

Principles of Planning for Disaster Risk Reduction

Moderator: Michele Howard

Presenters: Mark Keim, MD, MPH

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Operator:

Good afternoon and thank you for standing by. At this time all participants are on listen-only. After the presentation we will conduct a question and answer session. At that time if you'd like to ask a question please press Star 1. I would like to inform participants that today's call is being recorded. If anyone has any objections you may disconnect at this time. I would now like to turn the call over to your conference host today, Ms. (Michelle Howard). Ms. (Howard) you may begin.

Michelle Howard:

Thank you (Trey). Good afternoon. My name is (Michelle Howard) and I am representing the Clinician Outreach and Communication Activity, COCA, with the Emergency Communication System at the Centers for Disease Control and Prevention. I'm delighted to welcome you to today's COCA webinar, Principles of Planning for Disaster Risk Reduction. We are pleased to have with us today Dr. Mark Keim here to discuss the principles of an effective, efficient, and orderly process for disaster planning.

You may participate at today's presentation by audio only, via webinar, or you may download the slides if you are unable to access the webinar. The PowerPoint slide set and the webinar link can be found on our COCA web page at emergency.cdc.gov/coca. Click on COCA Calls and the webinar link and the slide set can be found under the call-in number and call password.

The objectives at the conclusion of today's session, the participant will be able to describe the characteristics of an effective disaster risk reduction plan, compare and contrast objective based planning, operational level planning, and capacity based planning, and list steps required for exposure reduction, susceptibility reduction, and resilience strengthening following a disaster.

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At the end of the presentation you will have an opportunity to ask the presenter questions. On the phone dialing Star 1 will put you in the queue for questions. You may submit questions through the webinar system at any time during the presentation by selecting the Q&A tab at the top of the webinar screen and typing in your question.

Today's presenter Dr. Mark Keim is a Senior Science Advisor and Associate Director in the National Center for Environmental Health of Science Office for Environmental Health Emergencies. In addition, he is an adjunct professor at Emory University School of Public Health and Harvard School - Harvard University School of Medicine. A residency trained emergency medicine specialist and a fellowship trained disaster medicine sub-specialist, Dr. Keim has provided consultation related to disaster management both nationally and internationally. He has authored numerous scientific presentations, journal publications, and book chapters involving terrorism, environmental health, emergency medicine, toxicology, global health, and disaster management.

Again the PowerPoint slide set and webinar link are available from our COCA web page at emergency.cdc.gov/c-o-c-a. At this time please welcome Dr. Mark Keim.

Dr. Keim:

Thank you very much (Michelle) and good afternoon to everyone and welcome to the presentation for today for the webinar on Principles of Planning for Disaster Risk Reduction. First off we have to ask ourselves why do we plan for health emergencies. And one of the main reasons is to save lives and lessen suffering of course. And now I'd like to add to that premise of - to by also asking why do we plan for disaster risk reduction. And this is a little bit different answer in that we do so to prevent illnesses, injuries, and deaths. So we're trying to get on the side of prevention as opposed to the side of cure, once again in a little bit more proactive approach and based on the

foundation of preventive medicine and public health. And as many of us know, good plans are simple to use, they're written by a group, they're written by the people that will actually do the work itself and that's included in the plan, and they're based upon goals that are set by leadership. And good goals are SMART and this SMART acronym comes from Peter Drucker, the esteemed management guru in his original book on practice of management in 1954 where he introduced the concept of management by objectives which are still used broadly in most public and private sectors throughout the world today.

Talking about the specific objectives or goals, S being specific. There is good goals state exactly how tasks are to be performed. They're measurable. These goals are - describe measurable signs of progress. Attainable, they are within our ability to achieve. And good goals are also realistic, they're based upon realistic expectations. And good goals also have a time schedule for completion. So when we think about planning and disaster planning in particular, we should consider the fact of management by objectives and the work of Drucker and many after him in identifying these specific goals. And I would propose to you that in some cases in disaster planning in the past whether it's response planning or now the new modality of disaster risk planning and risk reduction planning that many times it's a list of activities but not necessarily a list of objectives. And sometimes it's not necessarily time based or perhaps it's not - it's a strategic plan that is not very specific in stating these goals.

So we're going to talk a little bit more about the process of planning today and then afterwards transition into a discussion of what is disaster risk reduction. And then leave you today with an example or two of how disaster risk reduction plans can be written using this aspect of SMART objectives and with some other principles for effective disaster planning that I'll talk about in just a second. So we also know that good plans in the simplest version answer five questions. What tasks should we perform? Who will perform these tasks? How will we perform them? When will we perform them? And where will we perform them? So you can see that's also complementary to Drucker's SMART objectives as well but a simpler way to be able to approach this. And so we need to realize that our plans need to be very broad and not just a list of tasks. And this particular reference here, good plans are O2C3 or as I say O2 - actually it's O2C3.

This comes from a publication, an article that I published in the American Journal of Disaster Medicine. And for those of you that would like to check on this reference it's published in 2010 during the May/June issue and it's page 169 through 179. The title is O2C3, a Unified Model for Emergency Operations Planning. And once again that's in the American Journal of Disaster Medicine for May/June 2010. And so in particular this - during this - in that article I talk about the currently accepted principles now or best practices for what are emergency operations plans or disaster plans in particular. And in the article I talk about objective based plans, as we just

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described the SMART objectives that include measurable objectives.

