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THE GROWING THREAT OF CHOLERA AND OTHER DISEASES IN THE MIDDLE EAST

HEARING

BEFORE THE

SUBCOMMITTEE ON AFRICA, GLOBAL HEALTH, GLOBAL HUMAN RIGHTS, AND INTERNATIONAL ORGANIZATIONS

OF THE

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CONTENTS

Page

WITNESSES

Peter J. Hotez, M.D., president, Sabin Vaccine Institute 4
Issam I. Raad, M.D., president, Health Outreach to the Middle East 14
J. Stephen Morrison, Ph.D., senior vice president, director of Global Health Policy Center, Center for Strategic and International Studies 26

LETTERS, STATEMENTS, ETC., SUBMITTED FOR THE HEARING

Peter J. Hotez, M.D.: Prepared statement 8
Issam I. Raad, M.D.: Prepared statement 17
J. Stephen Morrison, Ph.D.: Prepared statement 30

APPENDIX

Hearing notice 62
Hearing minutes 63

THE GROWING THREAT OF CHOLERA AND OTHER DISEASES IN THE MIDDLE EAST

WEDNESDAY, MARCH 2, 2016

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AFRICA, GLOBAL HEALTH,
GLOBAL HUMAN RIGHTS, AND INTERNATIONAL ORGANIZATIONS,
COMMITTEE ON FOREIGN AFFAIRS,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:10 p.m., in room 2172 Rayburn House Office Building, Hon. Christopher H. Smith (chairman of the subcommittee) presiding.

Mr. SMITH. The subcommittee will come to order, and good afternoon.

During the last several years, conflicts in the Middle East have cost the lives of hundreds of thousands of people. It is estimated that as many as 470,000 people have been killed either directly or indirectly due to the fighting in Syria since 2011. During that same period more than 30,000 people have died in Iraq. In Yemen, more than 5,000 have died in a series of conflicts since 2009.

As a result of the conflicts in these countries, as well as the influx of refugees from conflict zones into surrounding countries such as Turkey, Jordan, and Lebanon, many of those who die are the victims of disease. Almost 17 million people in the region are in need of humanitarian assistance, including roughly 4 million refugees who have fled their countries, and an additional 13 million IDPs.

Dr. Peter Hotez, one of our distinguished witnesses today, points out that, and I quote,

> We have already seen that polio and measles re-emerge, and we are now seeing a massive surge, more than 100,000 cases of a highly disfiguring parasitic disease known as leishmaniasis, which the locals call "Aleppo evil." It is transmitted by sandflies that thrive in the uncollected garbage of Aleppo and other urban and suburban areas of Syria, Iraq, and Libya. The disease causes horrific ulcers that can appear on the face and disfigure people, especially girls and women and leave them with permanent scars that render them unmarriageable. There is a medicine that is administered by injection of an antimony containing compound into the lesion, but there is an access problem in the affected areas, and the bottom line is that we need a vaccine.

Today's hearing will examine the scope of cholera and other diseases to determine what can and should be done to control it, assist those who have been afflicted, and mitigate the spread. The World Health Organization reported that the spread of the cholera epidemic that first began in Iraq in 2007, which crossed over into Iran and Syria, is considered the region's greatest, although not only, health threat. These threats are worsened by the targeting of healthcare workers in Syria and by the Islamic State, which has no experience and little interest in providing social services. Thus, cholera and other diseases are untreated, often unreported, and pose a significant health threat in the region due to poor sanitation and overcrowding in areas such as refugee camps.

Cholera is an acute diarrheal disease that can cause death within hours if left untreated. Roughly 80 percent of those who contract the disease do not develop symptoms, leaving some uncertainty about precisely about how many people contract the disease annually. Scientists estimate that between 1.4 and 4.3 million people contract it annually.

Cholera bacteria are present in the feces of infected people for 1 to 10 days after infection and can be spread to others if they ingest food or water that is contaminated with their fecal matter. The spread of cholera is mostly facilitated by inadequate water and sanitation management, and outbreaks are common in areas where basic infrastructure is unavailable, such as urban slums and camps for IDPs and for refugees.

As devastating as this cholera epidemic has been and can be going forward, we must also remember the MERS epidemic of a few years ago. The Middle East Respiratory Syndrome is a respiratory illness and is caused by a virus which was first reported in 2012 in Saudi Arabia. It is different from other viruses that have been found in people before. MERS, like other viruses, is thought to be spread from an infected person's respiratory secretions, such as through coughing. However, the precise ways the virus spreads are not currently well understood.

The conflicts and political crises in the Middle East have brought anguished suffering and severe declines in health to people throughout the region. The most catastrophic case is by far Syria. More than a million people have experienced traumatic injuries, once-rare infectious diseases have returned, chronic diseases go untreated, and the health system has collapsed.

In Yemen, Libya, Gaza, and Iraq as well, violence has limited access to healthcare and grievously harmed the population. According to Physicians for Human Rights, last summer at least 633 medical personnel have been killed, and more than 270 illegal attacks on 202 separate medical facilities have taken place since March 2011 in Syria. Of the attacks on medical facilities, at least 51, or 19 percent, were carried out with barrel bombs. Almost all of the assaults were inflicted by the regime of Assad.

In the Middle East, threats against, as well as arrests and intimidation of health workers, extend beyond armed conflict to situations of political volatility, as is evident in Bahrain, Egypt, and Turkey. In most of these cases, doctors and nurses who treat victims of violence are, by the very act of providing treatment, deemed guilty of anti-government activity. In Bahrain, almost 100 doctors

and nurses were arrested, and 48 originally charged with felonies for having offered medical care to wounded people in the wake of the 2011 Arab Spring uprising.

Our panel today comprises health experts who will help us think through the health challenges and provide a roadmap with good concrete data and empirical information for us to consider as a subcommittee, which I can assure you will be used in helping us advocate for more assistance and more help to those who have been now affected.

I would like to yield to Dr. Bera for any opening comments.

Mr. BERA. Thank you, Chairman Smith, and thank you to the witnesses for taking time to be here today.

As a physician and someone who has done public health and global health work, you think about the conditions in the Middle East as they are today in terms of diminishing infrastructure, refugees that are in crowded conditions, diminished sanitation, malnourished populations, and the environment is ripe for outbreaks of cholera, but also other infectious diseases. So I am very interested in getting a sense from our panel today of what measures we can take in terms of trying to alleviate and prevent some of these issues.

Obviously vaccinations as appropriate, but even in a war zone that is very difficult because, as Chairman Smith has already indicated, to try to get healthcare workers in there, to try to get folks in there to help assess sanitation conditions, apply vaccinations where appropriate, and deliver rehydration salts or other therapies for those that are affected is very difficult to get that carry-in. I would be curious of your experience in other war zones and other conflict areas of the things we can try to do. While we may not be able to prevent some of these outbreaks, what can we do to mitigate and minimize some of these outbreaks, knowing that we may be stuck in a conflict zone not for months but maybe for a prolonged period? If we just look at Syria itself, much of the healthcare infrastructure is being devastated and will take quite some time to rebuild.

So, again, I will keep my opening statement short and save time for questions, but look forward to hearing from the panel. Thank you.

Mr. SMITH. Thank you, Dr. Bera.

I would like to now welcome our distinguished panelists. And without objection, your full statements will be made a part of the record, but please proceed however you would like. Beginning first with Dr. Peter Hotez who is president of the Sabin Vaccine Institute, leads the Texas Children's Hospital Center for Vaccine Development based at the Baylor College of Medicine. He is also founding dean of the National School of Tropical Medicine at Baylor. His academic research focuses on vaccine development for a wide range of neglected tropical diseases around the globe, as well as studies to increase awareness about the neglected tropical diseases in developing countries and in the United States.

Dr. Hotez created the Sabin Vaccine Institute product development partnership and was instrumental in creating the Global Network for Neglected Tropical Diseases. In 2014, he was named by President Obama as one of four U.S. science envoys with a man-

date to explore the development of vaccine centers of excellence in North Africa and the Middle East.

I would note as well that our End Neglected Tropical Diseases Act, having had Dr. Hotez appear before this subcommittee on two previous occasions, has passed out of the Committee on Foreign Affairs and we greatly benefited from the insights, Dr. Hotez, that you provided as to what that legislation ought to look like. So thank you.

We will then hear from Dr. Issam Raad Who is an infectious disease specialist and is a distinguished professor of medicine at the University of Texas at Houston. He is president of Health Outreach to the Middle East, or HOME, which is a Christian interdenominational organization that exists to bring physical, psychological, and spiritual healing to poor and suffering people in the Middle East in the name of Jesus Christ. HOME has established a program to train, build, and send thousands of Arab Christian physicians and healthcare professionals on how to share the love of God at the bedside. HOME supports three medical clinics, one charity hospital, a home care medical service, and mobile clinic that provides medical care for the people of Egypt.

Then we will hear from Dr. Stephen Morrison who is a senior vice president at the Center for Strategic and International Studies and director of the Global Health Policy Center. Dr. Morrison writes widely, has directed several high level commissions, and is a frequent commentator on U.S. foreign policy, global health, Africa, and foreign assistance. He has served in the Clinton administration, as committee staff in the House, and taught for 12 years at Johns Hopkins School of Advanced International Studies.

Dr. Hotez, the floor is yours.

STATEMENT OF PETER J. HOTEZ, M.D., PRESIDENT, SABIN VACCINE INSTITUTE

Dr. HOTEZ. Mr. Chairman, members of the subcommittee, Mr. Bera, thank you so much for giving me the opportunity to talk about a very ominous situation that is now happening in the Middle East. And now we are recognizing a spill-over into southern Europe. So this thing is already going beyond the Middle East and North Africa and that region.

Before I do that I just thought you might like to hear a little good news based on the work of this committee and subcommittee. I am part of an enormous initiative known as the Global Burden of Disease Study that is funded by the Gates Foundation to evaluate what the impact has been of all these big-picture programs like PEPFAR and the President's Malaria Initiative, and the USAID NTD program. And this is involving hundreds of scientists all across the world to evaluate the papers. The papers that come out look like something out of a certain physics laboratory, a massive numbers of authors and I will be happy to share that with you.

But I want to just give you the punch line of what's happened since the launch of all of these big programs. We have now seen a 30-percent reduction in the number of malaria cases and the number of malaria deaths. But you guys did that, so congratulations.

We have turned the corner on HIV/AIDS, 19 million lives saved from HIV/AIDS, and for the first time turning the corner on the number of deaths.

And then for neglected tropical diseases, you have reduced the number of cases of lymphatic filariasis, which is also known as elephantiasis, river blindness, and blinding trachoma, by almost 40 percent, so to the point now where we can talk about eliminating these three diseases over the next decade.

To date, over 500 million people have received treatments for neglected tropical diseases, totaling—I used to say 1 billion, I just got corrected yesterday by somebody from USAID—it is now 1.4 billion people. So these are incredibly effective programs. And now we have independent documentation to know how they are working. So congratulations and thank you for your leadership on that.

Well, let's get to the not-so-good news part of the story. The impacts of all these big picture programs has also, like peeling away the layers of an onion, revealed a new problem. And that, we have just completed on a large scale analysis in a series of papers to show that today most of the world's neglected diseases are now occurring in wealthy countries, in G20 countries. So we have been ignoring the poor who live in wealthy countries, and now accounting for at least half the world's worm infections, most of the dengue, the Chagas disease, most of the tuberculosis, most of the leishmaniasis, and quite a bit of the HIV/AIDS.

The silver lining on that is because these are inherently wealthy countries it is not just a resource problem, it is a political will issue. So that we need to think about providing advocacy at the next G20 summits about how to get these global leaders to pay more attention to their own vulnerable populations. So an example would be China. Eastern China is incredibly wealthy. You go into western China, the Sichuan, Yunnan Province, you go back in time 50 years.

Or you look at Mexico, into southern Mexico, in northeastern Brazil where the Zika epidemic is. The Zika epidemic in northeastern Brazil is occurring in the same place where the epicenter of all the other neglected tropical diseases are. These poor, small states of Pernambuco and others where you are getting lymphatic filariasis and schistosomiasis as well.

So paying attention to these pockets of intense poverty in G20 countries is going to become an important new global health theme.

Let's talk about the Middle East and North Africa. I like to say that the reason why Ebola emerged out of West Africa is not because it was tropical, even though it is a neglected tropical disease, it was because those three countries, Guinea, Liberia, and Sierra Leone had undergone a decade of atrocities and, with it, the collapse, the collapse of its health system infrastructure. So we are now seeing the same thing happening in the ISIS-occupied areas of Syria, Iraq, Libya and now, to some extent, Lebanon as well.

And the problem is it is very difficult to actually work in these countries to observe first-hand, so we have to rely on glimpses that we are getting of refugees spilling across the border into, into Turkey, Lebanon, Jordan, and Egypt. And that is where we are starting to see it. So you have mentioned leishmaniasis, Aleppo evil, that is transmitted by sandflies. Even in the best of times it was

difficult for the Syrians to control this disease. And now, in the face of the collapse of the Syrian regime, what we are seeing are massive numbers of cases, more than 100,000 in the last year. People with horrific ulcers that disfigure the face, especially little girls who are then rendered unmarriageable later in life.

There is a medicine that could be used to treat it. It requires an injection of the medicine in the lesion. Of course, the medicine is now unavailable. But also, with all the garbage now piling up, the sandflies are having a field day where they are proliferating incredibly, so they are able to bite people and transmit the disease. The disease is following the refugees, the sandflies are following the refugees into the border camps and the disease is continuing there.

This is happening not only with leishmaniasis, although because it is so disfiguring it is one of the more dramatic examples, we are seeing the emergence of dengue or other arboviruses, scabies, malaria, tuberculosis, schistosomiasis, hepatitis A and B and, as you mentioned, the resurgence of measles and polio.

The other thing that is happening in the Syria situation is not only humans are being trafficked but animals are as well. There is no border anymore, so with that, all of that trafficking with animals we are seeing a lot of zoonotic diseases, diseases transmitted from animals to humans, so an enormous amount of brucellosis. We are quite worried now about Middle Eastern Respiratory Syndrome, MERS coronavirus, going beyond the Arabian Peninsula. This is going to be we think an important problem that can cause an epidemic.

We have additional issues that come up as well, which is that another big area of human migrations is the annual Hajj, the pilgrimage. It is believed that dengue fever actually got introduced in the Middle East through the Hajj. And because they have the mosquitoes there, then dengue got introduced. It spread across the Arabian Peninsula and the Middle East. I just came back from Saudi Arabia, and we were having discussions with the Ministry of Health there, that they are worried now about Zika coming in too for the same reasons. So there is every reason to believe that Zika is going to go in.

These diseases are having a massive economic impact on the region. We have just completed an analysis looking at the neglected tropical diseases in the OIC countries, the Organization of Islamic Cooperation. And there is quite a bit of evidence that the OIC countries are disproportionately affected by the NTDs. And this is one of the major barriers to their economic development.

Now were are seeing spillover into southern Europe. So something quite interesting is happening. For the first time in 70 years, malaria has reemerged in Greece. It had been eradicated, now it is back. We are seeing the appearance of dengue in Portugal after 50 years. We are seeing West Nile Virus and chikungunya in Spain and Italy. We are seeing schistosomiasis, which is the ultimate neglected tropical disease of poverty, now on the island of Corsica. There is transmission of schistosomiasis in Corsica.

So we are, we think that a lot of this is having to do with spillover from the Middle East. So we are now seeing the first evidence that it is not just being contained in the region.

So let me end by just saying what I think you need to do about it. In my role as science envoy it is clear that there is no capacity for making vaccines for any of these diseases in the Middle East and North Africa. They are still entirely dependent on the multinational pharmaceutical companies, Glaxo, Merck, and Pfizer for making these vaccines. The problem is these diseases, for now anyway, are of regional importance, not global importance, and so the big pharmaceutical companies aren't going into this.

And we saw this before with Ebola, right? The technology to make the Ebola vaccine was actually first published in 2003, but the technology sat there for a decade because the big pharmaceutical companies weren't interested in making an Ebola vaccine. It is because the business model is broken, it says we, an academic researcher, develops it, then waits to license it to a big pharmaceutical company, turns it around to a vaccine. And, of course, by the time Glaxo and Merck did this for Ebola, because BARDA put up $100 million at the 11th hour, 5 minutes to 12:00, they made the vaccine in record time. But by the time they did testing, Ebola was gone and 11,000 people perished.

