International Disparities in Epilepsy
Webinar
(Transcript)

Dr. Laura Lubbers:	00:00	Welcome everyone to today's webinar. I'm Laura Lubbers and I'm the chief scientific officer of CURE Epilepsy. I want to thank you for joining us today on International Epilepsy Day.
Dr. Laura Lubbers:	00:11	Recently our webinar series addressed some of the factors that contribute to disparities in epilepsy care here in the United States. It reviewed some of the strategies that can address these disparities and improve treatment outcomes for patients. However, it's important to note that more than 65 million people around the world are affected by epilepsy and its effects can be even more profound in underserved populations worldwide.
Dr. Laura Lubbers:	00:38	Today's webinar is entitled International Disparities in Epilepsy, Social and Economic Effects of Epilepsy in Sub-Saharan Africa. This webinar is part of CURE Epilepsy's 2021 Leaders in Research webinar series, where we highlight some of the critical research that's being done on epilepsy. As an additional resource, today's webinar, as well as all other webinars are recorded for later viewing on the CURE Epilepsy website. You can also download transcripts of all of our webinars for reading.
Dr. Laura Lubbers:	01:12	For over 20 years CURE Epilepsy has raised more than $70 million to fund epilepsy research that supports our mission, which is to find a cure for epilepsy by promoting and funding patient-focused research. CURE Epilepsy provides grants that support novel research projects and advance the search for cures and more effective treatments. In 2020 we launched our CURE Epilepsy Catalyst award to help accelerate the basic research that we've traditionally funded into the next stage of development and prepare potential new treatments for clinical trials.
Dr. Laura Lubbers:	01:49	Today's webinar will focus on the complex challenges to epilepsy care in sub-Saharan Africa at the community, clinician and health facility levels. Epilepsy in sub-Saharan Africa is more common than in the United States, and seizure disorders in Africa are associated with a high risk of early death from seizure related injuries and status epilepticus. In addition, the epilepsy treatment gap, meaning the number of people with a chronic active seizure disorder who are not on treatment is 50 to more than 90% in most African communities.
Dr. Laura Lubbers:	02:26	This webinar will also address potential interventions aimed at preventing some common causes of epilepsy in Africa, including prenatal brain injuries, the high incidence of automobile related

injuries due to poor transportation infrastructure and cerebral malaria.

Dr. Laura Lubbers: 02:44 Today's webinar is presented by Dr. Gretchen Birbeck. Dr. Birbeck is a professor of neurology and the research director and chair of the epilepsy division at the University of Rochester. Dr. Birbeck has served as a physician, medical educator and researcher in Sub-Saharan Africa since 1994. Her overarching professional goal is to understand common neurological disorders in the region. She, excuse me, also seeks to identify modifiable risk factors for these conditions and their secondary comorbidities so that feasible, affordable, evidence-based interventions aimed at preventing, reducing neurological injury can be evaluated and broadly implemented.

Dr. Laura Lubbers: 03:30 Before Dr. Birbeck begins I'd also like to take this opportunity to note that the first part of today's presentation was prerecorded to ensure a stable internet connection as Dr. Birbeck is coordinating this webinar as she travels to her research location in Africa. We will then be joining live for the Q&A portion of the webinar.

Dr. Laura Lubbers: 03:51 During the prerecorded portion of the presentation I encourage everyone to ask questions. You may submit your questions any time during the presentation by typing them into the Q&A tab located at the bottom of your Zoom panel and then click send. I also want to thank those who submitted questions in advance of today's webinar. We will do our very best to get through as many questions as we can. We also want this webinar to be as interactive and informative as possible, however, to respect everyone's privacy we ask that you make your questions general. So with that, I'd like to turn it over to Dr. Birbeck.

Dr. Gretchen Birbeck: 04:28 Thank you Dr. Lubbers, and I'd just like to say on such an auspicious day, it's a real honor to have an opportunity to speak with CURE Epilepsy on this webinar on a topic that is quite near and dear to my heart. Next slide, please.

Dr. Gretchen Birbeck: 04:45 So just a brief overview of what I'll be discussing in the next 25 minutes. I'll go over a little bit about the epidemiology of epilepsy is sub-Saharan Africa, so how many people have it, what causes it. I'll discuss in some length the treatment gap, which is really quite horrifying in this part of the world, and then the actual burden of epilepsy in that region, not just the number of people with the condition, but things such a premature death, the economic impact of epilepsy in Africa, and then a little bit about the pretty stunning social morbidity associated with the disorder. Finally, we'll wrap up with a few thoughts about the way forward to try to decrease this burden of disease in such a resource limited setting. Next slide, please.

Dr. Gretchen Birbeck: 05:30 So, as we probably all heard on numerous communications, 80% of the people with epilepsy who reside on our planet live in low income countries. Now, there are disproportionate numbers of people living in those countries as well, so you could ask yourself, is that just sort of ... It makes sense there are more people there, but in fact comparisons really suggest that the burden of epilepsy is much heavier in regions of the world such as Africa. Direct comparisons are difficult. Challenges include things like age distribution adjustment. In Zambia a third of the population is under 15 years of age, so when you start looking at epilepsy cases, how do you compare epilepsy cases in a population that's so very young with a population like the US, which is quite a bit older?