We then know our progress in disaster plans when we have measurable objectives. We can then measure the effectiveness of a drill, of an exercise, or a response itself if it actually meets the objectives. So therefore by having it measurable it now becomes something that we can actually apply a quality control method. We can measure the effectiveness of some of these interventions as we do for other related public health projects and programs. The second component or the second O of good plans are operational. Plans are written to include operational level detail and I'll talk more about that particular aspect of what I mean by operational level in a moment. The first C is consensus based plans. Plans are developed by consensus among stakeholders. The second C is capability based, based upon what we are actually capable of doing, based upon the capabilities of the institution, of the group, the society, or even the nation. And finally they are compliant, our plans are compliant with local, state, or national strategies. This may be compliance with a state plan, compliance with state or local regulations, or compliance with national plans like the Federal Response Guidelines and so on.

So it follows guidance from leadership. The plans may also be compliant with international recommendations or guidance like the guidelines for preparedness for pandemic influenza for example that came from WHO and from CDC. So compliant once again, the third C of good planning. So objective based plans we just talked about in the - related to Peter Drucker's work. He says establish a set of objectives and then identify activities, specific activities that will accomplish each objective. So in that way we can have our leadership, we can have the leadership establishing the objectives and the workers and the responders and so on identifying what activities will specifically accomplish those objectives. So we are matching a more strategic approach to a more operational approach as well. And that's very important because sometimes the activities that we choose to begin with because of the changing scenarios, the changing challenges during the disaster, the activities may have to change. But we can also weigh our activities, weigh new activities, weigh newly proposed activities against the original objectives. So objective based planning is really a very reasonable approach and very effective approach has been our experience towards emergency operation planning.

And we have applied this concept of O2C3 actually in creating our nearly 200 disaster plans around the world in Asia, the Pacific Region, as well as in Africa and also in the United States as well. So we have had - we've found that it's very - objective based planning is very intuitive and people tend - all over the world tend to gravitate towards that model. They find it very easy to write disaster plans using that model as a focus. The second O being operational level planning, this just means is it details how strategic objectives or goals or plans will be accomplished. So this gives us the where are we now, where do we want to be, how do we get there, and how do we measure progress. So this gets down into the details of specific activities, specific responsible parties, and then also the timing.

And perhaps even other details for example like standard operating procedures for budgets and so on.

So these are the - once we have strategic goals from the leadership, we then fill this in with operational level goals and activities that really get into the details. And as you all know if you've been through a response in disasters in the past as many of you likely have, the devil is in the details when we talk about these particular challenges in public health.

And the first C of the C3 acronym is consensus based planning and these are the best plans that are written by those whom will actually implement the plan. And so these plans can be viewed as contracts, the result of negotiation of various stakeholders. So in that sense the planning is more important than the plan itself. The result in plan is nearly a document or a contract that shows and illustrates the discussions that have occurred and the agreements that the different stakeholders have made during the planning process. And this consensus based planning requires a very well organized facilitation process in order to save time. So we have many of these people coming together in a particular aspect in order to be able to provide a consensus based planning. So it's written by those people that will actually implement the plan itself and that's a very important concept. If you're going to have detail in the plan, you're really going to need the people that will do the work.

And so now the next C that we'll discuss is capability based planning. And this is very important that we all recognize in public health the importance of capability based planning because it's actually a national presidential directive now. Beginning with the last administration and carrying on through the current presidential administration, there have been presidential directives that have actually mandated our planning at the federal and state level to be focused on capability based planning. In other words focus on the capability and not the hazard. And it's very important that we do that because we just cannot predict the hazards. Many of you know that we were unable to predict the possibility of jet airplanes flying into the World Trade Center. But what we were able to do was predict our capabilities.

We were predicting our capabilities of fire suppression, capabilities of communication, capabilities of occupational health, capability of air quality and air safety, medical care, and population evacuation. Those are all capabilities that were applied to this one disaster that was unpredictable. So therefore rather than having disaster plans that are based upon the hazards which can also be a myriad of hazards, earthquakes, hurricanes, tornadoes, floods, and so on and so forth, what we should focus on are those capabilities in public health that we can apply in each of our institutions and public health and the medical profession can focus on these issues and then apply them to any disaster. So that's the idea for capability based planning. And as I mentioned that's currently a mandate and a presidential directive.

And so these capabilities for disaster risk reduction I'm going to talk about a little bit more in detail for you in this presentation but these are basically in two major categories. One of them is based on the hazard so and we'll talk a little bit more about detail of the hazard itself and hazard avoidance, in other words, avoiding these hazards to begin with. And then secondarily vulnerability and in particular vulnerability reduction which has three different categories of components, excuse me, exposure reduction, susceptibility reduction, and resilience building. And I'll talk more in detail about those.

But I really wanted to give you an idea of this aspect of capability based planning. You can apply this not only for disaster risk reduction but also for disaster emergency operations. You can apply it in a hospital where your capabilities are medical care, communication, patient records, radiology, and so on. You can apply it in public health where your capabilities are epidemiology, laboratory, surveillance, and so on. So focusing on the capabilities is a key element for any disaster plan whether it be before to reduce the risk and prevent disasters or later to respond to them. And this idea of capabilities we have applied in what we call the SOARES model for objective based planning.

The SOARES model starts with the capability. So we say for example the capability being epidemiology and then a strategic objective or the major overarching goal that will state our goal in epidemiology or surveillance. The second is an operational objective. In other words, specific goals that will accomplish our strategic objectives. Specific operational objectives that will accomplish our overarching strategic objectives. So a strategic objective may be all patients have prompt and excellent quality medical care. After that, operational objectives, you could break those down into categories. Patients are triaged quickly, patients are provided medical care appropriately, patients are discharged or admitted to the hospital in a timely and efficient manner. So those are all operational objectives that accomplish the larger strategic objectives. And they give us really a more focus - a better focus for this larger goal by assigning these activities. So underneath each objective we should have a list of activities for each objective how those activities in particular will accomplish that goal.