We still haven't fixed that problem. The same now is coming out of the diseases in the Middle East. But one of the things that we are trying to do, and this will be a key component of the Center of Excellence, is at the Sabin Vaccine Institute which is based at Texas Children's and Baylor College of Medicine, we are making the vaccines that people won't make for these diseases in the Middle East. We are making a leishmaniasis vaccine, a schistosomiasis vaccine. And the nice thing about it is, because we are non-profit, we can teach others how to make vaccines. So we are teaching the Saudis now. We are working with the Tunisians, the Moroccans to build their own capacity.

You can't walk into Merck or Pfizer and say teach me how to make a vaccine, but we can do that. And so this is an active program going on now. We have a group of Saudi scientists coming to our laboratory to learn every aspect of the vaccine development cycle. They will bring it back to Saudi Arabia. And we hope that we can do this other times as well.

And that is also important because we, as you can imagine, relations with Saudi Arabia have been strained over the last years, so being able to offer something like this to promote joint vaccine development is a really great example of what I call vaccine diplomacy.

So thank you so much for having me speak.

[The prepared statement of Dr. Hotez follows:]

TESTIMONY

Peter J. Hotez MD, PhD
President, Sabin Vaccine Institute

"The Growing Threat of Cholera and Other Diseases in the Middle East"

Subcommittee on Africa, Global Health, Global Human Rights, and International Organizations
Committee on Foreign Affairs
United States House of Representatives

March 2, 2016

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to speak with you today. I am Peter Hotez, a biomedical scientist and pediatrician. I am the dean of the National School of Tropical Medicine at Baylor College of Medicine and also the Texas Children's Hospital Endowed Chair in Tropical Pediatrics based at the Texas Medical Center in Houston. I am also past president of the American Society of Tropical Medicine and Hygiene, and currently serve as President of the Sabin Vaccine Institute, a non-profit which develops vaccines for neglected tropical diseases (NTDs) through a product development partnership (PDP) model. This year I am also serving as US Science Envoy for the State Department and White House Office of Science and Technology Policy focusing on the urgency to develop vaccines for diseases that are emerging in the Middle East and North Africa due to the breakdowns in health systems in the ISIS occupied conflict zones in Syria, Iraq, Libya, and also Yemen.

In my submitted written testimony I highlighted some of the successes in US global health policy, many of which can be attributed to the hard work of this Subcommittee working hand in glove with two presidential administrations since 2000. I cite evidence from the Global Burden of Disease Study (GBD) that brings together hundreds of scientists - I am also a part of this - who are measuring the impact of large scale global health programs. In a series of 2015 papers we published in the journal *The Lancet*, the GBD found that over the last 15 years (since the launch of the Millennium Development Goals) we have achieved great gains in HIV/AIDS, malaria, tuberculosis, and neglected tropical diseases (NTDs) through US Government led programs: PEPFAR, PMI, USAID NTD. The bottom line is impressive: A 30% reduction in the number of malaria cases and in the number of malaria deaths, approximately 300,000-400,000 lives saved annually; turning the corner on HIV/AIDS cases and deaths, especially in Africa, with an estimated 19 million lives saved and a significant decrease in the number of deaths. Third, we have cut the number of cases of three NTDs by 30-40% - lymphatic filariasis (LF, elephantiasis), onchocerciasis (river blindness), and blinding trachoma. And we can see the elimination of LF, river blindness and trachoma in the coming decade! We are particularly eager to see the US annual commitment for NTDs reach at least $125 million to achieve projected NTD goals and maximize the generous drug donations from leading pharmaceutical companies. To date, almost 500 million people have received over one billion treatments making this program one of the largest and most cost effective in all of global public health!

That's the good news, but I also have some not-so-good news. Like peeling the layers of the onion the great successes of USG-led initiatives have created some new interesting trends and observations in global health. One of them is the subject of my forthcoming book that will be published by Johns Hopkins University Press revealing a hidden burden of neglected diseases in wealthy countries, including the United States. I found that most of the world's NTDs are now paradoxically found in the wealthy group of 20 (G20) nations, together with Nigeria. The extreme poor who live amidst the wealthy in these nations today account for one-half the world's intestinal worm infections, and most of the dengue and other arboviruses, leishmaniasis, Chagas disease, TB, and other NTDs. I believe that this is an important observation, because while USG programs should continue for the poorest countries, we could eliminate at least one-half of the

world's neglected diseases if the leaders of the G20 countries would commit to taking on these diseases within their own populations.

I would like to go through two specific examples:

1. The Middle East and the countries surrounding the Mediterranean – North Africa and Southern Europe
2. Zika virus infection in the Americas and the vulnerability of our US Gulf Coast

And then briefly end on what we should be considering as a next step.

MENA and Southern Europe

In my role as US Science Envoy for the Middle East and North Africa it is becoming clear that the factors that promoted the emergence of Ebola in West Africa in 2014 are now present in the ISIS occupied areas of Iraq and Syria, Libya, and to some extent Yemen. It won't be Ebola but neglected diseases that are equally destructive. Let me explain – Ebola spread across Guinea Liberia and Sierra Leone not because it was tropical but because years or decades of atrocities has decimated their health systems and healthcare infrastructure, this combined with deforestation and human migrations created the perfect storm that allowed Ebola virus to flourish. Based on reports from the area and the diseases among refugees in neighboring Turkey, Lebanon, and Jordan, these same forces are in play in the Daesh occupied areas. We have already seen that polio and measles re-emerge, and we are now seeing a massive surge, more than 100,000 cases of a highly disfiguring parasitic disease known as leishmaniasis, which the locals call "Aleppo evil". It's transmitted by sandflies that thrive in the uncollected garbage of Aleppo and other urban and suburban areas of the Syria, Iraq, and Libya. The disease causes horrific ulcers that can appear on the face and disfigure people, especially girls and women and leave them with permanent scars that render them unmarriageable. There is a medicine that is administered by injection of an antimony containing compound into the lesion, but there is an access problem in the affected areas, and the bottom line is we need a vaccine. I will come back to that. We're also seeing the emergence of dengue and other arbovirus infections, and scabies, as well as malaria, tuberculosis, schistosomiasis, hepatitis A and B, and classical childhood viral infections such as measles and polio. Also of great concern is the emergence of zoonotic infections linked to animal trafficking across fractured international borders, such as brucellosis. As another example, Middle Eastern Respiratory Syndrome (MERS)—recently appearing in Saudi Arabia and elsewhere on the Arabian Peninsula—could spread undetected through camel animal reservoirs. Still another factor promoting the spread of diseases into the Middle East is the Hajj, the annual pilgrimage to Mecca. The Hajj is believed to be responsible for the introduction of dengue into Saudi Arabia and there are concerns that Zika will soon spread to Saudi Arabia as well.

In an additional study we found that these neglected diseases are now having a huge adverse economic impact on the member states of the Organisation of Islamic Cooperation, the world's Muslim countries and we're in discussions with the Islamic Development Bank about having a

greater role in disease prevention and vaccine development. With the exception of Indonesia there is almost no capacity for developing new vaccines in any Muslim country and zero capacity in the Middle East.

An interesting observation is that we may be seeing spillover of this situation into Southern Europe. Within the last three years we have seen the re-emergence of malaria in Greece after an absence of more than 50 years, dengue in Portugal, WNV and chikungunya in Spain and Italy, and schistosomiasis in Corsica. What's responsible, is it coming from across the Mediterranean from North Africa or from the Middle East? Is it climate change? The economic downturns in Southern European countries? Some combination?

Zika

And we're seeing a somewhat similar emergence of neglected tropical diseases – NTDs - in the Western Hemisphere. Chikungunya virus infection, an arbovirus infection transmitted by Aedes mosquitoes, entered the New World in December of 2013 on the Caribbean Island of Saint Martin and in the course of a year spread across the Latin American and Caribbean region with alarming speed. Now Zika virus, also transmitted by Aedes mosquitoes, has come across the Pacific, entered into Latin America via Easter Island off the coast of Chile and spread quickly throughout Brazil last year, with more than 1 million cases, and then Colombia South America with 700,000 cases. Some of the reasons for the rapid spread are under investigation but include mutations in genes encoding the NS1 and NS4 virus genes that facilitate virus replication.

The epidemic of Brazil's Zika epidemic is Pernambuco State, one of the Brazil's poorest states where other neglected tropical diseases are found, including elephantiasis and schistosomiasis. Again poverty is the most powerful driver, affecting mostly women who live in extreme poverty. Since poverty is a risk factor because of poor housing, absent window screens, and environmental degradation in the neighborhood

Zika appears to be unique among arboviruses in that when it infects a woman early in her pregnancy the virus not only enters her bloodstream but can be passed to her unborn baby to cause a horrific congenital birth defect known as microcephaly – small head 2-3 standard deviations below normal head circumference, together with an abnormally formed brain due to the invasion of the virus in the baby's central nervous system. So far there have been 4,000 cases of microcephaly, most in northeastern Brazil, and these children are expected to exhibit profound mental disabilities, or even be neurodevastated. The virus is also causing stillbirths.

The virus is spreading rapidly, now in five Caribbean countries and on Puerto Rico. we can expect that Haiti could get hit the hardest where it could infect up to a quarter of a million pregnant women who live in a country with no real health system – such that tens of thousands of babies could be borne with microcephaly, but even PR and the US Virgin Islands are highly vulnerable.

Gulf Coast

Could Zika hit the Gulf Coast of the U.S.? In coastal Texas, Florida and most places in between we have two different species of mosquitoes that can transmit Zika. Together with extreme poverty in places such as Houston's Fifth Ward and elsewhere, at our National School of Tropical Medicine at Baylor, together with Texas Children's Hospital we're already getting ready for the possibility of maternal infections and birth defects in our city.

The U.S. has poverty. In the United States I estimate that we currently have 12 million people living with at least one neglected tropical disease including Chagas disease, cysticercosis, toxocariasis, trichomoniasis, and toxoplasmosis. Like NTDs abroad, these chronic and debilitating infections contribute to poverty in the U.S. by impairing childhood cognition, making people too sick to go to work, and affecting pregnancy outcome. In a paper last year in *JAMA Psychiatry*, I wrote how some of these diseases may actually contribute to the achievement gap noted among socioeconomically disadvantaged children in our country. Pending legislation such as H.R. 1797, the End Neglected Tropical Disease Act, which passed out of the House Foreign Affairs Committee on January 7th, and H.R. 2897, the Neglected Infections of Impoverished Americans Act, could go a long way towards tackling these diseases, just as we have done in Texas by passing House Bill 2055 to begin surveillance for our neglected diseases.

New models for innovation: Supporting the PDPs

It sure would be nice to have vaccines for Aleppo evil, schistosomiasis and Zika. We urgently need to find a better way to develop innovations for neglected diseases, including NTDs. We saw how in 2014-15 the Ebola vaccine was not available to prevent the deaths of 11,000 people even though the technology to develop such a vaccine was published in the biomedical literature a decade previously. This is because the entire system relies almost exclusively on having the multinational pharmaceutical companies take an interest in developing vaccines, even if they are not financially remunerative. Once again in 2016 we will need vaccines to fight the following categories of neglected diseases and NTDs and it is not clear if industry will have an interest in developing these technologies:

To ensure these vaccines get developed, I believe that we will need to incentivize organizations known as product development partnerships (PDPs). PDPs are non-profit organizations that were established to develop and test products for NTDs, TB, malaria, and other neglected diseases. There are approximately 16-20 PDPs globally, including several that are developing vaccines. Our Sabin Vaccine Institute PDP in Houston, Texas, for example has a pipeline of six vaccines for NTDs.

Unlike the EU, and governments of Japan and several European countries, the USG does not specifically fund initiatives that support the PDPs. The SBIR mechanism fosters innovations among small businesses, but because PDPs are non-profit organizations they are not eligible for SBIR support. Similarly, the priority review voucher (PRV) system does not allow vaccine PDPs to obtain PRV funds until they license a vaccine, which is a very high and lengthy

window. One idea would be to allow vaccine PDPs to be eligible for PRVs by reaching milestones short of licensure such as completing phase 1 or 2 clinical trials. In a Public Library of Science article, I estimated that setting aside just 1-2% of the USG budget for global health initiatives for PDPs could provide sufficient finances for the PDPs to develop a new generation of antipoverty drugs, diagnostics, and vaccines. As there is no commercial incentive to develop new tools that mostly or exclusively affect the world's poor, there is an urgent need for increased public investment into NTD R&D in order to sustain momentum for the development of new health tools, advance products currently in development and deliver them to people in need worldwide. We urgently need to open windows that allow PDPs to gain financial support.

Mr. Chairman, this concludes my statement and I now look to answering any questions you or the Subcommittee may have.

6

Mr. SMITH. Dr. Hotez, thank you, sir, very much for your leadership.

Dr. Raad.

STATEMENT OF ISSAM I. RAAD, M.D., PRESIDENT, HEALTH OUTREACH TO THE MIDDLE EAST

Dr. RAAD. Thank you very much, Mr. Chairman and members of the subcommittee, Mr. Bera, and the staff director, Mr. Simpkins. It is a pleasure to be with you today.

I would like to, again, emphasize what Dr. Hotez mentioned that the devastation resulting from the conflict in the Middle East creates the right environment for these alarming epidemics that have spread rapidly within the region. And there is concern that it could be a global spread.

This has been also associated with the devastation, if you may, and the collapse of the local healthcare system in the area. And as you mentioned, Mr. Chairman, cholera is the, reported in 2015 in Iraq, is the tip of the iceberg, if you may. For example, the World Health Organization reports 5,000 confirmed cases between September to November 2015, with several deaths. But reports from our clinic in Baghdad, where we have clinics in Baghdad, we have in Kurdistan, we have even in the suburbs of Damascus, we have in Lebanon, Jordan and Egypt and in north Africa, but the reports from the clinics there that this is a vast underestimate. This is almost 2 to 5 percent of the cases actually contracted there, which we estimate at around 200,000 cases in 15 of the 18 governments in that part.

The concern also with cholera is that cholera is unique among water-borne bacterial infectious disease and its potential for global pandemics. And now we are in the third, second and the third wave of the seventh pandemic with more antibiotic resistance and acquisition of newer, more intense cholera function associated with cholera.

And also the concern is that some of these clusters or outbreaks occurred in Iraq in Najaf and Karbala, which are part of the holy, holy shrines in that country, with all the influx, with Shiite Muslims going to these religious pilgrimage areas.

The other big concern is polio. And this has been mentioned. But polio was thought to be eradicated in Syria. But it emerged in 2014 with more than 7,600 cases. And the big concern is that it occurred, the epicenter for the outbreak started in Deir ez-Zor which is the northeastern area, very close to Raqqa where the Islamic State is in control and where they have control in that district. And it is considered to be related to the fact, like the cholera, that the raw sewage is being pumped from these areas into, directly into the Euphrates River and the areas which provide the drinking and washing water to the other areas not under their control.

So with cholera, polio represents a form of a spread of the disease related to the conflict, but possibly a bio-terrorism aspect where they are kind of basically moving the raw sewage.

What is even more alarming is the fact that the strain of poliomyelitis in Syria has been linked to a wild type from Pakistan, particularly from a jihadist fighter who came from Pakistan to the

area, highlighting the regional spread of this disease and the potential, again, for a global spread.

Measles is another problem. I mentioned it in my written testimony. In Aleppo and then spilling over to Lebanon, for example, in 2013 the number of cases of measles among Syrian refugees increased to 1,760 from the baseline of 9 cases the year before. The same is true among the Syrian refugees in Jordan.

Dr. Hotez mentioned about the leishmaniasis, which is also referred to as a flesh eating parasitic infection. Fifty-two thousand cases were reported in 2012 after a time when this was considered to be a contained, local infection more in northern Syria.

MERS remains to be alive and well. You are well aware of the outbreak, large outbreak in the summer of 2015 in Riyadh in Saudi Arabia, as Dr. Hotez pointed. But also the recent outbreak in 2015 in South Korea with transmission of the organisms, basically the index case traveling from the Arabian Peninsula, so again highlighting the spread of these diseases.

I would like also to highlight in North Africa, although the hepatitis C epidemic in Egypt is not directly related to the conflict, but has been put under the rag for a long time. A recent study by D. Miller, with the Cornell Group, highlighted the fact that there is every year more than 500,000 new cases of hepatitis C, where almost 20 percent of the population, 15 to 20 percent of the population have this virus which has the potential in up to 85 percent of them to go into liver cirrhosis and hepatocellular carcinoma. So this is a major concern.

The major concern in Egypt is that this is being propagated through the healthcare system, where almost 18 percent of the dental instruments have the hepatitis C RNA, 90 percent of patients on hemodialysis will end up with hepatitis C, and 70 percent of the blood transfusions that are being given are really not being checked for hepatitis C.

