korogwe area, there are some villages located in areas where the soil is bad and where the farming doesn't go. So there are people there who perhaps under...how do you say...have malnutrition or doesn't get enough food, but the majority of this population is they do get the food and the water that they need. We have a research station there. So actually, the National Institute for Medical Research in Tanzania, which is part of the health ministry. This research institute has different research stations around in Tanzania, and we have one Korogwe, a field station there, where some researchers from the health part of the government in Tanzania are out stationed and have their life in Korogwe. So it's a collaboration with the government in Tanzania actually. So they provide the sort of the housing for us, the facilities for us to conduct the study. So it's all dependent on this collaboration. And this collaboration started 20 years ago between Denmark and Tanzania when starting to study malaria and identify the specific parasite variants. So it's a long term Danish - Tanzanian collaboration. So it's a station, a field station where there is quite good lab where we can process blood samples to the same good standards as we do in Denmark. And when you go across the street from the research field station to the main hospital, Magunga Hospital where a lot of the local doctors that we work with, and nurses are employed. It's very basic, but the people working there are fantastic, they have a really good spirit, and they are so interested in doing research, they really want to help. So we have such a good collaboration. If we didn't have that we couldn't do this study.

Gretchen Repasky 25:59

It's really interesting to hear that historical perspective how it was set up. And really, then that sets the stage for how it operates today. So let's go a little bit more now into your science. And tell us about your methods I picked up earlier that you're measuring vascularization.

Line Hjort 26:16

Yes, so I can just start by saying that for our study, we went out to all the smaller villages. So two, we had our bases at the field station and at the Maganga hospital, but we went to the villages and visited the mothers and children there. So we came to them, which also was assisting the high percentage of mothers and children agreeing to be part of it. So and we came to them, and they knew that they had to be fasting, so we could collect fasting blood samples in the morning. And we came out with a whole little mobile clinic. And we did a lot of anthropometric measurements - body composition using a mobile bioimpedance machine, that means that we can measure fat percentage and lean body mass and bone density. And we looked at their blood pressure, of course. And for the children that are older, the 11 to 12 year old children, we also did a puberty status examination because metabolism and puberty development goes together. And for all of the children, we did this measurement of arterial stiffness where we can measure - you have a small tonometer that you have on the pulse and the carotid arteries. And then you also

have a cuff to measure the blood pressure at the thigh. And this machine can then calculate how fast the blood takes to go from the neck to the thigh. So we get a measure of arterial stiffness, which we are very interested in looking at because we think coming back to the idea of these early life determinants of later health and disease, that if this increased inflammation that arise from the malaria or the other infections, or the maternal metabolic health, poor metabolic health, that's gives rise to your body being more inflamed, and increased inflammation - that will affect your vascular functions. So if we can see that something is already going on in children now, when they're - the youngest, only five, that would be very interesting.

Gretchen Repasky 28:54

So that helps you define that window of opportunity for the critical care.

Line Hjort 28:59

Exactly. So that's one of the most important outcomes we have of the study. And then we are going to do a whole lot of biomarkers on the blood samples as well.

Gretchen Repasky 29:10

So how far along are you in analyzing the samples that you have collected?

Line Hjort 29:16

So we have verify with the data from the pregnancy studies that happened over six years ago, but for this follow up study, we just finished collecting the data in October 2021. So in four months from June to October 2021, we examined the 634 children and their mothers, and that data is now being processed and I can - yes, so we first we are validating the database so we get the best high quality of data and that's almost done actually. So soon I will be able to start looking at the data, and I can't wait. But I can say the first results actually came Wednesday. And it was funny because we were talking a little bit about COVID and Tanzania when we had a talk earlier this week. And Wednesday, the lab came back to me with the actually they have processed the blood samples that we got from Tanzania from the follow up study from the mothers and children, where we wanted to see if they these mothers and children have antibodies for COVID. So if they had a COVID diagnosis, and we found that around 35% of all of our participants have had a COVID infection. So this is, this is not part of our original study. But we thought we had an ethical obligation to when we did a study collection during a pandemic, it was worth looking into that so that's something that's gonna be some of the first data to come out.

Gretchen Repasky 31:02

David, I would love to hear a bit about what you're thinking about the pros and cons of Line's approach.