And then once again cascading down, responsible party for each activity. So it's not enough to say in a disaster plan that we will accomplish this task. We really need to be specific about who will accomplish the task and also perhaps even go as far as to say in a specific timeline, will they accomplish a task in the first hour, in the first day, in the first phase of a response. And so the (sores) method, what we have found in our disaster planning around the world is that it's a very effective way to be able to conceptualize and organize and categorize each component of the disaster response in a way that makes it easier to find and also easier to write the plan because now we have a focus for our efforts.

We have boxes, we have sort of categories that we can now put our thoughts and organize - into which we can put it and organize our thoughts.

So this is just a very simple matrix that shows that same idea, that cascading element that I just spoke of with our strategic objectives and so on into a planning matrix. So you can see on the far left here is the strategic objective. And that would be one simple statement of the goal itself, an overarching goal for example. It may involve pandemic influenza, it may involve prevention of spread of the disease to the community. Operational objectives, then you can see this column has three rows for each of the operational objectives would accomplish this strategic objective. And then once again for each of the operational objectives activities that would accomplish that particular operational objective and then responsible parties assigned to those activities and specifics, either a timeline, SOPs, and so on.

So this is the overall planning matrix. And we're going to apply this at the end of our presentation today in a way that will help you to better organize any subsequent disaster risk reduction plans that you develop. The examples I've given you so far have been disaster response plans, what you would do in response to a disaster. But we're going to talk more now about reducing the risk of disaster and then how to apply those - this planning matrix to reducing disaster risk before the disaster ever happens. So let's talk a little bit about disaster risk reduction because I know that for some of you this is a terminology - this is a term that you're familiar with. Others may have just heard a little bit about it. Some of you may actually be - this may actually be the first time that you have really heard about this type of approach.

So overall what we've seen is there has been how shall I say, there has been a growth or a natural progression of thought related to disaster management in that it's transitioning in many places around the world to an approach of risk management. In other words, not only do we have response and recovery mitigation and preparedness but we're also starting to think about preventing disasters in particular. And so risk reduction is actually a component of risk management. This component involves three of the five areas or phases of risk management and risk reduction involves prevention, mitigation, and preparedness. So in that sense risk reduction actually lessens the likelihood of the disaster itself. And that's really the focus here compared to another disaster plan, emergency operation plan, or response plans or even preparedness plans by themselves is that our lingo here is to reduce the risk. And some of you that may have joined us at the last webinar that we had a few weeks ago, we talked a lot more about risk reduction. What we're going to do now is take that concept of risk reduction and move it into an effort of how to plan, how to write risk reduction plans at the community level, at the institutional level like hospitals and other institutions, or even at the societal level. And the real focus here of course being on the idea of preventing disasters from happening. And you may say well, you know, Dr. Keim that sounds all and good but I'm not so sure that you can prevent the disaster. I don't know, you may have magical powers that prevent the earthquake. I wish you would share those with us if you can. And, you know, of

course obviously I'm being facetious here. We're not talking about preventing the hazard but what we're talking about is preventing the public health disaster. We're talking about preventing the public health impact of these disasters which in many cases can be done. And in some cases actually the hazard can be prevented. For example the work in the United States that has been done with preventing floods -- remarkable accomplishments in the United States with that by preventing floods. In other words, preventing the hazard from occurring.

The management of our major river ways both throughout the South and Mississippi and the upper middle Midwest, remarkable accomplishments. We used to suffer in this country hundreds and hundreds of deaths every year, in some cases thousands of deaths every year. Now it's very unusual for there to be over 100 deaths throughout the entire country due to floods. In other countries by the way at the same time there are floods still occurring throughout the world that are literally killing hundreds of thousands of people per flood, in some cases millions of people during this past century have died in single events. So we're really talking about remarkable accomplishments that have occurred in reducing the hazard.

So now looking at the slide here, how do we estimate disaster risk? You know, we estimate there -- identify what the potential disaster risk by a simple equation, basically the probability of a hazard occurring times the probability of the vulnerability of the population. What does that mean? That means that a disaster occurs when a hazard and a vulnerability both occur at the same time. So if you have a hazard occur, for example if a cyclone occurs out in the middle of the ocean and there's no island there, there's no population for it to be affected, then it's simply a hazard and there is no vulnerability and therefore the vulnerability is zero, the probability of disaster or D is zero. And the same thing. If we prevent the hazard from occurring, hazard goes down to zero and therefore the disaster goes down to zero. So our goal is to really lessen one of these two variables, either the probability of the hazard or the probability of the vulnerability of the population. And of course we in public health in the medical profession, we have very little to do with lowering the risk of the hazard itself. Other organizations have done a great job of that including the Army Corp of Engineers in the example of flooding. But we in public health have a unique mandate to reduce the vulnerability of the population and we do so every day. And that is the point of this aspect of risk reduction I'd like to talk to you further about is that we truly are given that mandate. And our actions and many times our actions are at the forefront of reducing public health vulnerability of a population and therefore reducing the risk to disaster not just during the disaster, not just immediately before the disaster, but actually our daily work does contribute to that fact and I'll talk more about to elaborate on that point.