So I think recently from a visit to Egypt I met with the head of the National Committee for Control of Viral Hepatitis C, and I have been in contact with the CDC basically, Dr. John Ward, who has been in contact with the CDC groups there. I met with the CDC and USAID. And there could be a lot of good effort that could be done in a concerted effort to contain and basically eliminate the spread of this virus.

I also came from a trip from Mauritania. Ten days ago I was in Mauritania. I met with the President and the Minister of Health, as well as our Ambassador, Mr. Larry Andre, and talked about the hepatitis B epidemic there, where almost 15 percent of the population have this problem. And we can, Ambassador Andre has advised us to, and we have been in touch with the CDC, to really curtail that problem.

I would finally like to highlight two major problems. One is multi-drug resistant TB, which is not much is being mentioned about, but we are detecting it from our groups who are working in Mafraq, in a rural hospital which is a TB sanatorium in northern Jordan, among Syrian refugees mainly. And this other problem is salmonella typhoid fever where an outbreak has been reported in the Yarmouk Camp in a suburb of Damascus, with resistant organisms.

HOME has been serving as a group there. And most of us are from Middle Eastern origin. We have been working widely in all of these areas, particularly with mobile, a big network of mobile medical units and field clinics that we have established in various countries. We work closely with Samaritan's Purse, World Vision, and the National Arab-American Medical Association. We work with the American College of Chest Physicians, and the American-Lebanese Medical Association.

But we believe that HOME and other groups, other NGOs working in the area, and this is what we would like to propose, should have work in a concerted effort, collaborative effort with governmental agencies such as USAID, CDC, and Peace Corps.

And we ask that this subcommittee would, under you, Mr. Chairman, would call for a meeting for all relevant committee chairs, including the Health Subcommittee, with the experts, including Dr. Hotez and Dr. Morrison, and to set a plan and a policy for this joint effort for the Middle East. And have a model similar to what we have done with Ebola in west Africa where we have a concerted effort among the NGOs of Americans working there, as well as governmental agencies, to try to contain these, these infectious problems in the area. Because there is no doubt, like the Ebola, that they are going to spill over and we are going to reap the consequences.

In addition, it could be part, and we are talking here to this esteemed subcommittee which is a subcommittee of the Committee on Foreign Affairs, this could be part of the medical diplomacy, if you may, initiative in combating terrorism in that area and its implications of this, of these infectious outbreaks. A lot could be done in this concerted effort in terms of refugee medicine training, in terms of early detection of these infectious diseases, working with the World Health Organization on community health and water decontamination, hygiene education, vaccination campaigns, and appropriate use of antimicrobial therapy, which is very important for TB and other, particularly training the local community physicians on how to appropriately use antimicrobial agents.

Thank you very much.

[The prepared statement of Dr. Raad follows:]

THE GROWING THREAT OF CHOLERA AND OTHER DISEASES IN THE MIDDLE EAST

COMMITTEE ON FOREIGN AFFAIRS
SUBCOMMITTEE ON AFRICA, GLOBAL HEALTH, GLOBAL HUMAN RIGHTS, AND INTERNATIONAL ORGANIZATIONS

U.S. HOUSE OF REPRESENTATIVES
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INTRODUCTION

The escalating conflict in the Middle East, particularly in Syria and Iraq has been associated with a rapid collapse of the existing healthcare system resulting in a subsequent Public health catastrophe[1]. The devastation resulting from the escalating Civil War in these countries has introduced alarming epidemics that have spread rapidly within the region and have the potential to spread globally creating a Public health emergency.

The unrelenting war has created the appropriate environment for the spread of these epidemics through widespread contamination of the water and food supplies, poor sanitation, and massive displacement of a large segment of the population resulting in overcrowding of refugees[1-3]. Furthermore, the concurrent collapse of the public health and healthcare system has perpetuated the regional spread of these epidemics prohibiting the implementation of any effective infection control measures.

There are several factors that have contributed to the collapse of the healthcare system. These include but are not limited to wide destruction of healthcare facilities, shortage of healthcare personnel associated with a large scale immigration of healthcare workers and at times their physical elimination or injury, lack of access to essential drugs and medical supplies, and lack of secure routes and transportation[1, 4].

Hence, as well described by Dr. Souha Kanj (Chief of the division of Infectious Diseases at the American University of Beirut) the escalating war in these countries included a war on the healthcare system[1]. According to a report by the World Health Organization [WHO], 40% of the ambulances in Syria were destroyed and 57% of Public hospitals were severely damaged leaving the remaining 37% out of service[5]. Another report indicated that at least 160 physicians have been killed in Syria alone while hundreds others were jailed or kidnapped resulting in the massive immigration of more than 80,000 physicians[3]. In addition, prior to the war 90% of pharmaceutical needs are locally produced which was reduced to only 10% at the current time with extreme shortage of pharmaceutical supplies coming from outside the country because of lack of safety of transportation and the imposed boycott[2].

Below is a brief description of several outbreaks that occurred in the Middle East and that were perpetuated by a deteriorating healthcare system associated with local and regional conflict.

I. INFECTIOUS DISEASES IN THE MIDDLE EAST

1) Cholera:

Cholera is caused by the toxin producing strains of gram negative bacteria known as Vibrio cholerae leading to an acute diarrheal illness. This infection is often associated with massive fluid and electrolyte losses in the stools and the development of hypovolemic shock that can occur within 24 hours from the initial onset of the illness.

Cholera outbreaks occur in the settings of poor sanitation and inadequate access to clean drinking water[6]. This setting has been the hallmark of the raging civil wars in Iraq and Syria. Whereby water and sanitation management and infrastructure has been damaged by the current escalating conflict. For example, the 2015 cholera outbreak in Iraq has been thought to be related the low water levels in the Euphrates as well as the winter flooding that was thought to have contaminated the Euphrates River and shallow wells with sewage water[7].

Between September to November 2015, the World Health Organization reported a cholera outbreak in Iraq with more than 5,000 confirmed cases and several deaths. The outbreak was distributed in 15 out of the 18 country governorates. It involved the Baghdad county and several other counties in Iraq[8]. However, based on our recent contact with physicians from Baghdad, the number of confirmed infected cases is an underestimate of the total number of patients who contracted the disease. This is based on the fact that only around 10% of symptomatic patients obtain a stool culture that confirms cholera and only 20% of patients who contract cholera are usually symptomatic[9]. Hence, this puts the estimated total number of cholera cases in 2015 above 250,000 and the number of deaths, according to our contacts in Baghdad, in the hundreds.

Some reports indicate that this cholera outbreak has spread to neighboring Syria, Kuwait, and Bahrain with a risk of turning into a region-wide epidemic[7, 8]. The concern related to a region-wide epidemic relates to the fact that the areas where large number of cholera cases were detected includes the Shiite shrine cities of Najaf and Karbala where annually millions of Shiite Muslims come on religious pilgrimage to these holy shrines[7]. Furthermore, cholera is unique among waterborne bacterial infectious diseases in its potential to cause global pandemics. Over the last two centuries, we have witnessed seven pandemics of cholera and now we are in the period of the second and the third wave of the seventh pandemic cholera attributed to the Vibrio cholerae O1 el Tor[10]. It is to note that the second wave of the seventh pandemic was associated with the acquisition of additional antibiotic resistance and the third current wave is associated with the acquisition of a cholera toxin variant, both of which are of major concern and could reflect a global public health emergency[9].

2) Poliomyelitis:
In 2014, WHO estimated that over 7,600 Syrians were infected with poliomyelitis with subsequent spread of the infection to Iraq[11]. This occurred after 15 years of eradication of poliomyelitis in Syria[12]. Most of the cases reported occurred in the northern eastern province of Deir El Zur which was the epicenter of the outbreak[13]. However there were other several cases that were reported in rural areas of Damascus, Aleppo and other regions.
Poliomyelitis is a virus that lives in sewage contaminated water and food. Hence, several war related factors have contributed to this poliomyelitis outbreak. The first factor is the fact that, particularly during the war, the raw sewage was being pumped directly to the Euphrates River which provided drinking and washing water to many villages with simultaneous discontinuation of chlorination of that necessary water[14]. The second factor is related to the fact that poliomyelitis is a vaccine preventable disease and the vaccination coverage in Syria has dropped from around 91% in 2010 to as low as 45% by 2013[3]. The third factor is the overcrowding of tens of thousands of displaced and refugee population inside and outside Syria[1].
What is of great concern also is the fact that the strain of poliomyelitis in Syria has been linked to a wild type from Pakistan which is suspected to have been introduced to Syria by a jihadist fighter who came from Pakistan[15, 16]. This spread of the virus within the region was also noted in the fact that there were reported cases in Lebanon, Jordan, as well as Iraq[17]. Hence, polio in Syria has been declared as a public health emergency that requires international efforts and solidarity to prevent a possible global epidemic.

3) Measles:
Measles is a highly contagious viral illness that, with high efficiency of airborne transmission, but is vaccine preventable. Measles epidemic was reported in Syria during this unrest period, particularly in the northern regions such as Aleppo, with more than 7,000 confirmed cases[18]. The epidemic spread to the neighboring countries whereby Jordan reported 24 cases in 2012 and more than 200 cases in 2013[19]. In addition, Lebanon reported 9 cases in 2012 which increased to 1,760 in 2013[20].
Although immunization campaigns continued to deliver vaccinations for poliomyelitis and measles to tens of thousands of adults and children in Syria and the surrounding countries, the current conflict has restricted access to vaccination campaigns in large areas of Syria and surrounding countries, particularly the area under the control of ISIL and other northern areas of Syria and Iraq[1].

4) Cutaneous Leishmaniasis:
For decades, cutaneous leishmaniasis has been recognized as a skin deforming infection that is transmitted by a sand fly and which has been endemic in northern Syria, particularly Aleppo[1].

However, with the recent conflict in Syria leading to vast population displacement, an epidemic was reported in 2012 that involved more than 52,000 confirmed cases[21]. Subsequently, epidemics were reported among Syrian refugees were reported in neighboring countries, particularly Lebanon.
Before 2008, there were no cases of cutaneous leishmaniasis in Lebanon. However, by 2013, 1,033 cases were confirmed whereby 97% of them were among Syrian refugees[20]. The Lebanese ministry of public health, with WHO, launched a coordinated campaign to contain the spread of this infection which includes spraying pesticides to kill the vector, providing free treatment and diagnosis for newly diagnosed cases[1]. However, controlling the source of this infection, in northern Syria particularly in around Aleppo, has not been possible because of the escalating conflict in that area.

5) Middle East Respiratory Syndrome Corona Virus (MERS-CoV):
MERS-CoV is a severe respiratory illness caused by a Corona virus that was first reported in Saudi Arabia in 2012[22]. The MERS-CoV epidemic spread to the Arabian Gulf and other areas in the Middle East involving Qatar, United Arab Emirates, and Jordan[23]. However, this epidemic has not been associated with the conflict in the Middle East and there were no documented cases reported in Syria or Iraq. It is possible that such cases could have occurred in areas of conflict but not reported, including the country of Yemen[24]. Furthermore, cases have also been reported on a global basis in the Far East and other areas of Asia as well as Europe, North Africa and North America. In 2015, a large outbreak was reported in South Korea between May and early July with the index case travelling from the Arabic Peninsula[25]. In addition, a large outbreak was reported in a hospital in Riyadh in Saudi Arabia in the summer of 2015[26].
Bats are thought to be the reservoir with camels serving as a host for this virus[27, 28]. However, studies do strongly suggest that a human-to-human form of transmission also occurrs[29, 30].
The global spread of this virus, is associated high mortality rate of around 36%[31], the absence of ineffective treatment for this viral infection, as well as the absence of an effective preventive vaccine have all raised global concerns and made MERS-CoV a global health emergency.

6) Hepatitis C (Genotype 4):
Over the last several decades, Egypt has witnessed the largest epidemic of Hepatitis C virus worldwide. Egypt has the highest prevalence of Hepatitis C worldwide with an estimated 14.7% of the population having acquired the Hepatitis C virus, whereas according to WHO standards a prevalence above 4% is considered high[32]. Not only Egypt has the highest prevalence of Hepatitis C worldwide, but a relatively recent study confirms an ongoing hyper epidemic transmission with more than 500,000 new HCV infections per year[33]. It is to note that up to 85% of patient who acquire Hepatitis C would develop a chronic infection leading to either liver cirrhosis and failure or hepatocellular carcinoma[34, 35]. Although this epidemic has not been directly associated with the recent conflict in the Middle East, however, after the January 25 revolution in 2011 and the subsequent deterioration in the economic and healthcare conditions, efforts to control the spread of this viral infection have been hampered. The major concern related to the spread of this virus in Egypt is the iatrogenic form of the transmission where many segments of the healthcare system have been associated with perpetuating the transmission of this virus. Recent studies indicate that 18% of dental instruments have been contaminated with Hepatitis C while up to 90% of hemodialysis patients have developed this viral infection with up to 85% of healthcare workers with needle stick injuries and other injuries acquiring Hepatitis C[36, 37]. Furthermore, records show that 10-55% of transfusion recipients in Egypt have acquired Hepatitis C[37]. Egypt, like many countries in the Middle East and North Africa, suffer from high rates of unnecessary use of medical injections and transfusions as well as high rates of reusing needles and syringes[33]. Furthermore, Egypt and many Middle Eastern countries have among the

highest rates of needle stick injuries among healthcare workers worldwide[38, 39]. All of these factors have contributed to the spread of the Hepatitis C virus that yields high alarming rates. During my recent visit to Egypt in February 2016, it was reported to me that around 70% of blood transfusions are not adequately screened and tested for Hepatitis C. Hence, the concern that the healthcare system has become a major source for the transmission of Hepatitis C in Egypt, given the fact that this viral infection is mainly transmitted through blood transfusions and injections.

With the availability of novel effective antiviral therapy for Hepatitis C, Prof. Wahid Doss (Head of the National Committee for Control of Viral Hepatitis in Egypt) negotiated a deal with pharmaceutical companies such as Gilead to provide these novel agents at a very low affordable cost to the Egyptian population. Furthermore, the CDC under Dr. John Ward has worked with CDC Namro and the USAID branches in Cairo, Egypt to support Dr. Doss and the national committee in their efforts to control Hepatitis C in Egypt. However, the infection prevention policy devised by the CDC has not been funded yet, nor implemented.

7) Hepatitis A and B:
Clusters of Hepatitis A outbreaks have been reported during the Syrian conflict over the last two years particularly among the Syrian displaced population.
On the other hand, Hepatitis B is highly endemic and spread in Mauritania (North Africa). During my visit in February 2016 to Mauritania, I had the pleasure of meeting with the current Minister of Health and the President of Mauritania as well as the Head of the Hepatic Center. It is evident that the country has a problem with the spread of Hepatitis B at a large scale that needs to be addressed. Similar to Egypt, the CDC has been working through the embassy and with the officials there regarding this problem. HOME was invited to participate in that effort and was recognized as an NGO in Mauritania consisting of Arab-American healthcare workers who are interested in helping in the effort of controlling Hepatitis B in that country.

8) Other Infectious Diseases:
Other infectious diseases, such as Typhoid fever as well as multidrug resistant Tuberculosis, have been reported particularly in association with the Syrian crisis. Typhoid has been particularly reported among Syrian refugees as well as the Yarmouk refugee camp which exists in a suburb of Damascus[40]. This camp which has been controlled by the Islamic State and has been under siege by the government forces. The HOME teams working in the Al Noor chest disease sanatorium in northern Jordan have reported high rates of Tuberculosis, including multidrug resistant Tuberculosis, among Syrian refugees that are seen in the outpatient clinics of that chest diseases hospital.

II) WHAT HOME IS DOING

Health Outreach to the Middle East (HOME) is a 501(c)(3) charitable organization registered in the US since 1990 and consisting of largely Arab-American healthcare professionals who are committed to reaching the suffering in the Middle East. HOME has been highly active over the last two decades in various Arab countries undergoing conflict, including Iraq, Syria, Lebanon, Jordan, Egypt, South Sudan and more recently the West Bank and areas in North Africa. HOME members and leaders have chapters in many US cities and in all of these countries mentioned above. The members of HOME are healthcare workers and collectively they view themselves as medical ambassadors of peace, reconciliation and healing. In addition, HOME in the US view themselves as bridge builders between the USA and the Arab world, reflecting the shining, beautiful and healing face of America in the Middle East.