David Beran 31:10

Um, I mean, I wouldn't say there's any cons. I think what's interesting with Line's work is that this is sort of looking at things that haven't necessarily been studied. I think, for me, what Line's work opens up is, is sort of wider discussions about, you know, that that we faces as scientists is sort of the 'so what?' So what's next? What does this mean? And how do we translate the findings that Line has into hopefully trying to improve the well-being and health of populations. And I think, a few things that open up in terms of what Line described as these diagnostic criteria for, for example, gestational diabetes, do they need to be adapted? Do we also need better tests? I don't know if any of the listeners have ever watched or even had an oral glucose tolerance test done, but it's complex. And is it feasible in some of the settings that that, you know, Line describes? So you know, do we need? Do we need different criteria? Do we need different cut-offs in terms of blood glucose measurements? But also do we need different tests that are more adapted to this setting? Then the other element that comes to mind and listening to Line is, again, the variety of tests that have been done is this whole issue of screening populations, in settings where access to care is problematic, is as researchers what is our duty of care, our responsibility when we do research on issues that are important to document, and that need to be documented, but if we identify, you know, as Line describes, what do you do if in looking at gestational diabetes, you identify gestational diabetes, you do have a duty of care to your subject, to the person, but recognizing that the systems that that are there are not like what is present in Denmark or in Switzerland to then provide optimal care. So again, I think the challenge there is, and something for other researchers who might be interested in pursuing similar type of work to what Line has done, is this issue of, we need to document these issues. But we also need to recognize that if we do identify diabetes, cardiovascular disease or other diseases, when we're doing these types of studies, the system isn't there to then be able to refer people to get the care they need. And how do we respond to that? But I mean, I think overall, Line is doing important work. It's really interesting and important, and how can this type of work continues so that we can improve our understanding of diabetes as a global health challenge, and better understand what diabetes means in terms of risk factors in terms of disease progression in settings like Line is studying versus, you know, a traditionally sort of Western view of diabetes and other cardiovascular diseases?

Line Hjort 34:14

Yeah, I think David is so right about this, because we should be careful when we do a study where we can see that almost 40% of the population has GDM, we should be careful about going out and saying, oh, in this part of Tanzania, 40% of the women has GDM and it's dangerous, it's dangerous for you. It's dangerous for your baby. But we need to be careful how we communicate these things, because we are not sure if the same criteria like diagnosis criteria fits for this population. But we also have the duty to investigate this more. Because if it's true, that's a huge problem, both for the mothers and the children. So I think it's a difficult, but interesting, and really good possibility to dig into this sort of window of opportunity in pregnancy to see if that is a good time point in in these women's and these fetuses becoming children's life, where something actually prevention could be important. But we still need to know so much more.



Before we can really, yeah, we need to document better. I agree with David there to understand this, for example, the GDM prevalence better before we can inform better policies and the healthcare.

Gretchen Repasky 35:45

And what do you need in order to be able to do those kinds of follow ups? Whether it's examining the best criteria, or it's examining the ways in which the follow up care should take place? What is needed to be able to follow up and provide that information?

Line Hjort 36:04

That's a very good question. I think at the moment, we are trying to focus on our follow up study where we are looking at the health, and we want to see these women are also the children, these women who had GDM and pregnancy can we see now six years later, that they actually on the way to having type 2 diabetes? And what about the children? So understanding more, documenting more, I think we need that to do first, before we can try to come up with better health care strategies. I think that's where we are now.

Gretchen Repasky 36:38

I see, yeah. And obviously, you publish these results for the scientific community. But I don't know whether you or maybe David would want to comment on who else needs to be informed about these findings?

Line Hjort 36:51

Oh, yeah. The population where you do research is, has the right to be informed, I think. But I'm curious what David thinks about this. Yeah. He's more than an expert on this field. And I would really like to hear where he thinks that we could take these results.

David Beran 37:16

Yeah, no, I think I think you raise an important point in terms of feeding back to communities. And what does it mean for them in terms of what your findings mean for the local people? And policymakers as well. It's always a challenge, which policymaker and to tell them what, and I think you've done amazing science, but how do you translate that science into to something digestible for a policymaker? And that's always a challenge in terms of, you know, policymakers looking for the easily digestible message? And how do we, as scientists translate complex results into, you know, on that nowadays, a lot of policymakers and individuals like Twitter, so how do you translate, you know, an academic paper into the number of characters that you need for a tweet? And also, we need to feed back to policymakers. And how do we engage policymakers to address these complex problems? But more and more, I think, would we sort of always think

about policymakers as though that the very tops of the ministry of health, but how can we engage local policymakers, you know, mayors of towns, heads of districts, regional heads of health, are people at a sub-national level, recognizing that in Tanzania that the health problems are very different if you compare the urban areas to rural areas. I think it's, again, it's a complex issue. And I think what it raises is, you know, what is the role of, of scientists? What are the roles of academics in translating their research findings into policy or into messages that can be used by the wider public, and clearly this podcast is one tool that, you know, opens up the science to other scientists, but what tools can be used for policymakers for communities, and for the wider audience in Tanzania, as well as the wider diabetes audience to then take Line's results forward into tangible action, or as you highlighted more funding to be able to do more and answer some of these more of these complex questions.