Dr. Gretchen Birbeck: 06:20 Study design differences are challenging as well. One of the commonest ways to count epilepsy cases in a sub-Saharan African setting would be to do a door-to-door survey. Boy, can you imagine somebody going through a suburb trying to do a door-to-door survey or an urban setting in the US. Very different, so the study designs are different. Then perhaps most importantly the prevalence estimates, meaning the number of people with epilepsy captured at a particular time or in point or period in time can be very different, and that may be different because if you have people with epilepsy dying at a more rapid rate than people without epilepsy, you actually may fail to capture them in a prevalence survey and you can't capture them from an incident perspective because of the high mortality. So if mortality rates are disproportionately high among people with epilepsy in Africa, these prevalence estimates are probably a grossly low estimate of the number of cases because people simply die too quickly. Next slide.

Dr. Gretchen Birbeck: 07:27 In this nice study that was published in *Seizure* a couple of years ago, they actually map out here the prevalence rates as well as the incidence rates when available. So prevalence is the number of cases at a period of time, incidents is the number of new cases, and you can see for example Tanzania is running at 10, a Cameroonian study 58, Uganda 13. Compare that for instance to the United Kingdom at five. Now, these are just little points in time, but it certainly gives you a flavor that there's more disease in sub-Saharan Africa than in the wealthier West. Next.

Dr. Gretchen Birbeck: 08:04 This perhaps more sophisticated study was completed based upon a very exhaustive review of published data. Published in *Lancet Neurology* in 2017, if you have an interest in this, this is a very comprehensive review, and they looked at regions of the world comparing door-to-door surveys and then cross-sectional surveys, which are probably a bit more similar to what we would be doing in the West. Again, the rates are substantially higher than we would expect in a place like the US or UK, being as high as 64 in Central Africa, 22 per 1,000, 100,000 I might add in West Africa. Next slide, please.

Dr. Gretchen Birbeck: 08:43

In my own work some years ago with a colleague we actually did a door-to-door survey in a rural catchment area of 65,000 people. I should say it's important to understand what might prompt these surveys, so it's quite possible that they're not done in your average location. We actually did this door-to-door survey because we were very distressed that based upon the formal records of our catchment area of 65,000 people there were only 32 people with epilepsy in the region. That number would be low for any place in the world, but we also knew that a third of the patients being admitted to our burns unit were coming in with burns that occurred as a result of seizures, and most of these people had chronic seizure disorders and weren't listed in our registry of 32. So we could appreciate a pretty severe disconnect between what must really be going on in the community and what the hospital recognized. That's why we did this door-to-door survey. We found a prevalence of 14.5, which actually ended up being more than 2,000 people in our catchment area, not 32. So, these studies occur in a context that sometimes can't be appreciated just by the numbers. Next slide.

Dr. Gretchen Birbeck: 09:53

So, what about the causes of epilepsy? If epilepsy is so much more common in regions of Africa, why might that be? Next. Well, there's a number of reasons and pretty good data to support this. Poor antenatal services are very problematic. You saw my photo of the rural areas where I work in Zambia. People travel great distances to get antenatal services, and that's a big deterrent. Being away from home is often being away from farming and has a direct impact on the family's capacity to feed itself. So, just accessing care could be quite difficult. Then the quality of care when it's accessed is quite suboptimal in many regions. So antenatal birth injuries related to hypoxic-ischemic disease or related to abruptions, other things that in our setting in the West would never occur quite common.

Dr. Gretchen Birbeck: 10:44

You may not hear very much about it in the epilepsy world, but Africa is under a tsunami of hypertension and diabetes coming across the continent as Western diets arrive, and those premorbid conditions really contribute to a lot of cardiovascular disease. In addition, we still have quite a lot of rheumatic heart disease from infections in youth that aren't treated. So that combination of hypertension, diabetes, and heart disease results in quite a lot of strokes, and of course a certain proportion of people with strokes will go on to develop epilepsy. A traumatic brain injury is also quite common. Conflict in this region is well recognized. Next slide. But road conditions, as much as this might look comical, are really tragic. Vehicles with no brakes, vehicles with no lights, overcrowded vehicles, roads that were designed with the assumption that there would be 10,000 cars, now there are 100,000 cars, and of course the victims of these road traffic accidents are not just individuals in the vehicle but we see lots and lots of pedestrians involved and survivors almost always have some level of head injury.

Dr. Gretchen Birbeck: 11:54 Then of course there are infections. Infections have been my own interest for many years, the causes of epilepsy that are infectious in Africa. Next slide. So you saw on the previous slide neurocysticercosis, which I think most people are familiar with, but in fact cerebral malaria is probably one of the commonest causes of epilepsy in Africa. This is a severe malaria that comes to involve the brain and primarily involves children. So in an area where there is a lot of malaria, by the time someone reaches adulthood they have a fair amount of immunity but children under five do not, and it's the commonest killer of children under five as well. In this setting you have young children who are previously very healthy that suddenly become ill. They come ill with coma, seizures and about a quarter of them will not survive, but studies that we've done out of Blantyre, and these have good corroborating data from Kenya suggest that about 135,000 African children who survive cerebral malaria each year will go on to develop epilepsy within two years. Again, that's 135,000 children a year developing epilepsy in Africa as a result of malaria. So, malaria in addition to being a big killer of children is also a big devastator in terms of causing epilepsy in this region. Next.

Dr. Gretchen Birbeck: 13:19 We also believe systemic infections that have delayed treatments and result in very complicated febrile seizures are a problem as well. In rural Zambia we did the ChEAFS study that was the Chikankata Epilepsy and Febrile Seizure Study. We enrolled 214 children who would come in with febrile seizures, and these were not three febrile seizures, this was febrile status, very focal complicated difficult cases, and completing quarterly followups over three years, 14% of these children developed epilepsy. None of these children had meningitis, we excluded those. So these are just children coming in with febrile seizures that are very complicated by the time they present again delays in care. So, just general better care for children might result in better outcomes in terms of less epilepsy cases in this part of the world. Next slide.