In addition, over the last two decades, HOME has supported more than 18 clinics including field and mobile clinics and more than 8 charity hospitals in the Middle East, launching the largest network of mobile clinics in Iraq, Lebanon, Kurdistan, Egypt, South Sudan, and Mauritania.
Since its inception, HOME has insisted on providing humanitarian medical relief in a charitable, peaceful non-partisan and non-discriminatory manner to all the suffering people in the Middle East, irrespective of their race, religion, ethnicity, etc. In addition, HOME has worked with a large number of 501(c) organizations working in the area, including (but not limited to) Samaritan's Purse (SP), World Vision, American Lebanese Medical Association (ALMA), National Arab American Medical Association (NAAMA), American College of Chest Physicians, and Medical Bridges. Below is a brief summary of what HOME has been doing in each country:

1. Iraq: HOME started a stationary clinic in Baghdad in 2005 that has been active and has recently reported of the early suspected cases of Cholera during the recent outbreak. The clinic is in the green area and in 2012 initiated a mobile medical clinic in the Baghdad district which is attached to the stationary clinic. In addition, in 2013 HOME became active Kurdistan, particularly Erbil and Dahuk. HOME is now an approved NGO in that country providing medical relief to the large number of refugees. Currently, HOME is initiating a mobile medical unit service in Kurdistan.
2. Egypt: HOME has had various activities in Egypt including a mobile medical unit in Upper Egypt (Sohaq - Assuit) as well as several nursing and medical training programs. HOME has supported several charitable hospitals including Harpur Memorial Hospital in Manuf. In 2016, HOME will be initiating a large campaign for Hepatitis C and other infection prevention programs with emphasis on holding the transmission of Hepatitis C particularly within the healthcare system.
3. Jordan: After the Gulf War (in the early nineties), HOME has supported the Hope Iraqi Refugee Clinic in Amman, Jordan and the Al Noor chest disease/TB sanatorium in Mafraq, northern Jordan. HOME has sent physicians and nurses to help Al Noor hospital that sees a large number of patients with Tuberculosis and multidrug resistant Tuberculosis from the whole area, particularly more recently from Syria and previously from Iraq. In addition, HOME has supported a clinic in Zarka which has been reaching out to thousands of Syrian refugees on a monthly basis.
4. Lebanon: HOME has supported several charity clinics after the cessation of the Lebanese conflict in the early nineties. In 2006, HOME launched a mobile medical unit that went to all rural areas and became highly active with the influx of the large number of Syrian refugees to Lebanon from 2012 up to this day. Furthermore, in 2013 HOME initiated (supported by a grant from the South Korean government) the HOME Elpis Clinic in Beirut to reach out to a larger number of Syrian refugees.
5. Mauritania: Through its director Dr. Amanda Beatsy, HOME has been supporting the fraternity hospital in Chinguetti (northern Mauritania). More recently, HOME has been recognized as an NGO in Mauritania and Dr. Amanda was asked to direct that hospital. This humanitarian effort has been largely supported the US ambassador in Mauritania, Mr. Larry André Jr. Furthermore, HOME will be collaborating with the current Mauritanian Minister of Health and officials in Mauritania on controlling the spread of Hepatitis B in that country.
6. South Sudan: HOME is official in South Sudan and has a clinic in Juba as well as a mobile clinic. Both clinics were active particularly recently during the difficult events that South Sudan has been going through.
7. Syria: HOME has supported for more than a decade the Tabaleh Clinic in a suburb of Damascus under Dr. Edward Awabdeh. This polyclinic has been highly active particularly during the recent crisis with receiving between 1,500 to 2,000 patients a month, people from all background, particularly those who have been displaced within Syria itself.
8. West Bank: HOME has had mobile medical activity in the West Bank through the help of local Palestinian physicians.

III) WHAT NEEDS TO BE DONE

Given the catastrophic implications of these infectious disease epidemics in the Middle East both at the regional and the global level, a concerted collaborative effort needs to be initiated that joins governmental agencies (such as USAID, CDC and Peace Corps) on one side with NGOs that include Middle Eastern-American groups that are working in the area. We, therefore, suggest that a special campaign that aims at controlling these infectious diseases should be initiated through the following mechanisms of action.

1. Meeting of All Relevant Congressional Committee Chairs: We believe that these infectious outbreaks in the Middle East (including the emergence of polio and multidrug resistant tuberculosis) require immediate action. We suggest that the chair of this subcommittee convene a meeting of all relevant committee chairs (including the Health Subcommittee) to devise a policy and plan of action. These outbreaks should be dealt with in a similar serious manner like the Ebola outbreak in West Africa in 2014-2015.
2. USAID: NGOs, particularly those working in the area and having a Middle Eastern-American identity, should be encouraged to work with USAID and be given special eligibility status for grants as long as these NGOs are willing to maintain a neutral nonpartisan position and adhere to the US guidelines in a nondiscriminatory distribution of resources.
3. CDC: The CDC is to be encouraged, supported and funded to help deal, in coordination with USAID and the NGOS, with many of these outbreaks. The efforts of the CDC in controlling Hepatitis C in Egypt and its current efforts to control Hepatitis B in Mauritania are to be continued to be supported with encouragement to work with local Middle Eastern-American NGOs working in all of the areas outlined above.
4. Peace Corps: In 2011, the Peace Corps has launched a campaign to control malaria that grow out of the malaria prevention programs in Senegal. This campaign now includes volunteers working in 24 African countries. Something similar should occur to control infectious diseases in the Middle East. The Peace Corps are to be encouraged to work with the Middle Eastern-American NGOs serving in the area and closely collaborate with them as the "medical peace ambassadors" to the Middle East.

The campaign to control these infectious outbreaks should stand on these two foundations of the governmental agencies working closely and providing grant opportunities to the NGOs particularly the Middle Eastern-American medical health NGOs in coordination with WHO with emphasis on the following:

1. Refugee medicine training for the local community healthcare workers
2. Early detection of infectious disease through special kits and also training of the local healthcare workers
3. Community health and water decontamination and sanitation
4. Hygiene education
5. Vaccination campaigns
6. Appropriate use of antimicrobial therapy training, particularly for the local community physicians

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Mr. SMITH. Dr. Raad, thank you very much for your testimony and specific, concrete proposals for follow-up.

I would like to now recognize Dr. Morrison.

STATEMENT OF J. STEPHEN MORRISON, PH.D., SENIOR VICE PRESIDENT, DIRECTOR OF GLOBAL HEALTH POLICY CENTER, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Mr. MORRISON. Thank you very much, Representative Smith and Representative Bera. I appreciate your leadership on this and the opportunity to be here today. And a special thanks to Greg Simpkins, an old friend, for his leadership in pulling, pulling things together today.

I worked on this subcommittee in 1987 and 1991 when Dante Fascell, Henry Hyde were the iconic leaders. I worked for Howard Wolpe, Dan Burton as the minority member of that subcommittee. And that subcommittee had enormous impact in those years. And I am very proud of that. That was the first job I had out of graduate school. And I believe very strongly in the power and impact that a subcommittee like this can have today. And thank you for your leadership and for putting a special focus on this subject.

I am going to make five points. My first has to do with health security and where this crisis in Syria and the Middle East sits. We have had a lot of discussion around Ebola, a lot about, today about Zika, a lot about the global health security agenda. We haven't situated this crisis too much that we are seeing in Syria in terms of health security.

But I would argue that what we are seeing in Syria and the surrounding region is a very grave health security crisis that is gathering force. And it will become more evident. That health security crisis in Syria and the surrounding region is going to become more evident as infectious outbreaks proliferate and as other multiple health consequences become clearer due to the dissolution of the Syrian State, the deliberate targeting and destruction of health infrastructure, including killing of health workers, and the massive dislocation of vulnerable populations.

We are going to see the indicators. Dr. Hotez, Dr. Raad both enumerated the evidence of this in terms of malnutrition, chronic disorders, maternal and newborn health, infectious diseases. And the scale is formidable. It has reached the point of really, for Syrians, we are talking about 12 million, over half of the population.

I realize this, addressing this has a special set of challenges, particularly on the security side. This is an acutely dangerous and forbidding environment. Access by humanitarian health workers has become exceedingly limited. We are operating largely in the blind in terms of data and access and surveillance, and we need to admit that. But I think the situation is changing in some important ways. So that is point one.

Point two is we ignored this problem for a while. The war started in Syria in 2011, in March. I would argue that for the first 3 years we were pretty numb, disengaged and paralyzed as a staggering and colossal human crisis unfolded in that period. The crisis was seen as too distant, too difficult, too dangerous and that perception only worsened as more and more armed radical Islamist groups

gained prominence, even before ISIS entered in June 2014. And it became more difficult as MSF, as the International Committee of the Red Cross, as other NGOs were targeted, kidnapped, threatened and harmed grievously in that period.

There was an assumption that the surrounding region, the borderlands, Turkey, Lebanon, and Jordan would absorb these populations and they would not move beyond that. That proved to be a very mistaken assumption. They took in 5 million but they quickly reached a certain saturation point, which I will say a bit about in a moment. In that first 3-year period the geopolitics around this crisis was particularly toxic: The stand-off between the United States and Western powers versus Russia, Assad, and Iran. The U.N. Security Council stepped forward and tried to address this but with a number of resolutions that were toothless and ineffectual, and did little, certainly in terms of Assad's behavior, in terms of the egregious and flagrant violation of international law in this period.

We, as a government, were preoccupied with the Iran nuclear negotiations and we were progressively seeking to lower our profile in this region. Options like safe zones, no-fly zones were explored but ultimately rejected as too risky and too difficult. We did intervene in the destruction of the chemical weapons stocks in Syria, together with the Russians. And that was relatively successful. But there was no humanitarian bounce that came off of that.

Steadily, up until recently, the numbers, the funding levels for humanitarian operations into the U.N. were cut dramatically. And that, that resulted, of course, in a humanitarian regression and undermining the status of those populations that were reached in the border states.

My third point is that the situation geopolitically has changed fundamentally. And we ought to, we ought to take account of that. And I will explain what I mean.

I think that the geopolitical change has in fact pushed health and health security to the forefront of the stage, and it has created some very early opportunities potentially. The tipping point came, of course, as Turkey, Lebanon, and Jordan reached their saturation point, as the monies coming in on humanitarian operations were reducing, and as the Syrian populations both in those settings and inside Syria made a dramatic calculation in 2015 to embark straight off for Europe. So the numbers of Syrians moving went from 100,000 in 2014 to ½ million in 2015, accounting for roughly half of the population.

And those flows are continuing today. We are expecting fully 1 million more migrants this year into Europe, if not more, with a heavy share of those coming out of Syria. That, of course, has become a destabilizing factor. Just look at what's happening in Europe. Look at what's happening in Austria and the Balkan states where there is a, basically, they are freezing up the free flow of populations, refugee populations. Greece is becoming a black box, a holding operation. The politics are broken of the EU. And it is becoming an utterly untenable and destabilizing situation.

The geopolitical situation changed in two other very important respects: ISIS entered the region in June 2014, displaced 3.2 million people, took under its control roughly 8 to 10 million, and

then, of course, you had the Russians enter in September of last year and begin the aerial campaigns from Syrian bases, which drove, up to now have driven 300,000 to 400,000 people up to the Turkish borders and systematically targeted hospitals, clinics and other facilities.

So why is it now possible to think a little differently about the health crisis in Syria and the surrounding region? The process, the context has changed. The U.S. is now working with others in aggressively trying to achieve a cessation of hostilities and expand humanitarian access to the besieged and those difficult to reach inside Syria. And that is about 4.5 million people. Right now the aim this week is to reach 150,000 in besieged cities and to continue on that trajectory to reach 1.7 million by the end of March.

We don't know if that is possible. It is supposed to be done under joint U.S.-Russian oversight. We know this is a very perilous undertaking, but if it is successful it will create new windows for restoring capacities, including basic services and immunizations.

We are pressing at this same time to accelerate negotiations over national transition in Syria and expand support dramatically to the front line states, Turkey, Lebanon, and Jordan. February 4th was the astonishing summit in London which took in pledges of $11 billion, $6 billion in 2016 alone, $1 billion from the United States. These are unprecedented levels. And it is a stark reminder of just how geopolitically important this crisis has become, that you could have something like this happen.

Money is not the barrier. The barrier now is becoming access, vision, political leadership and capacity.

My fifth and final point is that there is more that the U.S. can do. The U.S. has been very generous on the humanitarian front. We have invested over $4.5 billion into the humanitarian response to this crisis since 2011. We are carrying 50 percent of the freight. But there is more that we can do. And let me just say a few specific things.

We need to get U.S. public health experts closer to the problem on a long-term and continuous basis. Right now in the cholera outbreak we were channeling volunteers, we were channeling temporary employees into UNICEF and WHO. We should continue that. We should step that up. But in order to be really effective in this next period we need a hub within the region, perhaps in Jordan, a continuous presence charged with coordination, quick response, and building relationships across the region.

This is an essential step to enlarge the U.S. region influence and to be better positioned to get smart about what is going on inside Syria, and to build the relations with the front line states, and address the security, the health security threats we are talking about.

There is much more that we can do to support Turkey, Lebanon, and Jordan. They have serious health security needs but there is access and opportunity to do that. We have not framed this in terms of the global health security agenda. I am arguing that we should think about that. We should think about planting this within that vision. That is a way to get assessments going. That is a way to leverage the G7. That is a way to offer an international framework around this. It has not been applied typically to situa-

tions as dangerous and complicated as this, but there is no reason why it could not be.

Lastly, the U.S. is not in a hegemonic position to drive events. We are in a position to be very influential. But we are not going to be the hegemon as this health security crisis grows.

Russia has established itself as a major driver. It has been a major contributor to chaos, dislocation and suffering. It has weaponized refugees. But it appears that there are some changes going on and we are going to have to move forward aggressively to rebuild capacities with the Russians, the Saudis, the Turks, the Iranians. We are going to have to rely very much upon our friends at the International Committee of the Red Cross, MSF, Doctors Without Borders, Syrian Red Crescents, courageous groups like the Syrian-American Medical Society which has done remarkable work.

So thank you very much, Mr. Chairman, for your patience.

[The prepared statement of Mr. Morrison follows:]

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

Statement before the

House Foreign Affairs Committee

Subcommittee on Africa, Global Health, Global Human Rights, and International Organizations

"The Growing Threat of Cholera and Other Diseases in the Middle East"

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"The Growing Threat of Cholera and Other Diseases in the Middle East"

Mr. Chairman, Madam Ranking Member and other Members of the Subcommittee, I am grateful and honored to speak here today. Thank you for the opportunity.

I understand that while you have an important specific interest in the recent cholera outbreak in Iraq, you also have a broad interest in the acute health security threat posed by infectious outbreaks across the Middle East.

Before discussing details of the recent cholera outbreak in Iraq and efforts to combat it, I wish first to comment very briefly on how the rising threat of infectious outbreaks in the region -- the most recent cholera outbreak along with outbreaks of measles, polio, tuberculosis and other infectious diseases -- stems from the widening disorder and human crisis that is steadily unfolding in the Middle East and North Africa. I will direct much of my focus on Syria.

That disorder is part of a broader global phenomenon: the advent of a dozen new wars in the past five years, atop several chronic unresolved wars, has generated over 60 million refugees and displaced persons, the highest levels since just after World War II.

The disorder has its roots in the wars that followed 9/11, most notably the 2003 invasion of Iraq, as well as the failed Arab Spring, which saw the dissolution of sovereign states in Syria, Libya, and Yemen. In each, there emerged violent and chaotic fragmentation, a fluid competition among diverse armed non-state groups, and the rise of radical Islamist groups, most notably ISIS's dramatic arrival in Syria, Iraq and Libya in mid-2014. To varying degrees in each, there has been flagrant disregard for the neutrality of humanitarian operations and the deliberate targeting, most egregiously in Syria, of health workers and health infrastructure.

It is critical to give special emphasis to Syria, given the colossal magnitude of the human crisis there, the severity of the worsening health situation, and how woeful health data is, given the breakdown of systems, limited access and rampant insecurity.

Most recent estimates by the Syria Policy Center report that over 470,000 have been killed and 1.9 million wounded in the Syrian conflict. UNHCR estimates there are now over 4.7 million registered refugees, while IDMC reports 7.6 million internally displaced persons within Syria, of whom 4.5 million are very difficult to access and close to 500,000 living in protracted besieged circumstances, cut off from virtually any medical services. An estimated 900,000 Syrian refugees have entered Europe.

Infectious disease outbreaks have proliferated: measles, diarrhea, typhoid, leishmaniasis. 35 cases of polio were reported in 2013, one case in 2014. A WHO polio official reported in January 2015 that at the time of the outbreak, an estimated 500,000 children under five in Syria had not been vaccinated against polio in over two years.