First off I'd like to talk just a little about the definitions of these two phrases that I'm using, hazard and vulnerability. What is a hazard? A hazard is basically a dangerous phenomenon, a

substance, or a human activity or a condition that may cause -- and these are the important parts for us for human health -- loss of life, injury, or other health impacts. And that's really the main focus of this. It also includes of course property damage and loss of livelihoods, social and economic disruption, environmental damage that also play into health impacts. But primarily the hazard is the dangerous phenomenon itself. It's the volcano, it's the cyclone, it's the flood water, it's the tornado. We're talking about a hazard that's not necessarily a disaster until it actually is coming into contact with vulnerable people. So examples of hazards that I mentioned are typhoons otherwise known as hurricanes depending upon where you live in the world, floods, there can be hazardous material hazards like radiation, chemical exposures, and so on. There can be biological hazards like outbreaks and so on as well as seismic hazards like earthquakes and other meteorological hazards like tornadoes and severe storms. So these are examples of types of hazards and there are many of those types.

And now what is a vulnerability? And this is where we're really talking in the area that many of us work on a daily basis in public health and the medical profession. Vulnerability is the characteristic and circumstances of a community, a system, or an asset that make it susceptible to the damaging effect of a hazard. And that's the UN's definition. In the broader sense as you can see it talks about community vulnerability, system or asset vulnerability on a broad sense. But now our focus in public health is of course the vulnerability or the susceptibility of this particular individual or the health of the population. So simply put, it's the likelihood that our population will incur physical or emotional illness or injury. And so that's how we're really looking at vulnerability. And as you can - as I see this - those of you that are watching online, excuse me, you can see this photograph of - photograph that I took in Indonesia. This was a grandmother and a grandson that were left alive, the only survivors in the entire family after the Indian Ocean tsunami. And actually that tsunami occurred even though these two are survivors. It struck me and I took this photo because as you can see these are the most vulnerable people of the family to impacts that are disastrous and we have to be concerned about their welfare not only after the disaster but certainly before. So vulnerability is different for different people. And public health vulnerability as we all know, certain populations are more vulnerable to disaster related morbidity mortality, as I described extremes of age, under 5, over 65, under the poverty level, different - with preexisting illnesses and co-morbidity. This changes the public health vulnerability among different populations. So given the different populations, even when they're exposed to the same hazard have different possibilities of having illness or injury. And so therefore we have to recognize that difference in vulnerability when we do our disaster risk reduction planning.

So let's talk more about this aspect of vulnerability. Let's break it up into some separate components and think of it in terms of the way that we can change this aspect of vulnerability. And I'd also like to refer you

as well to this particular discussion about public health vulnerability reduction. You can find it in the Journal of Disaster Medicine and Public Health Preparedness. This particular article was published in the June 2011 edition and it's on pages 140 through 148. The title is called Preventing Disasters, Public Health Vulnerability Reduction as a Sustainable Adaptation to Climate Change. Even though that article is focusing on climate change and the extreme weather events that may be associated, once again these fundamental principles of disaster risk reduction are germane to the broadest sense of disasters and so they're applicable to many different hazards. So therefore that's a great article if you want to learn just about more about vulnerability and this concept of exposure, susceptibility, and resilience. All of these are factors that affect vulnerability and components that we can impact separately in order to reduce the vulnerability of a population.

So as you can see I have framed these components within a simple equation that vulnerability is directly proportional to the exposure of the person. It's also directly proportional to the susceptibility of that individual to the hazard. And then it's inversely proportional to the resilience of that person. So what does that mean? It means the more that you are exposed the more vulnerable that you are. The more susceptible the person is to the hazard the more vulnerable that they are. And the more resilience that they have the less vulnerable that they are. And all three of these things play together to impact vulnerability to disasters. And it's important to recognize this. As we go forward today we'll talk in more detail about how we may be able to impact needs in our society in order to not just be merely be responsive and reactive to these disasters but in - to step into the focus of prevention so that prevention can guide our efforts and we can prevent the public health impacts. And it's very important for many reasons and I just want to emphasize this aspect of prevention as we go further. There have been recent studies, one of them recently - most recently completed by the World Bank that showed that every - for every one U.S. dollar spent on prevention of disasters or in a broader sense risk reduction, it saves up to \$20 U.S. for response and recovery efforts that were much more expensive.

Previously - there was also a previous FEMA study that estimated that level to be \$1 - for every \$1 spent in risk reduction \$4 to \$7 were saved in response and recovery efforts. Also I think it's important for us in public health and medical sector to recognize because it really affects our daily experiences is that prevention is also just merely, you know, more moral, much more moral and ethical approach.

It prevents the initial suffering from occurring to begin with and prevents these long lasting psychological and emotional and physical scars that can occur. And it's also - so besides being cost effective it's just a much more humane and humanitarian approach to disasters. So I'm not saying that we'll be successful in preventing all disasters from occurring. That's certainly not the case. But we should be thinking about

preventing disasters in every opportunity that we can and when we're not successful then we accept response as being a fall back. In the same way that we try to prevent heart attacks, we try to prevent other chronic diseases by lifestyle choices, by tobacco cessation, by exercise, by diet, and so on. And then when that fails then we have the emergency departments and the cardiac labs that take care of the heart attacks and so on.

So I think we need to also focus our efforts not only in the response, not only on curative approach or curative medicine with our approach to disasters. The world is now also adding on this impact of preventing disasters, mitigating their impacts, and reducing the risk overall. And it's not merely just a novel concept, this is being applied worldwide now in many - nearly all of the nations of the world are working in disaster risk reduction. Why is it the case? Why are they doing it - doing more disaster risk reduction overseas than what the Americans are doing? One of the reasons is that Americans are - other countries actually as compared to Americans have fewer resources for response. They are unable to mount a good response. They recognize the impact and the challenge to sustainable development that disasters cause by creating a cycle of (unintelligible) of rescue, a constant cycle of disaster after disaster. And so they really have been forced early on probably even as long as ten years ago to start adopting this idea of reduction of risk.