Dr. Gretchen Birbeck: 14:12 Well okay, those are the causes. What about the treatments? What are the treatment opportunities for people who are experiencing epilepsy in an African setting? Next slide. When we think about the treatment gap, and of course as I think most people on this call are aware, that's the number of people who have epilepsy that awards treatment that are not on treatment, that treatment gap we'd like to have it be as small as possible. This is a compilation work put together by Dr. Ana-Claire Meyer about a decade ago, and I'm sad to say I don't think the data has probably changed a great deal. You see here on the Y axis, the treatment gap. So the broader, the bigger the bar, the greater the gap. In fact, as you can see on the far left where we show low income places like Uganda, Zambia and Nigeria, that treatment gap is approaching or at 100%, meaning nobody with epilepsy is getting treatment. This treatment gap is huge, all above 80% almost uniformly in these low income settings, and again, on the African settings approaching 100%. In our own study in Zambia more than 95% of people were not receiving treatment when they were identified.

Dr. Gretchen Birbeck: 15:23 Another notable thing is that it seems to be worse perhaps among people in rural settings. Not a surprise, given the distances that people have to travel for care and given the low resources that are usually available at some of these very rudimentary rural clinics. Next slide.

Dr. Gretchen Birbeck: 15:42 I think bringing this forward to today there are some very novel and important work being done by Dr. Edwin Trevathan at Vanderbilt, who is conducting a randomized controlled trial with a number of very talented colleagues in Northern Nigeria, and in trying to overcome this treatment gap they're actually doing an RCT that's randomizing children to usual care, usual level physician care, versus community health worker care that's being guided by very carefully developed algorithms. These children are being actively sought out in clinics when they're coming for other reasons, and this study really will help us understand if we can shift the care away from physicians to community health workers and therefore maybe narrow that treatment gap. This study is amazing and its rate of enrollment has been about triple what they expected, very rapidly enrolling. They had already estimated that in Nigeria today the treatment gap in northern Nigeria would be about 65%. They're enrolling so rapidly because it's over 90%. So, even these kind of dire estimates of over 65% were very low estimates it turns out based on what's really found when you go into the clinics and start identifying active cases of epilepsy that aren't being treated. Next slide.

Dr. Gretchen Birbeck: 17:05 So the treatment gap is pretty dire. What does this mean in terms of perhaps mortality rate in this population? Next slide. What about deaths? Well, we don't very often do population based studies looking for deaths among people with epilepsy. I mean, the SUDEP world is trying very hard, that's difficult study design, but virtually any study that's following people forward in time who have epilepsy in the African setting will report multiple, numerous early deaths. I can tell you the BRIDGE study is finding this, the epilepsy study I cited from Malawi, the work we did with febrile seizures in Zambia. People with epilepsy dying often of status epilepticus and the status epilepticus deaths are very tragic because they're often occurring in the setting of sudden drug shortages. The most common medication still used in most regions of Africa to treat epilepsy is phenobarbital, and as some of you may know, that is not a drug you can stop suddenly. So people are being managed with a drug that really if you were going to discontinue it you would have to wean it very slowly to avoid rebound seizures. The drug suddenly becomes available and then you just have a rash of status cases, people often dying in status epilepticus at home.

Dr. Gretchen Birbeck: 18:21 We also see lots of deaths amongst people with epilepsy related to burns and drowning. Keeping in mind particularly in the rural areas, people spend a great deal of time around open fires. This is how they heat their homes, this is how they cook. So somebody with epilepsy who has a seizure is quite at risk to coming in contact with open flame. Similarly, collecting water from open bodies of water, rivers, streams, not an uncommon means of acquiring water, and if you have uncontrolled seizures the risk of seizing and then falling into a body of water is quite high.

Dr. Gretchen Birbeck: 18:59 I'll talk about it a bit more, but the fear of helping somebody who is in a midst of a seizure related accident because of contagion fears may actually worsen these early death rates as well. Now, this is to some extent anecdotal data. What do we know from a population basis? Very little, but there's excellent data from rural China that came out of the World Health Organization epilepsy treatment demonstration project that showed even after they instituted care very broadly for epilepsy in rural China, prime age adults died at about four times the rate of comparable age adults in their community. Now, these were individuals who actually had access to treatment, so they weren't status epilepticus related deaths. Most of these were accidental deaths, again, related to burns, drownings and falls.

We could step back and then when you think about a treatment gap approaching 100% and what we know about the risks for sudden unexplained death with epilepsy you might be very concerned about SUDEP rates in Africa, and I'm sorry to say we have no data on that other than to suspect that these must be quite high and we just don't have the information. Next slide.

Dr. Gretchen Birbeck: 20:11

Well, stepping back from deaths, what about cost? What is the cost of epilepsy to this environment? Next slide. In trying to look at cost you can look at cost from various perspectives. You can look at it from the payer perspective in the US health system, you can look at it from what the individual or their family is paying. There is one very excellent study, and it's the only one I could find. This is a study out of the Congo and this study involved asking people who had a family member with epilepsy about the costs that they incurred throughout the course of the year related to seeking epilepsy care. Now, in the Congo the average family spent $241 in a year. That may not sound like very much, but that was roughly half the household's family income. So half of the family income in these really poverty stricken areas being spent towards direct cost of epilepsy. Direct costs are listed in this slide as well. You'll see that about 20% of that went towards medications, a small percentage to medical consultations and hospitalizations, but the vast majority actually went towards seeking traditional medicine. Next slide.