That vulnerability to renewed polio outbreaks persists despite the success of the Global Polio Eradication Initiative (GPEI) in staging a dozen polio immunization campaigns following the 2013 outbreak. This major achievement, effectively curbing up to now further outbreaks and export of polio cases, was a testament to the determined response of WHO, UNICEF, the Syrian

Arab Red Crescent, local health workers, volunteers and civil groups. Concerted pressure upon the Syrian government from Syria's neighbors, major powers and international bodies was essential.

The Syrian American Medical Society estimates that there have been 300,000 deaths from chronic diseases due to a lack of access to basic treatment and drugs. WHO reports that fully half of the public hospitals are either damaged or destroyed, while PHR projects that of Syria's estimated 30,000 medical doctors prior to the civil war, over half have fled the country.

Now is a particularly compelling moment to address the rising health security threats in Syria and the surrounding region.

It comes in the midst of the current urgent focus in U.S. policy on how to achieve a cessation of hostilities and expanded humanitarian access to besieged populations, cut off from relief, basic health services and critically important immunizations.

It comes as the United States presses to accelerate negotiations over a national transition and advance efforts to shore up the borderlands – Turkey, Lebanon and Jordan – and improve the health and well-being of Syrian migrants there.

And it occurs as the United States and others struggle for more humane and feasible means to manage the massive outflow to neighboring states and beyond to Europe of hundreds of thousands of desperate and vulnerable Syrian victims of this exceptionally heinous and vicious war.

All of these factors contributed to the extraordinary outcome of the February 4th meeting in London, which recorded $11 billion in humanitarian pledges towards Syria and the surrounding region, $6 billion in 2016 alone. These levels are unprecedented. If these pledges are fulfilled, money will not be a major constraint. Political will, health delivery capacity and insecurity will likely be the principal barriers.

In my opinion, a grave health security crisis continues to gather force in Syria and the surrounding region. It will likely worsen before it abates, and it requires higher, concentrated attention by U.S. policymakers and others. At the conclusion of this paper, I offer a few concrete ideas on what more might be done.

The 2015 Cholera Outbreak in Iraq

Between September 2015 and January 2016, a major cholera outbreak occurred in Iraq. Most recent WHO figures report 4,864 confirmed cases of cholera throughout Iraq across 17 governorates.

Cholera is endemic to Iraq, with cholera reservoirs in several locations around the Euphrates and seasonal outbreaks during the summer months occurring as far back as 1966. There have been other recent major outbreaks in 2007 and 2012.

Whereas previously outbreaks have been predominantly in the north, this outbreak occurred in the southern regions of Iraq. South and central Iraq had not previously experienced a cholera outbreak of this scale.

The increased scale of internally displaced persons (IDPs) and refugees contributed substantially to the outbreak. In Iraq, UNHCR reports that more than 3.9 million people have been internally displaced—including over 1 million school aged children—with 87% of IDPs coming from three governorates, Anbar, Ninewa, and Slah al-Din. In addition to IDPs, Iraq also hosts over 220,000 UNHCR-registered Syrian refugees. These populations, highly mobile and difficult often to track, are themselves cholera-vectors who can fuel cholera's spread

Cholera, a bacteria found in contaminated water supplies and spread in places with inadequate water treatment, poor sanitation, and inadequate hygiene, thrives in severely disrupted environments. On June 2, 2015, ISIS closed the gates of a dam in Ramadi, reducing the level of the Euphrates River and causing water shortages and increased salinity downstream as far as Basra Governorate. After reopening the dam, the water supply to southern Iraq was contaminated and of extremely low quality. Further, ISIS has deliberately targeted and destroyed vital civilian infrastructure, including water treatment facilities.

The Iraqi Government Response

The Iraqi Ministry of Health, in conjunction with WHO and UNICEF, undertook a countrywide oral cholera vaccination (OCV) campaign, as well as increased public health education and preparedness activities through a UNICEF-driven WASH (water, sanitation, and hygiene) campaign.

WHO and UNICEF played critical roles in the monitoring, evaluation, and documentation of vaccine distribution, as well as vaccine campaign logistics and preparation.

The immunization campaign was not intended to halt the outbreak per se —the vaccine does not "cure" cholera, it merely confers future immunity to the disease with a 65% efficacy rate. The campaign aimed to mitigate the risk of future outbreaks among highly vulnerable populations.

The vaccination campaign complemented the WASH campaign already underway, which was aimed at increasing access to safe drinking water and promoting proper hygiene.

Two oral cholera vaccine (OCV) immunization campaigns were undertaken—one in November and a second in December—that focused primarily on camps that house Syrian refugees and Iraqi IDPs. All individuals over 1 year of age in these targeted camps received two doses of OCV. In total, the campaign vaccinated approximately 255,000 individuals in 62 camps across 13 governorates.

The vaccination campaign required 510,000 doses of OCV, causing a significant depletion to the global OCV stockpile.[1]

In total, 13,000 vaccinators and 650 social mobilizers were participated in the campaigns. The effort was successful, with no reported cases of vaccine refusal and vaccination coverage of over 93% among the target population. On January 8, 2016, WHO declared the end of the Iraq cholera outbreak.

It is important to note that the WASH campaign and the onset of winter season were the most significant factors which stopped the outbreak, and that additional outbreaks are expected when next summer commences.

The WASH campaign consisted of several public health education and preparedness activities, including a nationwide dissemination of information on safe water and good sanitation, distribution of bottled water, water kits, hygiene kits, and chlorine tablets, and conducting targeted sanitation improvements

Fears of a regional cholera epidemic—especially after reported cases of imported cholera in Oman, Iran, and Kuwait—never came to pass. WHO reports that no confirmed cases of cholera were identified in Syria, although large areas of northern Syria are inaccessible to international monitors and aid agencies. Likewise, the December "arbaeen pilgrimage" to Najaf and Karbala, Iraq did not result in any significant uptick in cholera cases.

Continued High Concerns over Syria

Unlike Iraq, cholera is not endemic to Syria and long-standing reservoirs of the bacteria do not exist. Fears of major disease outbreaks persist, however, tied to massive conflict-driven population movements across much of the country, coupled with the degradation or destruction of medical facilities throughout northern Syria.

Data on northern Syria remain elusive, since it is so difficult to conduct proper disease surveillance there, whether the territory is under ISIS, government, or militia control. If there is a cholera, polio, or measles outbreak in northern Syria, mounting a response will be exceedingly difficult. The risk of a regional epidemic remains high.

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[1]. The OCV stockpile was created between 2013 and 2014 to help control cholera epidemics, with 3 million doses in storage produced by a single pharmaceutical company, Shantha Biotechnics. It is overseen by the International Coordinating Group, which consists of IFRC, MSF, UNICEF, and WHO. In January, 2016, WHO approved a second OCV manufacturer, EUBiologics, to double the vaccine stockpile to 6 million doses

CDC's Contributions to the Iraq Response

The CDC's technical support in Iraq, through secondments of CDC experts to UNICEF and the World Health Organization, has helped strengthen the outbreak response. This was achieved through several streams of work:

- Improving the analysis and understanding of epidemiological data, including providing spatial and longitudinal analyses of the disease spread
- Assisting with the WASH campaign by visiting highly affected areas, attempting to understand the underlying causes of the outbreak, and helping expand WASH communication efforts
- Assuming a coordinating/mediating role between international actors, particularly between UNICEF, WHO, and the Iraqi government
- Supporting the monitoring and evaluation of the two OCV campaigns
- Encouraging the Iraqi Ministry of Health to be more transparent with their water quality and epidemiological data

Looking Ahead

There continues to be significant vulnerabilities to dangerous infectious outbreaks in Syria, Iraq and the surrounding region.

Rates of diarrheal diseases remain high, which could both contribute to disease outbreaks such as cholera or polio and generate significant malnutrition in the future.

The recent cholera vaccine campaign, although successful, is not a durable solution. Iraq needs significant investments in water and sanitation infrastructure to truly prevent future cholera outbreaks.

The success in launching a dozen polio campaigns inside conflicted areas of Syria proves the important point that with sufficient will, capacity, resources, and local partners, it is possible to navigate much of Syria's dangerous terrain.

There continues to be good reason to be very concerned about northern Syria, and the potential for either a disease outbreak or case importation into that area. Such a scenario could prove very costly for both the immediate region and Europe if cases were to be exported through refugee flows.

The outstanding U.S. policy issue is whether and how to strengthen the U.S. presence and engagement in the region to control outbreaks in Syria, Iraq and the surrounding region.

There are a few options which deserve serious consideration.

First, there could be an expansion of the secondment of US expert personnel to UNICEF and WHO to provide technical support on the ground.

Second, a base of U.S. public health expertise could be established in Jordan that would provide a continuous presence, charged with heightened coordination of U.S. contributions, quick response capacity, and intensified efforts to leverage relationships across the region. This would greatly extend the United States' reach and influence beyond the rotation on short-term assignments of U.S. personnel into the region.

Third, putting expanded U.S. efforts under the Global Health Security Agenda framework matched by additional resources could be very valuable.

We have learned from Ebola in West Africa and now Zika in the Americas that health security threats matter fundamentally to U.S. national interests and that they require a quick, smart response, in league with national governments, international bodies and non-governmental groups. They require resources and a plan of action over several years. We have learned that the Global Health Security Agenda provides a very valuable framework for assessing needs and steering investments in building essential capacities, as well we motivating other partners to join the fight and embedding the agenda into the priority work of the G-7.

Closing

Syria and the surrounding region simply cannot be ignored on health security grounds. It should be a high priority, matched by stepped up U.S. engagement. As dangerous and fluid as the situation is -- far more dangerous, I admit, than West Africa or the Americas -- there is much more the United States can and should do to establish a standing U.S. technical field presence in the region, improve data and surveillance, build capacity in partner states where it is possible, especially in Turkey, Lebanon and Jordan, and be poised to exploit openings as they appear in Syria and Iraq.

Thank you.