Gretchen Repasky 39:40

When I'm listening to you, I'm really thinking also about the role that education plays here too. And as David as you're highlighting, having communities be informed as well, that comes down to education and okay, maybe even education policies and we're back at the policies. Line, what do you think? Is this a role for you as a scientist? Is this need of an additional expert in your team? Or what are some of the steps now that would need to be taken to make really practical progress?

Line Hjort 40:15

Oh yeah, that's a very good question. I think the needs from a researchers point of view, there needs to be a big interest if and drive to be able to take your research all the way to a new policy making. And that's difficult for a researcher who was trained as looking at data and summarizing the results. So collaboration would be the way through and experts in communication.

David Beran 40:57

I think Line highlights these important points in terms of communication skills, you know, as academics, as researchers, we're used to one format of communication, so peer reviewed publications, PowerPoint, slides, graphs, but how do you feed back this research to communities that might have numeracy and literacy skills that are that are poor, to policymakers, again, who don't understand, you know, p values or complex statistical methods. And as you highlight, this need to sometimes go beyond our comfort zone, which is health and need to interact with people involved in education policy, or other policies, but also sometimes repackage our research. You know, Line, myself, we are diabetes researchers, of course, from different angles, but do we need to repackage our research away from diabetes and, and for Line, its packaging it as a maternal and child health issue, which on the global agenda is much more prominent than diabetes. And so how do you highlight that, you know, gestational diabetes, diabetes as a whole, is a problem for the well-being of women and children, and get a different community that's still in the health area interested in the work that Line has done, you know, which clearly is impacting maternal mortality and infant mortality, and well-being, globally, but is traditionally off the radar

screen of those non-governmental organizations or government agencies or even donors that fund maternal and child health programs in sub-Saharan Africa and globally.

Line Hjort 42:36

I think that's really a good point. And for sub-Saharan Africa, vaccination programs, that's something that's been really well implemented when it comes to children, I think, almost 99% of the children in our study, has had those vaccinations that the WHO recommends, and something, that's something that has been really well implemented in that part of the world can we do something similar? It needs, of course, a lot of funding. That's, child vaccination programs is costly, but it has been shown to really improve the health of and reduce mortality.

Gretchen Repasky 43:23

So if we're extending this out to thinking of the global picture of maternal and child health, isn't there a role here for the WHO?

Line Hjort 43:35

It would be in their interest. Yeah. Absolutely. I think, what do you think, David?

David Beran 43:43

I think so. I think you know, the World Health Organization has to deal with multiple health issues. And again, from my view is the World Health Organization is still relatively segmented in terms of you know, diabetes is dealt with the diabetes department, maternal and child health is dealt with another department. And those synergies and linkages between different health issues need to be made to address the whole, the individual, you know, a pregnant woman can have diabetes, can have malaria can have a whole variety of issues. And again, from a global perspective, how do we need to address that, but then also on the ground, how does the health system need to address that in terms of, you know, not only providing good care for malaria, because it's an endemic area for malaria, or decent care for pregnancy because well, you know, women are pregnant everywhere and clearly in rural areas, that's a service that the system needs to provide but also for diabetes and non-communicable diseases that are more slightly more complex and again, need a different skill set from nurses from doctors, need constant access to certain medicines that can be more expensive, such as insulin, as well as you know, ongoing education empowerment for individuals to manage, you know, a chronic disease on a daily basis. So I think there's, again, you know, the need from all the way global here in Geneva, just a few kilometers away from my office WHO to respond to this, as well as what does it mean on the ground for the nurse, the Clinical Officer or the doctor working in the health facility in the community where Line is doing her work.

Line Hjort 45:23

And if I can sort of sum up to really emphasize, like, we need to tell the WHO, or the policymakers that that focusing on pregnancy, you actually target two generations at the same time. So if you are in a, in limited resources, that would be somewhere to really, that's where you can do a different for two lives, in many aspects. And maybe that's like the message, we should try to bring, to really communicate maybe that I'm just starting to think about that. That's that that there's two lives here at stake, and limited resources. Of course, cost effectiveness is an issue all over the world, not only in low and middle income countries. So that means defining the time of time point, the window of opportunity where most, where healthcare is most needed. I think that we that's pregnancy,

David Beran 46:27

I think it's a really important point you mentioned Line, in terms of what when you deal with maternal health you're dealing with, with the health and well-being of two people. But I think also the importance of investing in maternal and child health, not only to ensure that children don't die before the age of five, but as they become the- they're healthy children, healthy adolescents, and then healthy adults as well, and that the investments that are made in maternal and child health will have an impact beyond, you know, beyond quality and an impact future generations of adults. And but the challenge there is that the investment is the long term. So the minister of health or the president won't to see the benefits of their investments, because you know, those investments only happened 30, 40 or 50 years later, but how can again, this work that you've done in its translation into policy and practice to highlight this issue, and hopefully get visionary policymakers to see that, that what they might do in terms of improving the well-being of mothers and children now will benefit their countries for many years to come.