Dr. Gretchen Birbeck: 21:21

We really cannot underestimate the role of the traditional healer in epilepsy care in Africa. Perhaps more so in the rural than the urban settings. There is historically quite a lot of conflict at times between healers and Western medicine, but as you see from this slide, people spend most of their money on the healers, and the healers are much more accessible than physicians. So I'm a proponent that we need to recognize this cadre of people as potential partners because it's definitely where a lot of the investment goes. Next slide.

Dr. Gretchen Birbeck: 21:55

Well, that's from the family's perspective. What about from the health sector perspective? My colleagues and I at the University Teaching Hospital in Zambia collaborating with the ministry of health actually did a costing study and we used actual costs and we were able to pull data related to a vaccination program in countries. So these were very solid costs in terms of what does it cost to have a health center and to pay a healthcare worker, and for that health center to keep the lights on and buy drugs, and we really had a model in which people who had seizure disorders came, most of them could be taken care of at the primary level, some would be referred to the secondary, and then about one in 10 would require tertiary care related to either seizure severity or other concerning aspects of their seizure disorder. We costed all of this out, and I do mean it was a very comprehensive costing study, and remarkably for the person who needed epilepsy care that could be cared for at the primary healthcare level it was less than $14 a year, going only as high as $61 if they had to go all the way to the teaching hospital and have a fairly extensive workup. So really by local estimates and local costing epilepsy care is very affordable in this setting for a chronic disorder. Next slide please.

Dr. Gretchen Birbeck: 23:10

I would like to point out that talking about costs incurred, such as occurred in the Congolese study, I think by anybody's perspective is probably a pretty poor measure. Households are simply too poor in this environment to purchase all the care that would be needed, and that's assuming the care might actually be available locally. So looking at it from the household's purchasing costs incurred really just tells you the burden, it doesn't tell you whether adequate care is being accessed. I'd also caution us to think about costs incurred from a healthcare perspective if we don't know how it's structured and how comprehensive the delivery is. The sad reality is providing no care is cost free to the health sector, and all too often that's what's happening in these environments. Perhaps one of the saddest realities is that the World Bank ranks epilepsy among the top five chronic conditions that are the most cost effective to treat. You saw the data from Zambia, this is not an expensive disorder to treat for the most part, and yet the treatment gap as we saw remains extremely high, extremely high.

Dr. Gretchen Birbeck: 24:19

Now, why that might be? I believe there are two core issues, and one ... Next slide, please. Is related to the lack of grassroots expertise and advocacy on the ground in Africa. I'd like to talk about that first and address stigma second. Next slide, please. This is a quote that proceeded a book coming out from the Institute of Medicine in 2002, noting that health policy on brain disorders has long been limited by the misperception that neurological illnesses were a problem in the developed but not the developing world. They go on to point out that this is clearly erroneous, since most people with epilepsy actually live in developing countries. I think that this was terribly true in 2002. I think things are moving forward, but we still have an environment that really lacks sufficient expertise to not only care for epilepsy but also to advocate for it. Next slide, please.

Dr. Gretchen Birbeck: 25:18

Now, this is a slide some of you may have seen before. It depicts from a color perspective the number of neurologists per

100,000 in the population. You'll see the purple regions are contained in Africa. If you see a white region there wasn't even anyone knowledgeable enough about the presence of neurologic expertise in the country at the ministry of health to complete the survey. You'll see the little blob of purple in the very middle of sub-Saharan Africa, and that would be Zambia and Malawi. I was the person that completed the survey 15 years ago, and you'll see it was less than .1 person per 100,000. Even when five colleagues joined me because of the numbers of people in the country we would've remained at this .1. Now, that's changed very recently for Zambia, but as a general rule there really are vanishingly few neurologists in this part of the world. Next slide, please.

Dr. Gretchen Birbeck: 26:13 But the problem isn't just in absence of neurologists. This depicts by territorial size the proportion of the gross domestic product for purchasing power. So you can see how poor these regions are, and I can tell you that the same diagram applies perfectly for the number of physicians. So we have a problem with not neurologists but we also have a problem with no physicians. Most care is being delivered by clinical officers who get two years of training after high school and without active intervention by groups such as CURE Epilepsy and individuals such as myself, epilepsy often doesn't make it onto the training curriculum for these non physician healthcare workers. Next slide, please.

Dr. Gretchen Birbeck: 26:55 So, what about stigma? What role does stigma play in all of this? Next slide. When we think about healthcare delivery and health sector I think it's very important to step back from our usual thoughts about stigma at the individual level and think about structural stigma. Structural stigma is sort of depicted here in the middle of the diagram, and the structural stigma is the social stigma that's perpetuated on sort of a public basis, that there are different treatments from first line providers, from healthcare providers, customer service, but there's also differences in human resources, et cetera, and I would really like to make the argument that the overall stigma associated with something such as epilepsy doesn't just impact the individual but it impacts the investments that a country makes in the care, that a country makes in the training of people who could take care of epilepsy, in the provision of services such as imaging, EEG services, and very critically basic drug services. In most countries antiseizure medications such as phenobarbital and carbamazepine are absolutely on the essentials drugs list, but if you look at how often those essential drugs are out of stock compared to other essential drugs it's disproportionately high. So structural stigma absolutely impacts the resource allocation.