Figure 1: UNOCHA: MENA and Afghanistan/Pakistan Overview

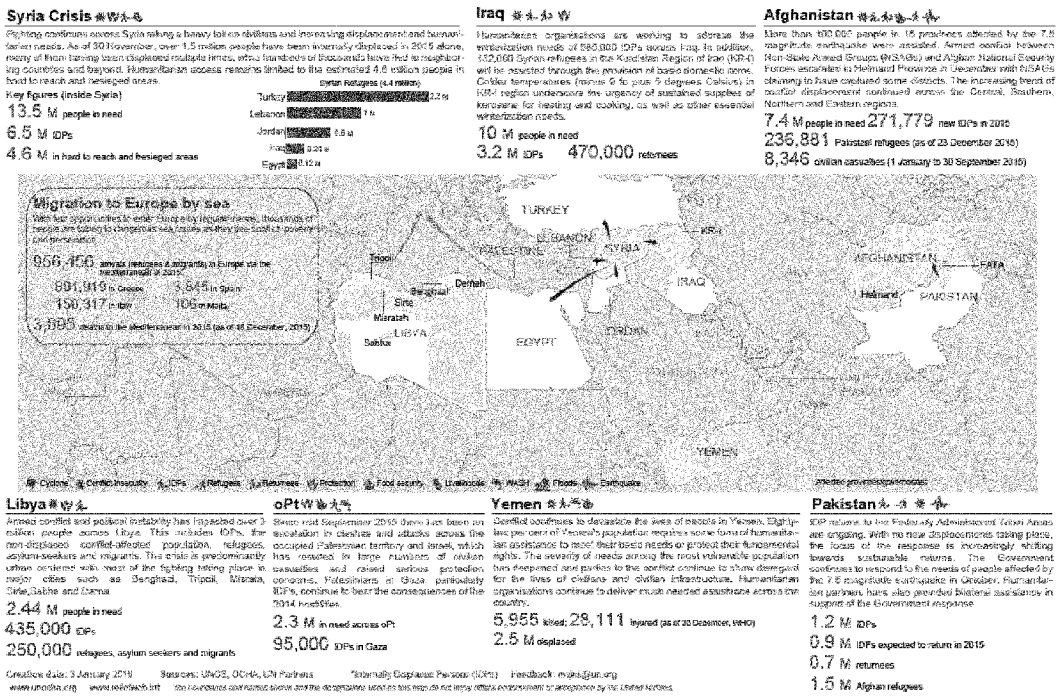


Figure 2: UNOCHA: Hard-to-Reach Populations in Syria

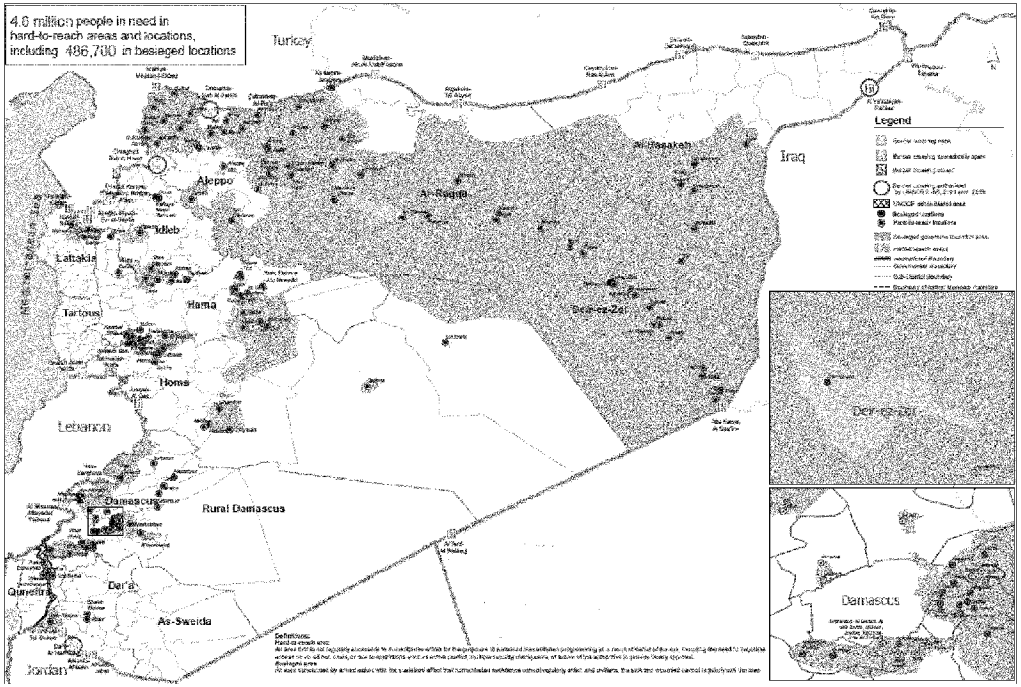


Figure 3: UNOCHA: Syria Refugee and IDP Overview

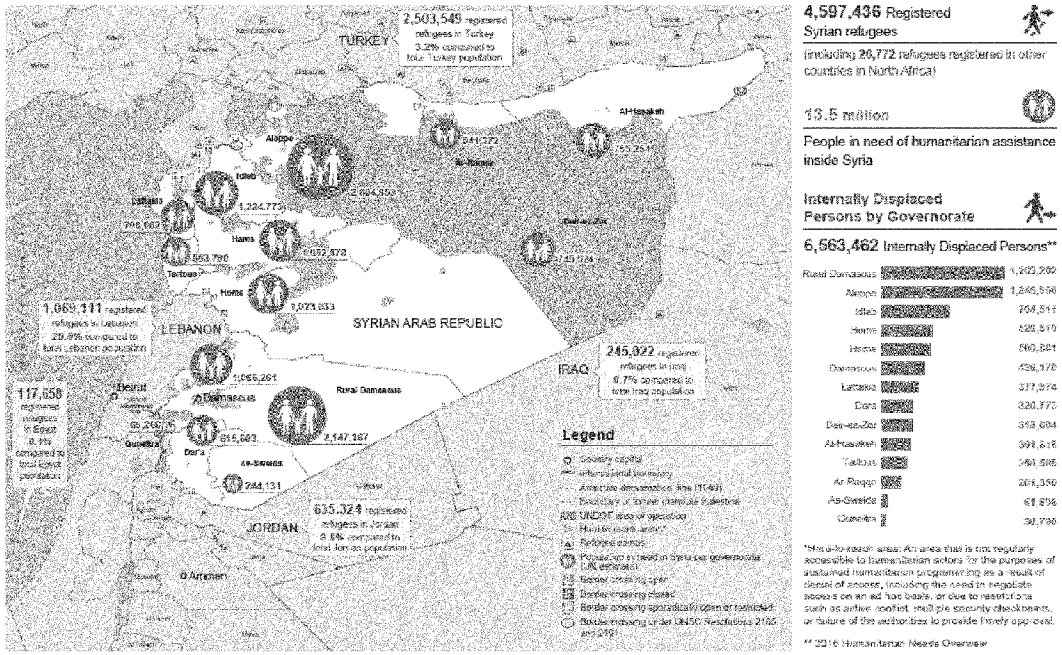


Figure 4: PHR: Attacks on Health Targets in Syria

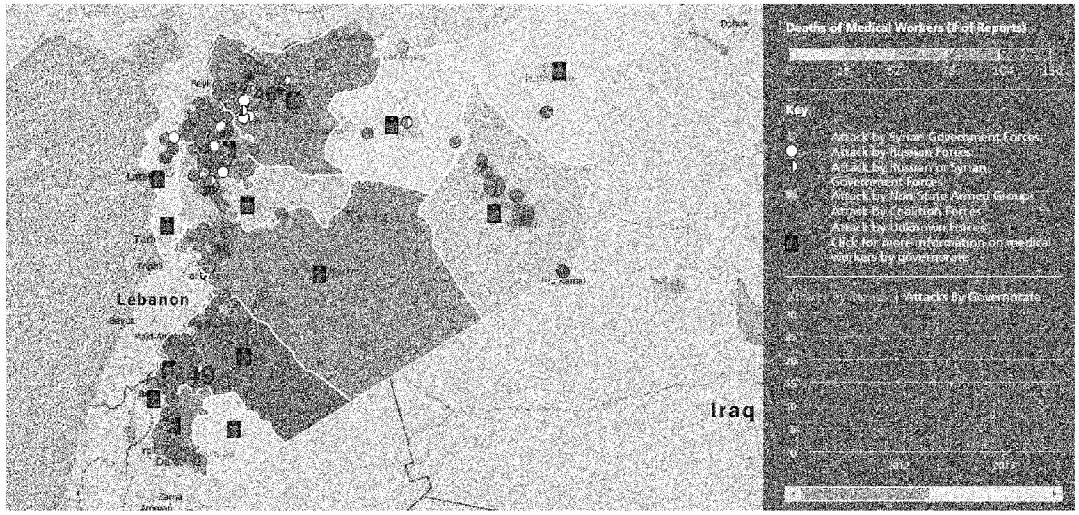


Figure 5: UNOCHA: United Nations Funding Appeals

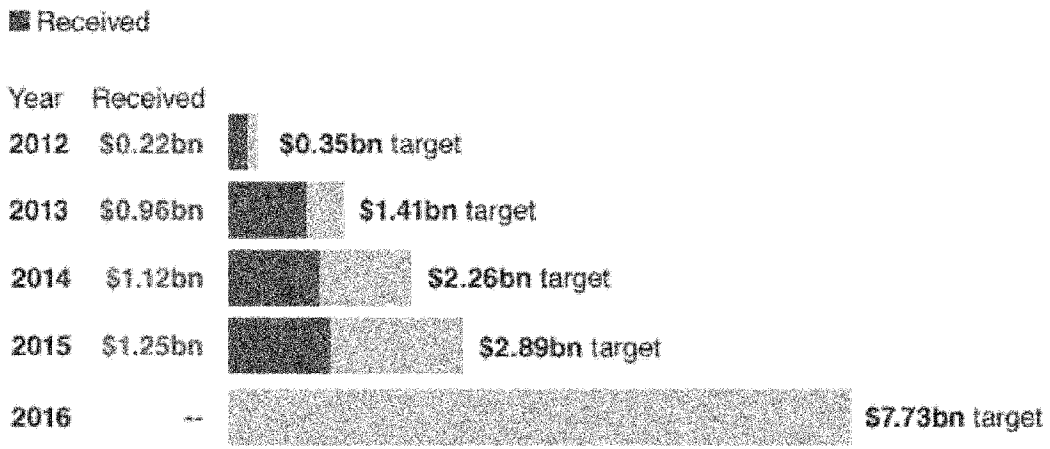
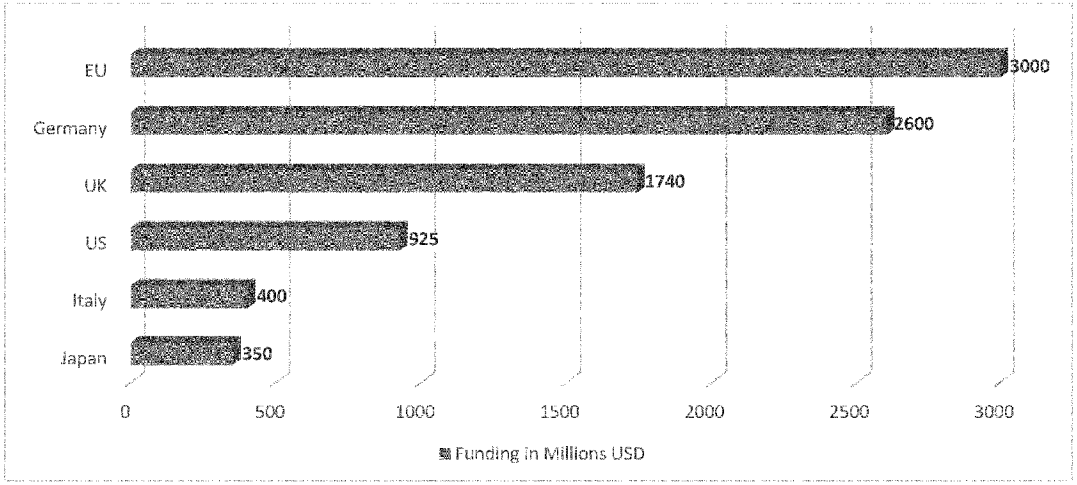


Figure 6: UNOCHA: February 4th London Conference International Pledges



Mr. SMITH. Dr. Morrison, thank you for your insights, your leadership all these years. And I am sure you miss being here on this side of the dais.

I do have a couple questions and I will probably come up with a few more that we might submit in writing. But to begin with, Dr. Hotez, how many vaccines do you have under study at the Sabin Institute?

Dr. HOTEZ. Thank you for that question. We have half a dozen, six vaccines now. So for hookworms, schistosomiasis, leishmaniasis, Chagas disease, SARS, and MERS.

Mr. SMITH. And are any of those ready for deployment?

Dr. HOTEZ. Well, right now they are in various stages of product and clinical testing. So we have two vaccines in clinical trials in Africa and in Brazil for hookworm and schistosomiasis. The SARS vaccine is about to be manufactured. The other ones are at an earlier stage.

One of the big problems that we face, of course, is funding. So there is not a real push mechanism of funds that go to product development partnerships. These non-profits fall through the cracks. They use industry practices, but because they are not registered as small businesses or businesses, we don't benefit from the SBIR mechanism for instance. And whereas the Dutch Government, the German Government has now specifically started funding PDPs specifically, and the Japanese as well, it is not really done in the United States. So it is a gap that could be addressed through the Center of Excellence concept, the neglected disease legislation, or we need more mechanisms like that.

Mr. SMITH. Now, with leishmaniasis you mentioned that there is a need for a vaccine?

Dr. HOTEZ. Absolutely.

And there is proof of concept that it is quite possible. Because what the locals do is quite interesting. They will scrape the lesions of somebody who has leishmaniasis and inject it into the buttocks of their kids to prevent them from getting, prevent them from getting a disfiguring scar on the face. It actually was discovered by the ancients. It predates vaccination. It's called leishmanization. But it shows you that you can make a vaccine.

Now, we can do better than doing that. So and you can do it by genetic engineering, making a recombinant vaccine. And we have done it now in the laboratory. Now it is a matter of getting the support for scaling it up.

Mr. SMITH. What would it take to scale it up? I mean what kind of money are we talking about?

Dr. HOTEZ. Well, we are looking at around $5 million to really move it into clinical trials.

And that is the incredible thing about this, it is, you know, it is not billions, it is not hundreds of millions, it is not even tens of millions, it is 10 to the 6th dollars, not 10 to the 7th or 10 to the 8th or 10 to the 9th. So the funding needs are so modest, and yet it is just not there.

Mr. SMITH. One of the reasons why I have introduced the End Neglected Tropical Diseases Act is because it really does take a modest amount of money to have a spectacular impact.

I would note parenthetically that for the second year in a row the administration's budget has looked to cut the neglected tropical disease budget. And, thankfully, in a bipartisan way we have been able to get the appropriations at least at level funding at $100 million. But it was a 20-percent cut now 3 years in a row, that too, which is very disconcerting from my point of view in terms of prioritization.

Dr. HOTEZ. And especially since the U.S. Government is getting so much bang for its buck. Through that, through that $100 million a year you are eliminating three diseases. I mean where else in the U.S. Government can you get that kind of impact?

Mr. SMITH. Exactly.

Let me just ask you, Dr. Raad, on MERS-CoV. You talk about how it is spreading, 36 percent mortality rate. You know, I am always, we are all I think thinking, you know, after World War I the misnamed Spanish flu, obviously the incubator for that had to have been the degradation caused by World War I. Is this one of those possible diseases, illnesses that could spread and become a pandemic? We know it is local and it is causing a huge amount of sickness and death. But looking at all of these diseases, including that one, what are your thoughts on that?

Dr. RAAD. Yeah, the South Korean outbreak is the best example of the global spread of MERS. And seeing MERS cases not only in the region but beyond, beyond the region. So, and it is a coronavirus. It is, as you well know, SARS is a coronavirus and had a global spread. So there is always that concern that it could have a global spread.

Again, the good work of my colleague Dr. Hotez as far as vaccination would be very important, because at this point all that we provide for MERS is supportive care. And this is why we have the high mortality rate associated with it. But also early diagnosis and to be on the alert.

And I think MERS is part of the bigger picture of the Middle East. The Middle East needs special attention for as far as infectious diseases. And this can be done. And it could be done as part of this concerted effort but also could be part of a, as I am talking here to your subcommittee which is part of the Committee of Foreign Affairs, part of the medical diplomacy to reach that area. Because the uniqueness of the United States is that we are not just providing a activity on the ground like the Russians are doing, and as Dr. Morrison has mentioned, in terms of a force, but providing also a solution to some of the devastating problems, including these epidemics and solution for refugees.

So I think there needs to be a concerted effort with special attention that the NGOs, governmental agencies, groups working, like my two colleagues here, to reach out to the region.

Mr. SMITH. And I do thank you for your idea of bringing other relevant chairmen and subcommittee chairman together. I think that is an excellent idea that we will look to follow up.

Dr. RAAD. Thank you.

Mr. SMITH. Let me ask you with regard to the bioterrorism you spoke about, the chlorinization has discontinued.

Dr. RAAD. Yes.

Mr. SMITH. Is that one of the casualties of war or why would, why did that happen?

Dr. RAAD. Well, it is one of the casualties of war. The whole healthcare system, if you may, and the sanitary system has collapsed. Syria, as you well know, the basic, basic needs basically of the people are non-existent. And I would dare say from reports of our colleagues in Baghdad, the same is true, is happening within Iraq. Baghdad is in chaos.

And I have some of the slides that I sent where people are going to wells that are already contaminated to provide drinking and sanitary water.

Mr. SMITH. Dr. Morrison, you note that ½ million children under 5 in Syria have not been vaccinated in more than 2 years. Is there a danger of unrestrained polio? Is that imminent in your view?

Mr. MORRISON. There is a risk. There is a continuous risk of further outbreaks of polio. There were 35 cases of polio in 2013. There was one case in early in January 2014. There were concerted efforts undertaken by a consortium of groups under the Global Polio Eradication Initiative that have resulted in 12 campaigns, 12 immunization campaigns that have been undertaken. And that is a remarkable achievement given the gravity of the situation and the dangers involved and the intensification of the war itself.

The fact that polio has been contained through those efforts, however, doesn't leave me completely confident that we are not going to see more outbreaks, more cases as this conflict continues. And I think there has to be, and there is, pretty concerted vigilance across the region.

No state within the region wants to see the reintroduction of polio into its borders. When that first case happened in 2013, there had not been a case of polio in Syria in 14 years before that. And this was a country that had managed its campaigns very competently, very effectively across a range of immunizations. And but that is broken now. And we know the hazards.

So I would say a need for high, continued high vigilance. But also, you know, an awareness of the achievements we have seen in the last period in reacting to those 2013 outbreaks.

Mr. SMITH. Dr. Hotez, you mentioned that the Hajj has had an impact on the spread of dengue and you raise concerns about the Zika virus potentially being spread that way. Do the clerics, do the leaders of Saudi Arabia understand the potential pitfalls, is there a plan of action that could be used to mitigate that?

Dr. HOTEZ. Yes. Yes, to the first part. But I think they are mystified about where to go from there in terms of restricting. Because one of the problems that you have with Zika is that many times you are without any symptoms at all. So you are going to have people coming in carrying the virus in their bloodstream without showing any manifestations. So it is not like we could check them at the Jeddah airport and say don't come into the country.

So this is going to be a real problem. We are going to see this. And the Hajj I think is occurring late in the summer or early fall this year, and that is going to be a huge issue.

Mr. SMITH. I mentioned earlier the targeting of so many medical personnel. Well, now that there is a cessation of hostilities—of course it doesn't apply to ISIS or to al-Nusra—but my question

would be are the medical doctors, the healthcare workers streaming in during this lull in hostilities, knowing that there are grave risks to them and that these hostilities could recommence at any moment?

Dr. RAAD. All of this has escalated to a tremendous number of healthcare workers, particularly physicians, immigrating and leaving the country with the exodus, and left basically. So the best policy is to work with the local people. And as long as we are working with groups that are neutral, non-discriminatory, and doing the work on the ground, and to strengthen.

And I think there is something similar to the healthcare, originally the health strengthening bill that was there for Africa, something similar should be done for the Middle East and to work with local groups on the ground in order to retain them. Because the healthcare workers are like anyone else basically in the midst of a catastrophe, and particularly when they are targeted.

We had difficulty having a mobile medical unit in Syria because it would be either shelled or basically and the people would be killed. And then the mobile medical unit would be taken over to be used to kind of transport weapons and so on. So I think the most important thing is to work within the system collectively and try to strengthen the healthcare system.

Mr. MORRISON. I don't think you are going to see a sudden return. Well over half of the 30,000 doctors that were in Syria prior to the advent of the war on March 11th are gone. And they are not coming back. And you have had over 800 healthcare workers murdered in this period. You have had the deliberate targeting your infrastructure. Fully half of your infrastructure is either destroyed or just non-functional at this moment in time.

So I think what's like—and the security threats remain very grave and very fluid. So I think what you are going to see is a step by step incremental reintroduction of personnel with heavy security guarantees around this. The U.N. convoys that have been going in in this last few days, into the five or six besieged cities, some in the government territory, some in opposition control, these are trying to get to those 15 sites where you have got 450,000 people who have been cut off for months and months and month, those are being done with very heavy preparation, very heavy concerns around security.

I might add one other thing. You have Deir ez-Zor, you have the city out in the east that is besieged by ISIS where you have got 200,000 people. There the airlifts are being attempted to reach that population. They are having serious problems with those. And, of course, airlifts are terribly expensive and not particularly effective oftentimes. But that is another measure of how desperate that population is.

But to get Syrians back in and to get international health personnel to go back in you are going to have to lay a pathway down in which their security is going to be guaranteed and protected. This is a much bigger challenge even than trying to get the hundreds of health workers who were needed to go into the three Ebola states in 2014 who were terribly worried about evacuation should they become infected or at risk, or if they perhaps infect.

So we face big challenges. There are a lot of very courageous people in civil groups and that have stayed behind in ad hoc facilities who are doing cross-border operations, who are working from the side of Damascus. The Red Crescent has lost hundreds of people in this period. There are many courageous people who have stayed to try and keep the lights on. And they deserve a great deal of credit.

Dr. HOTEZ. I agree with all these points. I would like to make the additional point that Ebola was relatively easy to contain because it was contained in a relatively isolated area of West Africa.

Look where the Middle East is, it is at the crossroads of Asia, Europe, and Africa. We are already seeing the expansion into southern Europe. Dubai is one of the busiest airports. We are going to be seeing widespread dissemination across into Pakistan and India, and then into sub-Saharan Africa.

So in terms of priorities in the global health security agenda, I think the Middle East has to be one of the most important because you are going to see this continuous seeding of three continents with infectious diseases. And we are already seeing the beginnings of that.