Also in the United States there is a movement, there is a new - there is a subcommittee, a White House subcommittee for disaster reduction that's looking now in the United States at the aspect of disaster reduction and how it may be applied to an intergovernmental approach. And that particular approach has also been widely shared among the UN as well and the UN international strategy for disaster reduction. If you'd like to learn more about the approach of disaster reduction worldwide, you may use a search engine to search unisdr.org. Go there and find some of the successes that much of the world has been able to put together in regards to disaster risk reduction.

So we were talking about now the components of vulnerability, back to the idea that we can reduce vulnerability by reducing some of these components. Let's take a look and define those different components of vulnerability. The first component we'll talk about is exposure. Exposure to the hazard is a variable among the population that is affected in a disaster. So exposure is people, property, systems, or other elements that are present in the hazard zone, in other words in the flood zone, in the tornado zone, in the storm surge zone, in the earthquake zone and they are subject to potential losses. So we can identify people that are in these areas many times in advance.

An example of exposure is living in an area that floods. So there are flood maps, very, very well developed flood maps in our country and overseas. There are also earthquake maps that identify seismic zones and potential seismicity throughout our country. There are also tsunami inundation

maps that show to the degree of tsunami impact in different areas. So we can at times predict what potential exposures may be. We must also recognize that exposure within these zones may also be different. If my home is made rather shabbily and your home is made with firm foundation according to seismic codes, I am likely to be exposed more to that hazard of earthquake shaking and the subsequent injuries that come from house collapse and destruction.

I am more likely to be affected in an adverse way by that same level of ground shaking that your home got as well only your home received only mine is now, obviously I'm more exposed. In the same setting as well we can talk about exposure, people living in an area that floods. Some areas in the lower lying areas may be flooded deeper. There may be a higher degree of exposure as compared to higher ground. So therefore the variability of exposure we want to recognize and pre-identify which is - the good news is we can identify in advance. And therefore we can identify that and start trying to reduce the risk before the disaster occurs. That can happen by many different ways and we'll talk about those methods here in a moment. The other component of vulnerability, the second component out of those three is susceptibility. Now some people may tend to use this phrase interchangeably with vulnerability but actually vulnerability is more complex than just susceptibility. It's because it has these other components that play into vulnerability. So they're not exactly equal. But what is susceptibility? Susceptibility is the state of being at risk if you're exposed to a hazard. An example is okay let's say that you are exposed to flood waters and the difference in your susceptibility is that you are not able to swim but others are. That makes a difference in your susceptibility to drowning because you're both exposed to the exact same hazard but only the person that is unable to swim is more susceptible to dying. So that's a good example in an environmental sense.

Now how about looking at other types of disasters? For example how about a biological disaster like an epidemic? There is a - we've had some remarkable successes in actually reducing susceptibility to epidemics and that and the success has come through immunization. When someone is immunized they are no longer susceptible or their susceptibility is way - is decreased by an enormous amount compared to people that are not immunized. So therefore we lower the susceptibility. The hazard may still occur, the pandemic and the epidemic may still occur, the exposures to that particular pathogen may still exist, but the person is no longer susceptible. Therefore vulnerability is down to near zero and therefore the probability of disaster among highly immunized population is now also down to zero. So you can see we have applied this model very well in other sectors of public health. And what we need to achieve is to also publish - accomplish the susceptibility reduction for environmental disasters as well and also really for a broad variety of public health adverse health events. And so therefore this concept of susceptibility is very broad when we talk about its application and its benefits. And so we'll talk more about how to reduce susceptibility here in a moment.

And now the third component of vulnerability is resilience. And we've heard a lot of people talking about resilience recently and much of the literature, much of the debate in disaster management circling around resilience itself. And in the broadest sense, and this is once again a United Nations definition, the ability of a system, a community, or society that is exposed to hazards to resist, absorb, accommodate, and recover from the effects of that hazard and so on.

So I want to talk a little bit about that idea. Because what you can see in that definition by itself says the society has been exposed to the hazard. So resilience occurs once an exposure has happened. So we have not been able to avoid the hazard completely, prevent the hazard from occurring. When the hazard does occur we are not able to prevent exposure. So therefore resilience really defines the element of trying to get back to normal after we've been exposed and suffered some element of impact from the hazard itself. So an example of resilience is living among people that can help you, healthy people that can help you after a disaster or after the exposure to these hazards. And so as you can see resilience is returning back to normal. In a more generic definition in the dictionary it's talking about returning to a previous state after an impact or change in structure. So why am I making this point? Because resilience accepts the fact that the disaster is going to occur and that there will be exposure and that there will be susceptibility and in that case we should be resilient to that. And as important as that is, I will also propose that we should also take steps in addition to resilience to try to number one, prevent the hazard; number two, prevent the exposure; and number three, lessen susceptibility; and then finally we should also strengthen resilience so that if all those other elements fail then we can resist and absorb. And why is this important? Why should we be focusing so much on these other elements of vulnerability in addition to resilience? Why can't we just focus on resilience and say we want to resist it and absorb the damage once it occurs? It's because we have the element of loss of life affected in this particular model. We talk about resilient communities. These are communities that can be rebuilt. We talk about resilient homes. These are homes that can be rebuilt, societies, infrastructure can be rebuilt if it has been completely destroyed, bridges and so on, electrical grids and so on, all can be replaced in many cases.