Dr. Gretchen Birbeck: 28:16

Then of course social stigma as we all know plays a huge role and I believe probably a disproportionately heavy burden on people in Africa. This was a quote from a focus group discussion we held once, where a woman was describing when she had her second seizure and it was clear to the family she had epilepsy that her uncle, and in this culture her uncle should be her greatest protector, had said to her, "If someone is bewitching you better they should just kill you." And that attitude is all too common and faced by people who suffer from seizure disorders in this part of the world. Next slide, please.

Dr. Gretchen Birbeck: 28:52

To sort of pull together this link between individual burdens of stigma and how that translates when it meets with some of the structural burdens, we sort of developed this model that we call the accumulated burdens of stigma or the stigma stairs. And the key features about this, as you see, someone has a seizure disorder, they're losing illness, they're losing time at work to illness, and they're now incurring care costs, but as you go down you realize that the cost of the care is one issue but the quality of care for stigmatized disorders such as epilepsy is proportionately poorer than the quality of care for other conditions that aren't stigmatized in that setting. So, even if they can access care, the care is poor. We also know that the infrastructure that's available in the household for people with epilepsy gets diminished as they become less and less economically stable. So that we see people with epilepsy in Zambia are actually more likely to live in households without running water, to live in households that use open fires as opposed to stoves for their heating, so that their risk is disproportionately high as well. So you have this kind of steady decline that ultimately results in entire households suffering from poverty and sadly abandonment of the person who has the seizure disorder is all too common. Next slide, please.

Dr. Gretchen Birbeck: 30:14

So, given that sort of bleak reality, what are the next steps? Next slide. I think we can think about them in sort of three different categories, and I think that CURE Epilepsy is ... I'm a big fan because it addresses what I would consider the root causes of can we prevent epilepsy to begin with. Now, in places such as Africa, many of the measures to reduce epilepsy would really be outside of the realm of neurologists but would be more in terms of medical and social infrastructure, better antenatal care, more available antenatal care, better vaccine programs. Many of those complicated febrile seizures occur in the setting of vaccine preventable diseases. Improving road conditions, let's have lights and brakes on the vehicles that are on the roads, and then of course more appropriate and rapid management of febrile seizures in children.

Dr. Gretchen Birbeck: 31:10 I think we also need to think about neuroprotective interventions. Much of my own work now is aimed at looking at neuroprotective interventions for children with cerebral malaria. For a child to survive cerebral malaria they had to seek medical care. So we have them in our clutches, can we do anything besides treat the malaria itself to try to protect the brain, to try to prevent that 185,000 children who we can expect to develop epilepsy as a result of cerebral malaria? Can we prevent some of those? And we have now our third clinical trial, this one looking at more adequate temperature control, preventing hyperpyrexia in this population.

Dr. Gretchen Birbeck: 31:48 So really addressing the root causes is needed. To decrease the disparities we also desperately need to narrow the treatment gap. Next slide. Now, of course narrowing the treatment gap means more advocacy, and I think it's really important and attribute to probably many of the people on this call, to just recognize what's facing people who are epilepsy advocates. There is so much that needs to be done in so many areas of the world and our own lives calling for advocacy. So that's not a trivial ask, but narrowing the treatment gap really is going to happen primarily through advocacy and local experts.

Dr. Gretchen Birbeck: 32:26 Then finally, stigma reduction interventions are really going to have to play a key role in these. I think some years ago we envisioned stigma reduction interventions as being sort of mass social marketing campaigns. Over time I think we've come to appreciate that those are probably not effective and certainly not sustainable. My own work is involved looking at interventions that are focused very much on epilepsy and looking at interventions that are school based and health sector based. I think as we mature as a discipline and a stigma reductions discipline I'm really coming to believe that we need to work with unified theories about how to form interventions. What do I mean by unified theories? Those basic human tendencies to stigmatize epilepsy are the same tendencies that stigmatize leprosy, that stigmatize any number of health conditions, and it should be feasible to develop stigma reduction interventions that address a number of conditions at one time and would be more sustainable, would have more economic and political support, and perhaps that's the way forward when we think about stigma reduction interventions. I think that's probably the next generation coming. Next slide, please.

Dr. Gretchen Birbeck:	33:45	So, with that I'd like to thank you for allowing me to share a part of this special day with you. This is my epilepsy care team in rural Zambia in 2019, all of whom are quite heartbroken in 2020 when we couldn't have our community based activities. Again we're in the same sad COVID situation that we can't do that this year, so we're hoping very much 2022 will look more like 2019. Thank you for your attention.
Dr. Laura Lubbers:	34:09	Thank you Dr. Birbeck. Thank you so much for such an impactful and haunting presentation. Clearly many populations around the world are suffering and need support. Thank you again Dr. Birbeck. We are joining her live now as she is in route to her research site in Africa on this very prominent day, International Epilepsy Awareness Day. So again, I want to thank you for making the time to give us that presentation and also having you here to address questions.
Dr. Laura Lubbers:	34:48	We invite our audience members to pose questions in the Q&A tab located at the bottom of your Zoom panel and clicking send. I know we already have a couple that have come in. I also want to apologize for the earlier issues that we had with audio, but those seem to be solved. So, let's go on to the first questions that we have.
Dr. Laura Lubbers:	35:10	This question comes in, is about cerebral malaria. Is it more likely to cause seizures than neurocysticercosis?
Dr. Gretchen Birbeck:	35:19	Good question. I don't know that there's been a head-to-head study. Neurocysticercosis in many ways is more heterogeneous, so people can have lesions in different places and the risk of subsequent epilepsy is probably based upon the location of the parasitic lesion. So I think it would be hard to do a head-to-head study. I think the location may matter as well, so obviously there's limited cerebral malaria in, say, some areas of Latin America that have quite a lot of cysticercosis. We actually do have plenty of cysticercosis in Africa as well, so I think it's probably just safe to say both are really contributing to the burden any time you get into low resource settings.
Dr. Laura Lubbers:	36:06	Okay. Thank you. Here's another question related to stigma. Why do you believe that stigma reduction interventions cannot be streamlined? Can you give examples of what hasn't worked in the past?
Dr. Gretchen Birbeck:	36:19	So, the mass social marketing campaigns that were looked at, if you examine the outcomes of those--not what they did but rigorous assessments evaluating whether they actually impacted stigmatizing attitudes. First of all, they weren't terribly