Line Hjort 47:40

Really important point.

Gretchen Repasky 47:41

So this makes me also think back to the fact box and the statistics of the global childhood deaths that are due to infectious diseases such as malaria, these numbers are pretty staggering. So do you have a sense of whether though, we're going in the right direction? So if we had just taken that snapshot from 2020? But are we going in the right direction? Or are we going in the wrong direction?

Line Hjort 48:07

As far as I know, David can correct me, but I think it's not becoming worse. But I think it's not becoming better as well, not as fast as we would hope for. But maybe David can comment?

David Beran 48:26

I think to answer that question. I think we were seeing positive trends before COVID, in terms of that statistic, but I haven't seen any more recent statistics in terms of the impact that COVID may have had on that the disruption of services that that happened due to COVID. So, you know, facilities closing because healthcare workers were not there or diverted to COVID services, people not going to health services for fear of COVID or because of lockdown measures. So I think we were on a positive trend for many of these global indicators, including mortality of young children, but I don't know the impact that COVID may have had on that. Some people argue that COVID has set us back in terms of in terms of childhood mortality, as well as maternal mortality, and also to recognize that we might see an upsurge in mortality. Unfortunately, as Line highlighted in many sub-Saharan African countries, there were good vaccination rates. But again, were those vaccination services disrupted because of COVID? And, you know, if we don't catch up quickly, we might see, you know, outbreaks of certain communicable diseases that are vaccine preventable.

Gretchen Repasky 49:39

It'll be interesting to see what the effect of COVID is, and it might take us a few years to have that revealed. Well, Line and David, it's certainly been really interesting and a pleasure to hear your reflections on all of these important questions and also on Line's work. I'd like to end our discussion by taking us back to where we started when I posed a couple of questions out there to our listeners. And I asked, 'Can malaria infection during pregnancy, and let's say even on the mother or the father, preconception - could this affect the likelihood of the child developing diabetes later in life? You want to leave us with a concluding thought?'

Line Hjort 50:25

Yeah. So the answer, short answer would be we don't know that yet. But we have strong suspicions. And we think it's really important to reveal these and document these associations. That would be my short answer. And also, considering this double burden of diseases, the infectious diseases and the non-communicable diseases. I think there's a huge knowledge gap there understanding the sort of interplay between these infectious diseases early in life and later development of non-communicable diseases.

Gretchen Repasky 51:08

David, what do you think?

David Beran 51:10

I would agree, I think it's not clear yet. But I think it's for me, it also opens up the wider issues that do, that fundamentally do is the reason that, these communities where Line is studying, is the

reason that they're getting malaria as well as potentially developing diabetes rooted in these wider social determinants of the environment where they live in, that both lead to malaria, through a communicable disease route and non-communicable disease route through a whole variety of complex issues that Line's work is trying to disentangle from an epigenetic, sorry, and physiological perspective. Again, looking at this double burden, what Line's work is doing is looking at the impact of the environment on the health of women and children and the longer term impacts this has.

Gretchen Repasky 52:06

Well, a very, very big thank you to both of you both for spending time with us, but also for sharing your work with our listeners.

Line Hjort 52:14

Thank you so much for having us. Yeah, it's been a great pleasure to share this study, a little story from Tanzania.

David Beran 52:22

No, thank you very much. And congratulations, Line on your amazing work and look forward to seeing the next steps.

Line Hjort 52:30

Thanks so much, David.

Gretchen Repasky 52:33

And Line, I'm really looking forward to when you have your next publications out and what your results look like and what that window of opportunity might be. So I wish you both all the best as you continue your work as you continue to improve the health care outlook for vulnerable populations around the world.

Line Hjort 52:52

Thank you.

Gretchen Repasky 52:52

Thank you. Thousands of researchers globally, are dedicating their careers to better understanding and improving diabetes prevention, care and treatment. You can learn more



about Line and David and their work at our website, DanishDiabetesAcademy.dk/podcasts where we have short bios, additional information and photos of them at work. Our show today was produced by the podcast agency Kontekst & Lyd. A very warm thank you to the Danish Diabetes Academy for keeping Postdocs Talking. Thanks for listening!