But now when we're talking about human life, when you lose your life you cannot be resilient. And that's, you know, I like to say that resilience is for survivors in that sense. And so of course it is important then as resilience is in the public health model, we can't entirely rely upon resilience because taken over that threshold, taken to 100% destruction of that human element, and now we're talking about a loss of life that cannot be replaced. We're also talking about family members, loved ones that cannot be replaced and the longstanding impact and emotional distress and emotional illness that this can bring to others as well to the survivors. And so once again very important concept, very important for us to do preparedness and response and recovery in resilience and we also need to focus on these other elements that prevent the loss of life to begin with.

So I'm going to talk a little bit about a case study that we can look at and we'll actually use this to - we can consider this case study and then use this to apply our practices of vulnerability reduction. So here is a case study of two heat wave disasters, one of them earlier in Chicago 1995 and then more recently in Europe a very severe heat wave in 2003. And in 1995 Chicago had the second hottest heat wave on record with 750 deaths and most of those deaths were among isolated elderly. It caused power failures because of the overwhelming demand for power on the grid. There were also reports - there were also reports of inadequate ambulance service and hospital facilities that were overwhelmed as well as cooling centers that were not fully utilized. So there were some problems in responding to this particular disaster that were well documented in Eric Klinenberg's book *Heat Wave, a Social Autopsy of Disaster in Chicago*. Now in addition nearly about eight years later in Europe was the hottest summer on record. This death toll was remarkable. Multiple countries in Europe were affected and the death toll exceeded 70,000. Some people are saying that these numbers are actually even higher. And once again though, most deaths were among the isolated elderly so we're looking at a specific population exposed to heat hazard that was particularly susceptible due to their demographic and also their social network, their social isolation. So in that sense susceptibility was very specific to these. It also occurred at a time when many physicians were on vacation because during the summertime vacations are much more focused in the timeframe of the late summer months. In August many, many people around Europe take vacations almost simultaneously. And so for that reason and these other factors there was a very remarkable number of lost - very remarkable loss of life in this particular example. As you can see this is very difficult problem, heat waves occurring in two different parts of the world. Those factors though of susceptibility were remarkably similar. And then once again we see a failure in the response systems being able to handle that and therefore perhaps not being able to save as many lives as could have been saved in a better response.

So of course we should be continuing to try to improve those response but we could also be thinking in terms of how in our own communities that may suffer heat wave disasters, how can we reduce the risk? How can we reduce some of these problems that may occur? We in public health of course cannot reduce the incidence of heat waves. We have no control over the weather that would give us that kind of power to reduce heat. But however there are some things that we can do in reducing people's vulnerability to exposure, vulnerability - excuse me, susceptibility and resilience. So on this next slide I'm going to talk about the capability, once again we're starting with capability based planning. And talking about a very simple plan, a very simple matrix here and giving you some examples of exposure reduction that can be applied to heat waves.

So I've just thrown these in here, please don't take these as being - the subject matter content of this as being the gospel. I'm just throwing some examples up here of how we would use the matrix, how we would - and apply that to exposure reduction in order to have a capability based and operational based plan that can then be applied in our own communities. So for example under the capability of exposure reduction, a strategic objective could be something simple like hazard exposures are reduced. And then there are three operational objectives. Number one, people are warned. Number two, the need for evacuation is lessened. And then number three, people are evacuated. So those are three operational objectives that seek to accomplish the overarching strategic objective. And then for each of those operational objectives I have listed several activities. So for example under the operational objective people are warned, the activity can be develop public service announcements. The second activity can be identify people at risk and so on. And obviously there can be several other activities to that. And then for each of those activities you can see I have identified a specific responsible party. In one case this may be public health. In another case it may be non-governmental organizations or non-for-profits that may do this. For example like identifying people at risk can occur among not only public health but charities, non-for-profits, churches, outreach groups, and special interventions. Many of those groups can be responsible for this community based approach to reducing the risk. Then underneath the operational objective the need for evacuation is lessened. There could be several activities for example perform a needs assessment so that we know in advance which one - which people may need to have these needs for evacuation or potential needs and then provide interventions. For example, provide home cooling for high risk groups or provide other interventions and social networks that can check on these groups and so on in that idea that we can actually lessen the need for evacuation before it occurs.

And these may be performed by nearly the same groups. Responsible parties may be public health, may be charities, outreach groups, may be individual families and volunteers that could help to perform these activities. But once again, reduce the high risk group exposure to the hazard which is heat. And finally the activity of identifying cooling shelters is one of those that would contribute to evacuating people. That could include public health, it may include the local emergency management agencies, and once again the idea of reducing the exposure.

So you can see we try to warn people to prevent their exposures, for example public service announcements that tell people how to avoid heat, how to stay cool, avoid strenuous exercise, drinking plenty of fluids, how to cool down in baths and so on. And then also the need for evacuation lessening that and then finally accepting the fact that evacuation may be necessary but that's once again reducing the exposure, not allowing people to stay in their homes, be exposed to the hazard, and then result in a casualty that we're now treating a medical or a public health consequence, an adverse health event rather than trying to lessen the environmental exposure in this particular result.

So that's an overview of how this matrix can be applied to - this (sores) matrix can be used to write disaster plans. So how would you do this in your community? How would - could you potentially lead a disaster risk reduction planning effort? As we learned earlier in the principles for effective planning, we want objective based plans which certainly that's what this is. We want operational level plans that get down into the detail of activities, responsible parties, and specific guidelines. Once again this matrix serves that purpose. We want a capability based plan which once again that's what this matrix is bringing to us. Here is the other thing that we really need at the community level. We need consensus based plans and this means that the people, the organizations, the volunteers, the public health, the charity, the outreach groups, those that will actually do this work, will actually be involved with risk reduction, must assist in writing the plan themselves. So it's important for public health to be seen as - and medical caregivers to be seen as conveners of these work groups, conveners of these planning committees, and among these groups that are consensus based. So that way we can come to a consensus of how it will be done in our community and agree upon that approach and then do so preferably long before the heat wave occurs.