well studied, and when they were looked at usually the benefits were very short-lived. Those are very expensive things to do, and so they're not really very sustainable. My own group had looked at focused interventions in terms of it was an epilepsy focused, it was epilepsy stigma reduction, but we identified power groups. So we worked very closely with people with epilepsy and came to recognize that rather than trying to decrease stigmatizing attitudes in the general population we might benefit the lives of people with epilepsy more if we targeted individual groups of people who have a big impact on the lives of people with epilepsy. We decided or determined that that would include people like teachers, clerics, healthcare workers, police officers because in areas where there's no 911 if someone has a public seizure the police officer may be the person coming to the scene, and employers.

Dr. Gretchen Birbeck: 37:37 We did interventions with those groups and some interventions were successful, some were not. Some were even being scaled up, but again, the cost of these interventions and the cost of sustaining them really, really quite high. We're trying to think about what could be sustainable if we could partner with other common stigmatizing conditions, the models of the stigma, the driving forces of the stigma being shared, and work with those conditions to do sort of broad interventions, I think the sustainability would be more likely. So yes, you can do focused interventions that are effective, but the question is sustainability and scalability. So to do them in one country really isn't enough, we want to do them everywhere.

Dr. Gretchen Birbeck: 38:23 I can provide this after the talk, but we did an article, there was a whole series from the Fogarty International Center on stigma and this was published in *Nature*, and we really tried to make the argument about what these would look like, these sort of broader stigma reduction interventions that epilepsy could be one of the conditions that's looked at. I do think if such interventions were sort of developed say by the World Health Organization or the World Bank and scaled up, those interventions would almost always include epilepsy amongst the conditions of interest because it is very well recognized I think even outside of the epilepsy world, that when you think about health related stigmatizing conditions, epilepsy is unfortunately the top of the pile.

Dr. Laura Lubbers: 39:12 Well, thank you. Actually on a related note, one of our audience members noted that there's an advocate's toolkit for making epilepsy a priority in Africa, and that can be found at www.epilepsyafrica.org. That's a great resource, and it sounds like we've got other resources that maybe we can gather and share with this audience.

Dr. Laura Lubbers: 39:36 So another question. Can you tell us a bit more about the traditional healing methods that are used and if any of these have been researched?

Dr. Gretchen Birbeck: 39:45 Yeah. So I have to say we have been very fortunate where I work in that we have developed I think a very effective partnership with our healers in the rural areas. One of the things we discovered, it was actually in the setting of the ChEAFS study, that was the febrile seizure study which was requiring a cohort, a group of children that we would follow through home visits over several months was actually three years followup, and in trying to determine what would perhaps undermine those followups, it was pointed out to us that if the traditional healers in the village didn't want children to continue to be in our study they simply would pull out or be unavailable.

Dr. Gretchen Birbeck: 40:30 So that was our original motivating factor to bring in the traditional healers and speak to them about what we wanted to do and take advantage of that situation to talk to them about how they conceptualize seizure disorders and epilepsy, et cetera, and it ended up being a very positive foundational way to work with this group.

Dr. Gretchen Birbeck: 40:50 The way they described their understanding, and again, this is one region of Africa, so I cannot claim that this is generalized, most of these rural traditional healers were from the communities, they had had some life event that had led them to be chosen to be a healer or believed to be a healer, and they have a very strong bond to their community, and I would say that they have a very strong therapeutic relationship with their population. That may be very different than some of the real scoundrels that kind of come through to make a bunch of money and leave. With that group of individuals they really viewed a seizure as a problem. They would intervene and the seizure would stop, as seizures usually do, and then some people would go on to have more seizures, so we would call those persons who now have epilepsy, and those patients they really didn't want to take care of because they didn't think they could help them. So what they viewed their role as was to take care of acute symptomatic seizures, which are usually brief and usually go away, so they were usually successful. Then when people developed chronic seizure disorders they really didn't think that they could help them, and they in fact once the therapeutic door was open they became very happy to refer those patients to us.