Mr. BERA. Thank you, Chairman. You have laid out a number of challenges that we obviously face. And if we were to start to look at these as separate challenges, but interrelated challenges, and one challenge is in the refugee camps, whether you are looking at Jordan, Lebanon, or Turkey, and how we approach those challenges where safety may be less of the risk, but the conditions under which people are living clearly is a risk and an incubator of sorts where, if you do have an outbreak things could travel fast. So I would segregate that and think about how we address some of that challenge.

Looking internally in Syria or occupied areas within Iraq, safety becomes an issue. The infrastructure, Dr. Morrison, you pointed out some of the infrastructure that has been decimated certainly becomes an issue. And how you get healthcare personnel in there may not be as feasible, but how you work with the individuals that are still there and the infrastructure there may be a different challenge in how you address that.

And then we have been talking a little bit about MERS and so forth. And, again in, folks that may be traveling to the Hajj and then traveling back to their home countries, how you work, whether it is MERS or dengue or Zika virus, how we work with the infrastructure in Saudi Arabia and a country like that. So folks that are coming there maybe perhaps getting exposed and then returning to all parts of the world how we work.

And that is I would think about it in three separate ways where you may have slightly different solutions. And maybe, Dr. Morrison, if you want to start?

Mr. MORRISON. Thank you, Dr. Bera. I think those are great points. A few, a few thoughts on that.

One is to keep in mind the demographic transformations going on within the region. Syria before the war was 23 million people. Syria today is roughly 17 million, and continuing to empty. I do not believe, given how devastated this country is, and how you have seen the dissolution of sovereign power, unitary sovereign power, I do not expect you are going to see many of those who have fled

coming back any time soon, and that there has been a shift of thinking today toward those populations in Turkey, Lebanon, and Jordan working toward enabling those countries to be able to provide employment opportunities, education, housing, health services, and the like to those populations as well as their own citizens, and restabilize those societies and make it in their interests to take that step.

And you have got trade deals, you have got the EU stepping forward, this London conference I spoke to. That is a big shift of thinking and a very important one.

On the access internal to within Syria itself, I think we need to come at it from multiple directions. The WHO, UNICEF have shown extraordinary courage in their operations, though they will remain central in trying to use their legitimacy and their record and their access to move forward. But there is going to be more and more cross-border work. That has been validated and endorsed unanimously in the U.N. Security Council resolutions. And those corridors can be opened up as well.

Thank you.

Mr. BERA. Dr. Raad.

Dr. RAAD. Mr. Bera, I think you bring a very, very insightful thought into this because this is a very complicated problem with multiple dimensions and sort of moving variables. And you pointed to the fact there needs to be a strategy for the refugees and the displaced from, you know, the displaced in these countries like Jordan, Lebanon, and Turkey, versus something else respective to the areas that are inside the war zone, if you may, Syria proper, Iraq. There are certain areas where we cannot get to like where under the control of the Islamic State. So this is a red area where we cannot get to.

And then there needs to be a contemplation or part of the policy of the Hajj and the flux and the movement that has taken place and how to handle this. So I think this is why we need a team that would be looking into all of this. Because now a lot of groups are working from the U.S., and sometimes the right hand is not knowing what the left hand is doing.

And there is excellent effort, Dr. Morrison has pointed out, and great ideas that Dr. Hotez has brought into the picture, but we need to integrate this into one common strategy where in these different areas how do we act and how do it?

This is why the thought in some of these areas we have to rely on some of the either the local people or more Arab-Americans that are willing to work there, Dr. Morrison mentioned SAMS, the Syrian-American Medical Society. We are Arab-American at our work. From various backgrounds and faith value as long as they remain neutral and within representing they are a medical-diplomatic Peace Corps, if you may, of this country that are moving into this area. But it should be part of a bigger picture of the general policy that is being devised by your subcommittee and other relevant committees.

Mr. BERA. Dr. Hotez.

Dr. HOTEZ. I would just mention also the other actor in this could be the Russians, doing some cooperative medical diplomacy activities with Russia. There is precedent for that. Many people

don't realize that the oral polio vaccine most of us took as kids was developed jointly between the U.S. and Soviets. At the height of the Cold War right after the Sputnik launch the two countries put aside their ideologies and made the polio vaccine. And they cooperated to make the dry vaccs for smallpox eradication. So there is precedent for that and it would be an interesting opportunity to investigate.

Mr. BERA. Great. Thanks, Dr. Hotez.

Dr. Morrison, how are medical personnel, and actually any of the witnesses, you know, medical personnel that are not attached to, you know, that are going into this war zone, how are they perceived by whether it is the Assad regime, whether it is from the rebel fighters outside of the Islamic State, are they perceived as neutral players coming in for humanitarian need, are they are under constant threat as well?

Mr. MORRISON. In the chairman's opening statement he referenced the study by the Physicians for Human Rights. That group, as well as the International Committee of the Red Cross and Doctors Without Borders, MSF, have carefully documented and tracked what has happened in Syria, which is harrowing, which is the deliberate targeting of health personnel and infrastructure. The most egregious violence coming from the Assad government, and most recently from the Russians. But not limited to that.

And you have the introduction of radical Islamist dimensions into this as well, where it becomes actions taken against Westerners who are seen as carrying a hostile agenda, and they just happen to be operating in the health sector.

So the respective neutrality of these operations has eroded. And the degree to which the providers themselves have had their access, their access to populations and their abilities to function have narrowed significantly. They don't have the benefit that in other conflicts where you have had a legitimacy and a respect and level of protection, where even in a highly-conflicted setting you could migrate across lines. Instead you are seen as partisan, as party to one side or another, giving active support. And, in fact, serving those who are wounded who are combatants as simply implicating you, so leaving you open to being attached because it is just part of a broader combat operation.

Mr. BERA. So shifting gears, Dr. Hotez, you talked about what it would take for vaccine development. And let's take leishmaniasis. If we were to be able to appropriate the funds to do the research and come up with, you know, some of these cures or viable vaccinations, in your assessment, kind of looking at American pharmaceutical companies or global pharmaceutical companies, because you will now have to commercialize some of this, is there a market for commercialization or would it, you know, in many ways would we have to continue to appropriate those funds or through the WHO or other organizations?

Dr. HOTEZ. Thanks for that question. I think once the product is developed there is a commercial market and there is a commercialization plan. It is modest. It is, you know, it is a fraction of what some of the other vaccines are that Merck and GlaxoSmithKline makes. And even the vaccines are less than a lot

of the small molecular drugs that we all take. So it is a very modest market but it's not zero, and it should be sustainable.

Mr. BERA. Okay, great. I will pass——

Mr. MORRISON. May I just add one point,——

Mr. BERA. Yeah, please.

Mr. MORRISON [continuing]. Dr. Bera. In this last year there have been four major studies of what happened in Ebola undertaken by the Stocking panel, the Harvard-London School Panel, the National Academies of Medicine, the U.N. Secretary-General's High-Level Panel. All four of those panels, to varying degrees, identified the research and development dimension as this critical gap, one where there needs to be a mobilization of resources and a higher level of effort in order to create some kinds of platforms that would prioritize those dangerous and neglected diseases for which there is no market, and be able to get the early development accelerated through new initiatives.

And at the Davos, at the World Economic Forum earlier this year, a number of players came together to try and build on that momentum coming out of Ebola and those four studies and move it to the next stage. And that is led by the Norwegians, the Wellcome Trust, Gates Foundation, the British Government, and others. And that is, that is moving along.

And I am hopeful—Peter probably knows more about exactly what might be in store on this—but it is still in, it is still getting worked out. But at some point later in the year I think Ebola convinced us of the need for a higher level of action to correct for this and to put us on a different pathway.

Mr. BERA. And before I yield back let me thank the chairman for his leadership in making sure we do not forget about some of these neglected diseases that pop up and making sure that we continue to focus in on this.

If we use the Ebola example, we are not that far off from developing a vaccine and developing—is that a correct statement that with a concerted effort we could come up with?

Dr. HOTEZ. Specifically for Ebola now and after there was a big investment by the U.S. Government to get it launched, yeah, I think we are pretty close.

Mr. BERA. So we are pretty close.

If we were to now look back in hindsight and think about how much we spent cumulatively globally to maintain, contain and treat this last outbreak I am going to guess it is not an insignificant amount of dollars that went into that. Is that?

Dr. HOTEZ. Well, and I am sure Steve knows those numbers probably better than anyone, but the economic impact of Ebola was certainly in the billions of dollars. I am sure there is a specific number attached to that.

You can imagine what the economic impact of Zika is going to be——

Mr. BERA. Right.

Dr. HOTEZ [continuing]. On the Caribbean economy, for instance. And we are going to see this again now with the diseases coming out of the Middle East. It is already in southern Europe. What is going to be the impact now of having malaria in Greece?

So there is no question that these innovations will pay for themselves hundreds of times over.

Mr. BERA. Dr. Morrison, do you have an idea what that number is?

Mr. MORRISON. In terms of the economic costs for west Africa of Ebola?

Mr. BERA. Yeah.

Mr. MORRISON. The World Bank has tracked that cost fairly carefully and also offered projections. In the first phase of 2014–15 it was somewhere in the order of $3 billion to $4 billion, if I recall, which may not sound that much, but when you are talking about economics of this scale, these three countries have a total population of 22 million people. They are among the poorest countries in the world. That is a pretty serious setback.

And just to add to this, OECD just 2 days ago came in with estimates of what is going to happen in Brazil. And we are looking at a 4-percent drop of GDP in Brazil this year. Now, before Zika hit they were having trouble. But this can be, this can have profound impacts in an economy as big as Brazil's.

Mr. BERA. It is fair to say we will have another Ebola outbreak, whether it is this year, whether it is 2 years from now. So it is a drop in the bucket to not stop now but actually continue and finish it and come up with that vaccine and that therapy?

Dr. HOTEZ. Yeah. As we pointed out getting to launch of a leishmaniasis vaccine or a MERS coronavirus vaccine it is a few million, and the economic impacts in the billions. So anybody would tell you, any economist would tell you, it is a great investment. It is just a matter of getting those initial funds.

Mr. BERA. Well, let's go ahead and do that then, so we don't have to, you know, lose those billions on the back end. Thank you.

And I will yield back, Mr. Chairman.

Mr. SMITH. Before moving to Mr. Clawson, I appreciate you being here, the two questions: One, as we all know, incentives make the world go around. You point out, Dr. Hotez, that there are no commercial incentives to develop new tools. And you do point out in your testimony, unlike the EU and governments of Japan and several European countries, the United States Government does not specifically fund initiatives that support product development partnerships, or PDPs.

And you mention that there are 16 to 20 PDPs globally. I wonder if you could tell us how many are in the United States?

And what do these other countries do? Are there tax incentives? Are they grants? You know, are there a number of best practices that we ought to just look to apply to our own situation here in the United States, again learning from the EU on this one, and Japan?

Mr. MORRISON. So thanks. So of the 16 to 20 PDPs, they are equally shared between Europe and the United States. So about half in the United States, half in Europe. But the way that things are working on the European side is they are being mobilized through their Ministry of Foreign Affairs. So the Dutch Government has launched a fund for product development partnerships, so has the German Government just released one. The Japanese Government has just released one.

And they, the way they operate is through what are called RFAs, Requests for Applications. And they are really lifelines for us because the Gates Foundation has dramatically decreased funding for PDPs. So Gates Foundation funding for product development partnerships is about half of what it was back in 2008. So some of them are really struggling now for survival. And we are going to lose all of that innovation expertise. So it is great that the European governments have done this.

What I have said is, the U.S. Government doesn't have an easy mechanism for funding PDPs right now. They do fund one specific one, IAVI, which is the International AIDS Vaccine Initiative, they're a very specific appropriation that goes through USAID. It is a pass-through. But beyond that, they don't really.

Even if you mobilized 1 or 2 percent of funds for global health for PDPs, that would release $100 million to $200 million into the system. That would do it right then and there.

Mr. SMITH. Why has Gates pulled out or at least diminished their portion?

Dr. HOTEZ. This, I don't know. This current regime is very focused more on supporting directly industry it seems. And so they are taking some different routes. And but we will see how long that lasts for.

Mr. SMITH. And one last——

Dr. HOTEZ. They are still, they are still funding us, you know, fairly well.

Mr. SMITH. Yes.

Dr. HOTEZ. But not as much as they used to.

But as I said, you know, we know for some of these vaccines, you know, $5 million here, $6 million here, $3 million here makes a huge difference. We are doing our whole Chagas vaccine project on $4 million. We were able to get a schistosomiasis vaccine through, from discovery through clinical trials, all the way for $2 million. And that was done in part because NIAID rescued us and they paid for the clinical trials separately, and they paid for the toxicology tests.

Mr. SMITH. When might something for leishmaniasis be available?

Dr. HOTEZ. Well, we could go into manufacturing pretty soon. But we don't have the funds right now. So we could probably go into manufacturing by next year or if not earlier. But——

Mr. SMITH. Could we get all the details on that——

Dr. HOTEZ. Sure.

Mr. SMITH [continuing]. From you?

Dr. HOTEZ. Yeah, absolutely.

Mr. SMITH. Appreciate that.

And one last question on the G20 question. If we, as a subcommittee, put together a letter, which I think would be a great idea, I would appreciate if all three of you would provide us insight as to what you think ought to be in that letter.

Dr. HOTEZ. Absolutely.

Mr. SMITH. Thank you.

Dr. HOTEZ. You are welcome.

Mr. SMITH. Yes, Dr. Raad.

Dr. RAAD. Mr. Chairman, I think the issue of vaccines is extremely important. But from my interaction in the area there is a tremendous respectability to the healthcare, the U.S. healthcare system. And I think we can do a lot with whatever we have as we are developing new vaccines.

For example, the polio is, there is an available vaccine, but how to implement it there? The issue of water sanitation, the refugee medicine kind of training, the early detection of these diseases. I think we have the best healthcare system in the world and they look up to us.

And, again, to improve relationships maybe beyond governments with the people, and the people if they would see us as a country trying to reach out in a way to provide them better health and opportunity to kind of deal with the catastrophic situation, I think a lot can be done. Appropriate use of antimicrobials and training programs for the people who are doing relief, and so forth.

Mr. SMITH. I saw in your list you mentioned training other healthcare personnel for refugee situations. What does that take: A weekend, longer?

Dr. RAAD. It might take a week or 2 weeks on refugee medicine and how to deal with different situations. There is tremendous need for such initiatives. And on the ground they are effective. And they are——

Mr. SMITH. Who are the trainers for the camps?

Dr. RAAD [continuing]. They are cost effective. You can send trainers to train them in areas that are safe like Jordan or possibly Lebanon, or maybe other places. But you can—they are very cost effective. I mean the whole thing is not a——

Mr. SMITH. Is USAID doing that now?

Dr. RAAD. I am not sure. I would like to investigate by being in touch with them. But this is something that could be emphasized.

Mr. SMITH. Mr. Clawson.

Mr. CLAWSON. Sorry I came late, I had another meeting. We are often double-booked up here. So appreciate you all hanging around long enough to hear my questions. I may very well be repetitive since I haven't heard what has already been asked. So if that is the case, I apologize.

When I think about mosquito-based illnesses I have kind of this sequence in my mind that starts with, at least with daytime diseases, mosquito-based diseases, that starts with dengue fever, dengue fever times four strains, then chikungunya, now Zika. And each one of those rides the same Trojan horse, the same tiger mosquito. And that there will, therefore, be another Zika or another chikungunya. That the movie we have been seeing the last 10 years or so will continue, and the next one could be even worse than Zika and could be, you know, a real disaster. That is how I think of it in my mind.

And so although I like getting rid of stored water or pooling water, I like making sure people have air conditioning so they kill the larva under the bed, like all those things, it still seems to me that until we get something that takes out the tiger, the Aedes mosquito, that we are going to see this movie again and again and again. And so I don't know if that is a genetic fix for this mosquito

or if right now it just seems like we are going after the results as opposed to the base carrier of these types of diseases.

Do you all see it the same way I do? And if that is the case, that is my theory would say the only long-term solution, at least for this strain, is to get on that mosquito. You all agree with what I am saying?

Dr. HOTEZ. Well, I guess I could start. This morning I testified to Energy and Commerce; they were holding hearings about Zika. I work on the Gulf Coast of Texas and I focused on the fact that the Gulf Coast of the U.S., Texas, Louisiana, Mississippi, Alabama, and Florida have something very unique. We have not the Asian tiger mosquito, which we have that as well, but the real bad actor is Aedes aegypti, which is the one that is transmitting Zika——

Mr. CLAWSON. Right.