The second element of this approach for vulnerability reduction is that of reducing susceptibility. So that's our capability for this particular focus. Our capability is reducing the susceptibility to illness or injury as a result of this heat wave. So how do we do that? And actually this is one aspect of disaster risk reduction that is actually consistent with a broad variety of activities that we already perform on a daily basis in public health and medicine. Every day if you are in the public health and medical profession your work reduces the risk of susceptibility among a population. You reduce susceptibility to illness among people when people are healthier. So healthy people are less likely to die in disasters because they are less susceptible to being overwhelmed by the adverse health effects of those particular hazards. So for example, healthy people are a result of promoting healthy lifestyles, being active, diet, etc. Those kinds of things that prevent chronic disease from occurring results in healthier people and therefore people that are less susceptible to illness or injury and then disaster. If people have cardiac disease they're more likely to die in disasters. For example a recent study after the Fukushima tsunami and radiation disaster was looked at congestive heart failure and decompensation or worsening of congestive heart failure among elderly patients as a result of their evacuation from their homes in this disaster. And it was documented that excess morbidity and mortality due - excuse me, I'm sorry, that excess mortality due to that evacuation which resulted from change of diets, change of exercise, lack of access to medications and so on an so forth, it tipped people over the edge that were functioning on a marginal level with congestive heart failure and drove them into situations where it was non-survivable.

That's an example of people that were initially unhealthy to begin with and then the disaster hazard exposure caused their mortality. So the focus once again in the broader sense that healthier people are less likely to die in any disaster regardless of whether you're evacuated from your home, why you're evacuated from your home. The healthy people survive disasters better. And the same aspect when we see throughout the world for health in children. Children under five that are malnourished, have vitamin deficiencies are also more prone to many of the respiratory illnesses that occur and kill many children throughout the world. So once again, healthy people promoting these types of lifestyles and promoting an absence of a lower burden of disease so to speak is really - contributes every day to disaster risk reduction.

The other aspect of this particular operational objective, another activity is promoting healthy homes, healthy homes that are less susceptible to the impacts of wind, of rain, of flooding and so on. Those create a healthy environment that is less - people are more healthy when they live there on a daily basis and certainly also more protected during the disaster itself. Promoting - improving access to healthcare. Good access to good primary care, secondary care, and so on, hospital care, preventive care. All of these things make people healthier and so also are activities that contribute to lessening susceptibility.

And finally there is another example of activities, eliminating health disparities. We know that certain populations after a disaster are more prone, those populations where there may be a health disparity among the population are those people that have a higher burden of disease or illness or injuries within that population. So we can focus on eliminating those health disparities in these regions that have - that are high risk for disasters. We can focus our efforts in those zones, in those areas of high exposure. So once again, focusing programs that reduce susceptibility among populations that are potentially going to be exposed.

And then finally this last operational objective of at-risk groups (unintelligible). And once again another example of an operational objective that makes people less susceptible, I mean, in this case we could improve the social networks for elderly. In the Chicago example, in the European heat wave example, many of the elderly people that died as a result of these disasters actually did so because they were isolated, had few social networks, had few links to the outside where people could number one, identify their needs, where they could communicate their difficulty, and also people that could assist them in being - in mitigating these whether it may be staying in the home in a healthier - lessening exposures in the home or actually evacuation. So once again improving social networks for the elderly can be an isolated event that not only contributes to lessening of risk for heat wave disasters but also lessens the risk for many other types of adverse health events that affect the elderly including also improving behavioral health. As you can see once again in this matrix we assign a responsible party for that.

And finally this last component of resilience - excuse me, this last component is resilience. And this is once again the third component of reducing public health vulnerability to disasters. Here we have a strategic objective, operational objectives, activities, responsible parties, and a specific timeline, strategic objective. Lives are saved during an emergency so once again resilience, the exposure has occurred, people are susceptible, now what do we do when we're in the disaster. And this is the type of thing that many of you have already become accustomed to doing, writing emergency operation plans, responding in disasters with those plans that actually build resilience.

So as you can see under lives are saved, you see three operational objectives. People are able to recognize heat illness, emergency medical services are fully operational which was the problem in Chicago, and clinics and hospitals are also fully operational, another problem that was described during the Chicago disaster. So we can apply activities now both in advance and in disaster as well as during the disaster itself that will achieve those operational objectives. Public education, support of 9-1-1 and also ensuring that emergency medical services have adequate resources, ensure that hospitals have adequate resources. Those are all activities that we would commonly identify as preparedness activities and many of us have been involved intimately with the preparedness movement post 911 so obviously you can recognize many of those. And once again assigning responsible parties. When you are in the planning session in your communities and you are writing out these activities together, be sure to stand up and identify the responsible party. If you're among these different groups, these groups should be at the table during the planning -- public health, public safety, EMS, medical systems. Those are all stakeholders in building resilience and therefore their input is important in this community based plan. And whenever possible, specific timelines. And these timelines may be for example in terms of number of hours after the event, number of days after the event, and so on. So you can see once again the matrix fits this disaster risk reduction model. That may also fit disaster response as well.