Dr. Gretchen Birbeck:	42:05	So, for the group that I've worked with, they actually don't believe that they're particularly effective at taking care of epilepsy. We do see them try and many of them will tell you that trying to refer patients to help centers and hospitals are difficult because of the cost to the patients and because often they will get to a health center and find there are no drugs anyway, so they traveled all that way. The healers take excellent case history, so I'll often see a patient come who has localization related epilepsy with sort of focal onset in one limb. That limb will already have tattooing or scarification.
Dr. Gretchen Birbeck:	42:41	The healer who has actually obtained the history, they give sometimes rather magical explanations that make sense to patients. So if a patient has sort of an aura that is a rotten egg smell they will decide that the cause of the seizures was witchcraft and that eggs were used in the magic. So there's a lot of reasons why their explanations and their management are sort of contextually very valid to patients. What I find most reassuring is that when I work with healers closely, most of them are very happy to refer chronic seizure disorders to us because they feel like their intervention is with the acute symptomatic seizure, which again, is usually brief, is usually going to resolve, and many of those people won't go on to have a second seizure or at least won't have one for some time.
Dr. Gretchen Birbeck:	43:30	There are some healers that have particular herbs that they use and we have seen situations, usually in families that already have a family member with epilepsy and they have some traditional herbal teas is the household that are being given to that individual, where somebody with an acute symptomatic seizure will receive those. That can be problematic if sort of a hot tea is orally administered to some child in the midst of a febrile seizure because then you have oral burns, aspiration pneumonia, et cetera. So, for those sort of mismanagement, which I might say is actually the family taking a therapy for somebody else and administering it to the child without the healer's input, we have tried to do some public education about that to decrease the oral injuries and the aspirations that we've occasionally seen. But in general in the rural healers in Zambia what I found is once the therapeutic door is open they will continue in the community to manage acute symptomatic seizures that aren't epilepsy, but refer epilepsy quite happily for care to the hospital.
Dr. Laura Lubbers:	44:35	Fascinating. Fascinating interactions. Along the same lines, do religious leaders can they decrease stigma and reduce that evil spirit ideology? Is that something [crosstalk 00:44:45]?

Dr. Gretchen Birbeck: 44:45 Yeah, so it's interesting. We did some early work trying to look at what the drivers of stigmatizing attitudes were in different important groups of people, power entities, and you heard me say that clerics are power entities, teachers are power entities. Each of the power entities we looked at--and we looked at teachers, police officers, clerics and healthcare workers--each of those groups had different factors driving stigmatizing attitudes. You've asked about clerics. The clerics' driver was whether or not they recognized epilepsy to be a stigmatizing condition--I'm sorry, to be a biomedical condition. So for healers who recognized that epilepsy was a brain disorder, it's like having TB or a broken leg, you need to take this to the hospital. For healers who recognize epilepsy as a brain disorder and not being bewitched and not being possessed, those healers actually had pretty good attitudes. They were not stigmatizers. It was the clerics who were unaware of the biomedical basis of epilepsy who were stigmatizing.

Dr. Gretchen Birbeck: 46:02 So it would seem that the ideal intervention would be to improve their knowledge. Now, that is one of the lines of investigation and intervention we did, so we did a series of intervention programs with clerics in a large swath of Zambia, and we were able to improve knowledge. Yet we didn't improve attitudes and we didn't change how they were handling people with seizure disorders in their congregations.

Dr. Gretchen Birbeck: 46:28 So then we went back to the drawing board and spoke to them in kind of structured interviews and in-depth interviews to understand this better, and we'd fail most because they felt like they had to respond to seizure disorders in the way that their congregation expected and not necessarily congruent with their new knowledge. So, that is a group we actually failed miserably with.

Dr. Gretchen Birbeck: 46:52 Let me give you the success stories, since we've been talking about stigma reduction. So we were able to improve clerics' knowledge but we could not change their behavior. They felt compelled to behave in a certain way based on congregational expectations. On the other hand, for teachers we found that one of the primary, actually the primary driver was teachers are educated, they knew that seizures were a biomedical disorder. Whether or not they stigmatized, and I should state they stigmatize much less than the clerics, but their stigmatizing attitudes in terms of throwing kids out of the classroom, not wanting them in the classroom, thinking that they were not capable of some of the work was really driven by whether they had any personal proximity to somebody with epilepsy. So did

		they have a friend or a neighbor with epilepsy? And if they did, then they were much more accepting of the condition.
Dr. Gretchen Birbeck:	47:44	So our intervention with teachers was an educational program that took place over some days in a seminar center where people were attending the seminars full time and eating communally, pre-COVID, eating communally and staying in accommodations next to each other and coming to know each other, and the instructors were people with epilepsy, the teachers found this out at the end of the intervention. So much as the intervention looked like an educational intervention, it was actually a personal proximity intervention, and that was worryingly successful in terms of not only changing teachers' attitudes and changing what they were doing, but actually also there was a knockoff effect with other teachers in their school sort of changing attitudes over time as well based upon interactions and education from that other teacher. So we failed miserably with clerics, I'm afraid, but we did have more luck with some groups such as teachers, healthcare workers and police officers.
Dr. Laura Lubbers:	48:41	Right. Thank you for that really well rounded answer. Here's a question. There's a couple questions along this line. What are the best ways for nonprofit organizations outside of Africa to support African organizations to narrow treatment gaps and what areas are most helpful to approach first, is it diagnostics, medication, advocacy?
Dr. Gretchen Birbeck:	49:06	Yeah. I think here your local partners have to really inform you because it's really the situation on the ground, and it can be very different from country to country, it can even be very different from regions within the same country. Coming in from the outside I don't think that we can really hope to understand what that is. I think that sometimes we come in with a list of what we think people could need, and the more open we can be to really allowing the true needs to come forward from the community that's advocating on the ground the better. Sometimes the asks, the things they may need might seem very unusual, but if you get the full details of what they're dealing with it'll be clearer. So I really think in these situations local partners have to guide us because you just can't know from the outside.
Dr. Laura Lubbers:	50:01	Right, right. Okay. There was another follow up question around is there a line in Western medicine that people need to be aware of? Do we need to be more accepting and understanding of the traditional healing? Can we be wrong in our Western approaches or our Big Brother mindset?