Dr. HOTEZ [continuing]. Throughout South America and now into the Caribbean.

The other factor that the Gulf Coast, our states have is poverty. And that is not often appreciated as a risk factor. But the reason why Zika is wiping out Pernambuco State in Brazil, and now it is going to decimate Haiti, is because women who live in poverty have no access, live in houses without window screens or holes in the window screens, and the environmental degradation around them breeds the Aedes aegypti mosquito.

So I am very worried about the Gulf Coast of the United States more than many others.

And the consequence of that is we need to do something about the mosquito. We are not going to have a Zika vaccine in time for this epidemic. And so we have been pushing very hard for a program——

Mr. CLAWSON. And just to interrupt. And we are not going to get rid of all pooling water in the lower socioeconomic neighborhoods that don't have air conditioning either. We need to work on all of that.

Dr. HOTEZ. Yeah.

Mr. CLAWSON. I am in southwest Florida. I am on the Gulf too.

Dr. HOTEZ. Yeah.

Mr. CLAWSON. So I am really worried about my more humble neighborhoods and their ability to fight back if the virus, if this mosquito comes north. And I am not sure why it is not there now. But it doesn't seem to be.

Dr. HOTEZ. It will. I will come north. And so I am quite worried we are going to start seeing Zika on the Gulf Coast, including your district, starting this spring and summer.

And so the approach needs to be, one, we know we can go pretty far with old-fashioned methods using existing insecticides and getting rid of the garbage, getting rid of the discarded tires on the side of the road and doing what you can with water. There are some new technologies out there. Whether or not they are going to be available, whether they can be shown to be scalable in time for this epidemic is unclear.

Mr. CLAWSON. Are we close on this mosquito? And I got you that we need to get rid of tires and other pooling water and have more air conditioning and more screen doors. We hear it. But until we take out this particular mosquito, not only in our country but par-

ticularly, you go to the Caribbean and you go to Haiti or the Dominican Republic or Curacao, no one has air conditioning. And when it rains, there is water everywhere.

Dr. HOTEZ. That is right.

Mr. CLAWSON. Dr. Morrison, what were you going to say?

Mr. MORRISON. I support what Peter has to say which is that control of mosquitos is really hard, and it is expensive and it is tedious. And the old methods are still the ones that we are going to rely on in this period. And I worry enormously about what is going to happen in the areas where Aedes aegypti is endemic in the United States. And as it gets warmer those areas are going to become enlarged.

There are technological fixes that people are exploring: There is radiation, there is introduction of bacteria, and there is genetic engineering. Those are the three methods that are actively being explored. I think they are going to get much higher attention in this next period, but there are no quick fixes here.

Mr. CLAWSON. I dropped a bill that would give a 10-percent tax credit, like the investment tax credit from years ago, to any company that is working on what you just said. Because I am with you, we are, we have got to treat pooling water, but we have also got to get at this mosquito. And that is not the typical screen methods at night that we would use for a malaria mosquito, right? This is a daytime,——

Mr. MORRISON. Right.

Mr. CLAWSON [continuing]. Indoor, hot zone kind of——

Mr. MORRISON. Right.

Mr. CLAWSON [continuing]. Critter, right?

Mr. MORRISON. Right.

Mr. CLAWSON. Let me ask one other thing and maybe——

Dr. HOTEZ. I would say one other,——

Mr. CLAWSON. Yes.

Dr. HOTEZ [continuing]. One of the other issues, problems that we are seeing in the U.S. is mosquito control is very much done at the local level, at the county or city level, and there is a lot of inconsistency in terms of how well that is carried out from county to county.

Mr. CLAWSON. I agree. I agree.

Dr. HOTEZ. So there is going to be a, I think there is going to be some need for Federal Government intervention with these harmonized technologies and coming up with a more consistent——

Mr. CLAWSON. Or standardize what the treatment ought to be, even if it is implemented locally. I think my districts are pretty good. My counties are pretty good. But lots of times when I travel I see people spraying at night. And I say that is going to kill the wrong mosquito.

Dr. HOTEZ. Right.

Mr. CLAWSON. And so we think we see spraying at nighttime that might be a good thing. As far as I can tell from this bug, that doesn't do anything.

One more question real quick about the Middle East. I mean it seems to me that you have distrust of governments, distrust of outsiders in the Middle East in general. Can't get doctors in. Bad water, bad sanitation. It is just an invitation for mosquito-based in-

fectious diseases, and all infectious diseases. And I don't even know where to start in that environment.

By the way, I am not sure it is American. I mean I think it in Southeast Asia and Africa there are a lot of people that looked at other refugee crises and had to set up sanitation real quick in previous wars. I am not sure it even has to be America. But I see that big, wide problem. And unless resources, even if it is regional, unless we can come in, it is going to be hard to solve it. Am I right on that, Doctor?

Dr. RAAD. I fully agree with you. I think it is, as we mentioned earlier,——

Mr. CLAWSON. Sorry I missed it.

Dr. RAAD [continuing]. It is a complicated problem, it is multi-faceted, and it is not one size fits all. I mean we need to kind of handle it in different areas in different ways.

For example, there needs to be a policy for how you deal with the refugees and the problems related to that? How do you deal within the areas which are the combat zone or may be difficult to enter to? There has been one other issue is the issue of the Hajj and where you have the aggregation of people, whether it is in Saudi Arabia, or possibly Iraq and some other places, and so forth. Water sanitation and the implication of what is happening now of the sewage being directed into the water supply for these areas from the areas where the Islamic State is.

So it is a complicated problem but I think it needs to be dealt with systemically, in a multi-faceted manner creatively. I think there needs to be some creativity because in some areas. But I believe that what you are saying is very true, but the response should be insightful, should be practical, and should be creative. And I think a lot will be done.

The other factor is one has to account for the fact that the problem is escalating and it has so many variables that are moving targets occurring that this is why there needs to be a special attention through a concerted effort. And maybe a joint project between NGOs——

Mr. CLAWSON. In some conflicts more people die of illnesses than they do from gunshots or bombs.

Dr. RAAD. That is very true.

Mr. CLAWSON. What about in this case?

Dr. RAAD. Which is true. For example, I gave some figures. An area which is not really in the major conflict, Egypt, where the conflict is mainly in Sinai, but people are dying, there are more casualties from hepatitis C in Egypt over the last 5 years than there are from the war in Syria.

Mr. CLAWSON. Yeah.

Dr. RAAD. Actually, you know, ¼ million in Syria killed during the war. There certainly in all these outbreaks have resulted in a lot of people killed because of these infectious outbreaks because of the Syrian-Iraqi conflict, if you may. So I fully agree with you.

Mr. CLAWSON. Dr. Morrison.

Mr. MORRISON. There has been various efforts made in this current, these current wars and in the past to try and estimate mortality from various sources. And the data remains weak oftentimes. But there seems to be across multiple cases a pattern where a sub-

stantial, a substantial portion of mortality comes through the decay of your health system.

Mr. CLAWSON. Okay, so let me interrupt. Can I have 1 more minute on it?

What do we spend on bombs and guns and killing versus what do we spend on preventing disease?

Mr. MORRISON. That is a big question.

Mr. CLAWSON. I know you have got a, I know you thought of this now. Come on now. I know you all thought of this, right? We spend a lot more on bombs.

Dr. RAAD. I think that, yeah.

Mr. CLAWSON. I'm just asking.

Dr. RAAD. I think this is the whole point that we, we together were trying to bring, that a lot could be done if we appropriately use these resources in a targeted manner. And that would reflect a certain view in the region, particularly among the people. It is people to people of how they view the United States of America. That we are not involved in the conflicts through the only really kind of the war sort of policy that we have, which is legit and certainly we are fighting terrorists. But there is another side initiative of this great country where we are reaching, where we are the kind of hosts of groups like Doctors Without Borders and so forth, that we are making initiatives on the ground and we are having people move on the ground.

And this, this had a tremendous impact in west Africa with the Ebola virus, and could have a tremendous impact on the people and, ultimately, the governments in the area. If we have a good policy that will deal with this crisis and we come as the people are trying to solve a major catastrophic problem——

Mr. CLAWSON. You would agree in the case, I mean I have a close friend who is a physician that went to Africa to fight the Ebola outbreak, as an example, university professor, physician, et cetera. A lot of Americans, Americans are great that way, right? If there is a problem around the world, we are always one of the few that swashbuckle and get on over there to help out, right?

Dr. RAAD. Yes.

Mr. CLAWSON. But it is a lot harder in war zones. And it is a lot of our dollars that are going in there to, right, to defend and make war. So maybe in those zones we ought to think how can we also offset part of that with medical——

Dr. RAAD. That is true.

Mr. CLAWSON [continuing]. And sanitation.

Mr. MORRISON. Congressman, we were talking earlier about the response to the human crisis that has grown out of the Syria war and has spilled into the region and now spilled into Europe. The United States' engagement on that side has amounted to $4.4 billion since the Syrian war started in March of 2011.

The military side of the equation has been largely, within that region we have been scaling down our military engagement, but only recently scaling up with the coalition campaign against ISIS. Right? That is the central investment that we are making within that region on a military ground. So I mean you——

Mr. CLAWSON. The President's original ask was $5 billion or $6 billion, something like that, correct? To train Syrian insurgents, as I recall.

Mr. MORRISON. I don't remember the exact number that was made in terms of the training.

Can I come back to one point that you raised about the Zika response, just to get back to that?

Mr. CLAWSON. Sure.

Mr. MORRISON. Because I want to, before we run out of time I wanted to make one important point.

Mr. CLAWSON. You know, the chairman over here might have a different view on that. But go ahead. Are you all right here, boss?

Mr. SMITH. Yes.

Mr. CLAWSON. Alright.

Mr. MORRISON. You know, it is going to be very important in this period that the CDC be able to bring forward additional capacities and resources to states and communities that are attempting to address these threats through a variety of different measures of sanitation, water, screening, air conditioning. But and the current, the current $1.9 billion request, emergency request that is up here for consideration includes I think it is almost $900 million to meet that need.

Mr. CLAWSON. Seems low.

Mr. MORRISON. And——

Mr. CLAWSON. If I wanted to do an economic impact of an outbreak in south Florida, I could probably get to that number just in Florida pretty quick. Am I right? You all agree with that? So it seems low, $1.9 billion just seems low. Just a cursory view of it, seems low.

Dr. HOTEZ. Well, I think you have to remember the consequences. If we start seeing clusters of microcephaly cases appear on the Gulf Coast by the end of this year, it is going to be spoken about in the same context as Hurricane Katrina or the BP oil spill.

Mr. CLAWSON. Seems low.

Dr. HOTEZ. So, yes.

Mr. CLAWSON. But the human cost would be hard to describe, right?

Mr. MORRISON. When you look at the costs I think it is important to keep in mind, we are not talking about a crisis of Zika and of the mosquitos, we are talking about a crisis of microcephaly.

Mr. CLAWSON. No, I understand that. I got you.

Mr. MORRISON. And the population that is most vulnerable is the pregnant women or women who are to become pregnant.

Mr. CLAWSON. Right. In poor neighborhoods.

Mr. MORRISON. In poor neighborhoods in particular.

Mr. CLAWSON. Where there is no air conditioning.

Mr. MORRISON. And so, so we need to, we need to keep our eye on the ball in terms of what the most vulnerable population in need is.

Mr. CLAWSON. And what was the basis for the $1.9 billion? What is the——

Mr. MORRISON. Well, that has been detailed in the request. It breaks it into its different component parts.

Mr. CLAWSON. Right.

Mr. MORRISON. They were making an estimate of the requirements in this first phase to get moving. And I think the urgency around this is what Peter is referring to, which is we do not know if we are going to see 8, 9, 10 months out or beyond, if we are going to see a proliferation of microcephaly.

Mr. CLAWSON. But you all would agree, and again let me, you all agree with me, even if it is not—remember where I started—even if it is not Zika, it is going to be something riding the back of this particular mosquito. So whatever money that we spend, even if Zika is not an outbreak, we might be very likely preventing a future outbreak in whatever we do to attack Zika now. Even if Zika isn't our worst case scenario, there will be another one on this, on the Tiger mosquito that is going to get us.

Mr. MORRISON. No, this Aedes aegypti mosquito that is endemic in these coastal areas, 23 million people live in those areas, this same mosquito carries dengue.

Mr. CLAWSON. And chikungunya.

Mr. MORRISON. And you have had outbreaks that have been brought under control.

Mr. CLAWSON. That is my point.

Mr. MORRISON. I mean there was an outbreak in Key West of dengue in 2009–2010 that was brought under control. So it stands to reason that many of the same measures that have protected Americans against dengue and chikungunya—correct me, Peter, if I am wrong—are, should be applicable in this instance with lots of modifications around the, around the threat module.

Mr. CLAWSON. Right. Which is why I would like more than $1.9 billion. It just seems like cheap money for future lives and problems.

And with that I will—and I really like the CDC, by the way. With that I yield back.

Mr. MORRISON. Thank you very much.

Mr. CLAWSON. Thanks for the time. Appreciate you all—sorry I came in late—appreciate you all's input here.

Dr. RAAD. Thank you.

Mr. SMITH. Thanks, Mr. Clawson. And thank you.

Anything you would like to say before we conclude the hearing?

Mr. MORRISON. Just thank you.

Mr. SMITH. Oh, I mean anything on the subjects.

Dr. HOTEZ. Well, thank you for raising this issue because this has been beow everybody's radar screen, and yet it is so important.

Mr. SMITH. Thank you for the insights and counsel. And we do have a lot of things to do in follow-up.

The hearing is adjourned.

Mr. CLAWSON. Thank you, Mr. Chairman. Really good job.

[Whereupon, at 3:50 p.m., the subcommittee was adjourned.]

APPENDIX

Material Submitted for the Record

SUBCOMMITTEE HEARING NOTICE
COMMITTEE ON FOREIGN AFFAIRS
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515-6128

Subcommittee on Africa, Global Health, Global Human Rights, and International Organizations

Christopher H. Smith (R-NJ), Chairman

March 2, 2016

TO: MEMBERS OF THE COMMITTEE ON FOREIGN AFFAIRS

You are respectfully requested to attend an OPEN hearing of the Committee on Foreign Affairs, to be held by the Subcommittee on Africa, Global Health, Global Human Rights, and International Organizations in Room 2172 of the Rayburn House Office Building (and available live on the Committee website at http://www.ForeignAffairs.house.gov):

DATE: Wednesday, March 2, 2016

TIME: 2:00 p.m.

SUBJECT: The Growing Threat of Cholera and Other Diseases in the Middle East

WITNESSES: Peter J. Hotez, M.D.
President
Sabin Vaccine Institute

Issam I. Raad, M.D.
President
Health Outreach to the Middle East

J. Stephen Morrison, Ph.D.
Senior Vice President
Director of Global Health Policy Center
Center for Strategic and International Studies

By Direction of the Chairman

The Committee on Foreign Affairs seeks to make its facilities accessible to persons with disabilities. If you are in need of special accommodations, please call 202/225-5021 at least four business days in advance of the event, whenever practicable. Questions with regard to special accommodations in general (including availability of Committee materials in alternative formats and assistive listening devices) may be directed to the Committee.

COMMITTEE ON FOREIGN AFFAIRS

MINUTES OF SUBCOMMITTEE ON *Africa, Global Health, Global Human Rights, and International Organizations* HEARING

Day *Wednesday* **Date** *March 2, 2016* **Room** *2172 Rayburn HOB*

Starting Time *2:10 p.m.* **Ending Time** *3:50 p.m.*

Recesses [*0*] (____to ____) (____to ____) (____to ____) (____to ____) (____to ____) (____to ____)

Presiding Member(s)

Rep. Chris Smith

Check all of the following that apply:

Open Session [✓]
Executive (closed) Session [ ]
Televised [✓]

Electronically Recorded (taped) [✓]
Stenographic Record [✓]

TITLE OF HEARING:

The Growing Threat of Cholera and Other Diseases in the Middle East

SUBCOMMITTEE MEMBERS PRESENT:

Rep. Ami Bera, Rep. Curt Clawson

NON-SUBCOMMITTEE MEMBERS PRESENT: *(Mark with an * if they are not members of full committee.)*

HEARING WITNESSES: Same as meeting notice attached? Yes [✓] **No** [ ]
(If "no", please list below and include title, agency, department, or organization.)

STATEMENTS FOR THE RECORD: *(List any statements submitted for the record.)*

TIME SCHEDULED TO RECONVENE _____
or
TIME ADJOURNED *3:50 p.m.*

Gregory B. Simpkins
Subcommittee Staff Director