Dr. Gretchen Birbeck: 50:20 Yeah, I think we have to at least be open to what the healers bring in. I think I've had a different experience than many people because of my sort of home base and work really originating in rural areas. So, I really believe in the rural areas the vast majority of healers who come they are from the community, they originate there, they live there, and they really very much view themselves as being responsible for trying to improve the health of their community. They often get very little in terms of personal income or gain, but they get a lot of status in their community. I've learned over time most of those people have all the best intentions, and I don't think I'm incorrect in that.

Dr. Gretchen Birbeck: 51:10 On the other side, in the urban settings, I've seen plenty of charlatans coming through and they'll whip into a city and they'll set up a clinic, and they'll appear from nowhere, they'll make outlandish promises, they'll charge huge amounts of money, and as soon as they make enough trouble for themselves they sort of disappear quietly overnight with everything that they've made. I think we have to just be open-minded about who we're dealing with. I'd be very careful about sort of painting any group of people that are claiming at least to be trying to help individuals with seizure disorders as being bad just because of sort of a label they have. I think it's healthy to have some skepticism and to learn more. I wouldn't recommend sort of suddenly trying to support unknown groups that are providing traditional medicines, but there's a lot to be said for the therapeutic benefit to the family.

Dr. Gretchen Birbeck: 52:04 Let's say somebody has their first seizure. It's a brief, unprovoked seizure, they may well go on to develop epilepsy. This is an intensely traumatic event for anybody anywhere, first seizure, right? It means a lot to that patient that their family seeks care for them, and it doesn't matter that that care may be garnered from the traditional healer in the community as opposed to a primary care clinic 12 miles away, that they may not even know the nurse or clinical officer there.

Dr. Gretchen Birbeck: 52:34 There's a lot of importance in the family unit and just people's responses to such an acute traumatic event, of just the simple care seeking process and having healers in the community makes that possible. So I think we have to be open-minded and sort of willing to learn a bit more about what an individual is actually doing, what are their motivations for being in that community before we sort of decide that they're either all good or all bad.

Dr. Laura Lubbers:	53:03	Right, thank you. Very complicated community there. Here's another question. Is there a difference for children or adults with the first onset seizure? Is one or the other more likely to be referred for care?
Dr. Gretchen Birbeck:	53:19	It depends. So we have some data sadly to suggest that females in general are less likely to be sent for care in the African setting, and I think actually sadly they're seeing this in the Nigerian study that I cited as well. So that sort of your value in the community, your value within your family probably determines how hard or how many resources are going to be expended to get care for you. So if you are a prime age adult male you're going to do a lot better in terms of resource seeking and the family investing in that than sort of say a young female. So yeah, it goes along power differential. The family wealth itself obviously makes a difference, but if you control for that, less valued individuals.
Dr. Gretchen Birbeck:	54:12	This becomes problematic if you think about let's say somebody with comorbid cerebral palsy or some comorbid condition that may be playing a role in their seizure disorder. Somebody who is disabled may be very much devalued by their community. So maybe very unlikely to have care sought for them because that requires resources that even within the family nobody wants to invest. So yeah, unfortunately there's differential care access, even at the family level.
Dr. Laura Lubbers:	54:42	Okay, thank you. And our last bit of time for question. What can people watching this webinar do? How can they support the cause? In fact, one person was interested in learning more about how to join research efforts and even your group. It's been wonderful. You've clearly inspired people.
Dr. Gretchen Birbeck:	55:04	There are groups like CURE Epilepsy, right? I mean, there you go. There are organizations that are already partnering with local organizations in communities doing important work. I think your best bet is to identify groups whose values and approach kind of resonate with yourself, because the more what they're doing sort of seems in line with how you feel about the condition and what the priorities should be, I think the more positive feedback that you're going to feel in your engagement.
Dr. Gretchen Birbeck:	55:41	Then think about what you do. I mean, I see some people on the line here, and there are EEG technicians, and people with those skills who sort of volunteer. There are people who give money there, people who give support to educational activities that are ongoing to try to build local expertise. I think there's a lot of opportunities out there if you tap into everything that groups

		like CURE Epilepsy and ILAE and World Federation. If you have a particular location in the world that you have some connection to you might make some inquiries and say, "What's going on in your community for epilepsy care?" And you may be astonished to find there's a small group there, some grassroots group trying to advocate for or do something, and then you can do something more personal.
Dr. Gretchen Birbeck:	56:26	We've done things for Christmas gifts just within my university, where people can gift a goat. I know that's a thing that some of the bigger organizations do, but we've been able to do it on a small basis, and yet it has a big impact locally because of the revenues that then support some of our patients who are really on the most dire end of poverty and really can't afford medicine. So I think you have to kind of look for what works for you, but I think even a brief internet search and you will find lots of opportunities to get involved. Then I would just look hard for the ones that resonate most with you so that you can have maximal enthusiasm for following through and engaging.
Dr. Laura Lubbers:	57:06	Right. Great. Thank you so much. Thank you so much for such an inspirational and thought-provoking seminar and I want to thank our audience for such great questions and engagement. It's clearly inspired a lot of people. I also want to let you know that we're interested in learning more about your interests in webinar topics. So if you have an idea for a future webinar, please do let us know at CURE Epilepsy or at research@cureepilepsy.org. Also please stay tuned for an announcement for our next webinar that should be coming out shortly.
Dr. Laura Lubbers:	57:43	So again, Dr. Birbeck thank you very much. Very safe travels to you as you head off to Africa, and best of luck with your work.
Dr. Gretchen Birbeck:	57:50	My pleasure. Thank you everyone.