So I've really now come to the conclusion of my presentation. And I want to thank you for your interest and your attendance in this lecture. I would also like to challenge you to go forward and talk among your colleagues in your institutions and your workplaces about how you may in your own communities and neighborhoods about how you can work together to reduce disaster risk. And I would also like to turn it over to our moderator so that we can now take any questions that you may have.

Operator:

Thank you. At this time we are ready to begin the question and answer session. If you would like to ask a question please press Star 1 and you will be announced prior to asking. To withdraw your question press Star 2. Again at this time to ask an audio question please press Star 1. One moment for the first

question please. Our first question does come from (Stacy Sayer). Your line is open.

(Stacy Sayer):

Hi Dr. Keim, thank you as always, great presentation. I had a question on the data that you mentioned from Japan. Was that published?

Dr. Keim:

Yes (Stacy) it was published in the Journal of Cardiology.

(Stacy Sayer):

Okay thank you.

Operator:

The next question does come from (Theresa Harris). Your line is open.

(Theresa Harris):

Yes, I just wanted to get the link to the slide show again. I wasn't able to get that down.

Dr. Keim:

Okay, actually is (Michelle) still on the line? Because I think that we can help you offline with doing that.

Michelle Howard:

Yes I am. The link to reach the slides can be found on our COCA web page and so that is emergency.cdc.gov/c-o-c-a. And then you're going to click on the COCA Calls and then you'll see the webinar link where you can reach the slides.

(Theresa Harris):

Thank you.

Operator:

Our next question does come from (Ibad Khan), your line is open.

(Ibad Khan):

Thank you. Dr. Keim, I have a question. Can you please talk a little bit about the challenges of

building resilience in a developing nation as opposed to a nation that has advantageous resources?

Dr. Keim:

That's a very good question and thank you for that and that's actually a very astute question. You know, that's the challenge of resilience is because resilience is actually a much more expensive model in many cases than those elements of exposure reduction and susceptibility that may be as simple as evacuation or changes in behavior. Resilience implies that there is a preparedness and response and recovery apparatus. And we know from as I mentioned from World Bank's studies internationally that we - that the response in recovery components of emergency management are extremely much more expensive, many times over than preparedness, mitigation, and prevention. So those aspects, there is however when we look at resilience itself and we define it as being comprised of preparedness, response, and recovery, there are low cost elements of prepared - of resilience building that we can apply in the developing world and that's preparedness. Preparedness, some of the publications that I've - some of the articles that I've written in the past have defined preparedness as in the 11 E's of emergency preparedness and one of them being education. So education is not necessarily - does not necessarily have to be an expensive undertaking but it is a low cost way to build resilience among populations, to build preparedness among populations. And so I think that's another thing.

Another very important component of preparedness that is one of the 11 E's is actually early warning. And so if a population gets early warning of an impending hazard then it does not require a large infrastructure, a large capital investment in order to be able to maintain an adequate response. For example, if people get an adequate early warning of floods, impending flood, then they can simply evacuate the area at relatively low cost compared to an expensive medical or public health intervention that would occur once these people are injured or become ill. On the same token, when we look at preparedness overall there are many other aspects of that but in addition to education we can also talk about emergency operation planning for example where people have plans on what to do. That's once again a community based effort or an institutional based effort that really takes people sitting around in a room and discussing what they would do to apply their own capabilities to a response. And so there are some relatively less expensive approaches to building resilience in these communities.

But also I don't want to overemphasize that at the expense of reducing exposures.

Long term land use is really an important key element of international disaster risk reduction. And the recent United Nations International Strategy for Disaster Reduction publication stated that really public policy is one of the firm drivers of disaster reduction in the way that we describe it, the way that land will be used and regulated as well as building codes when we build our buildings and in dangerous areas.

And even to the sense of sustainable development for the future. We - of course we are not proposing that if a hospital is in a dangerous area, hazard prone area for example on the shoreline where it could be exposed to a tsunami or in a flood plain that you tear down the hospital now.

But the reality is that sometime in the future there will be - a new hospital will need to be made or an additional hospital will be built. And we can make those kinds of choices when we know that there is going to be that element of development in the resource coordinations where we can build those hospitals in a safer way, we can build them in a more and safer environment and in a safer location. And those also help to reduce the exposures and the susceptibilities of many of these buildings. And I'd like to take this opportunity as well to add to your - just elaborate a little bit further regarding your comment. There - the WHO currently has a program called Safe Hospitals which is focusing on disaster risk reduction as applied to hospitals. In a disaster if the hospital is the first place destroyed then obviously the morbidity and mortality is excess and goes up as a result of that.

So I'd like to refer you to the website, WHO website for safe hospitals as well. That's a great resource for once again reducing exposure but also improving this element of community and hospital resilience. And so thank you for that question. As you can see I feel very strongly about that particular cause you mentioned.

(Ibad Khan):

Thank you very much.

Operator:

At this time I show no further questions.

Michelle Howard:

I actually had a question Dr. Keim. This question is in regards to your suggestions that you can provide for a community public health disaster planning committee on how to - how exactly they would encourage or how to encourage them to use capability based planning.

Dr. Keim:

Well one of the ways is just simply showing the model because, you know, when we show this SOARES model to people around the world, the simple matrix of strategic, operational, goals, activities, responsible parties, and specific items, it's intuitive in human nature. And actually objective based planning is - actually the inventor or the author of the original papers about objective based planning is a Nobel Prize winner. So these are very intuitive to human nature.

We have taken these matrices around the world and immediately upon seeing the weather in rural Asia, in metropolitan Africa, cities like suburbs of Los Angeles and Florida, this is very intuitive for someone to be able to look at the matrix and fill in the boxes. And that helps to give the communities first off just an organizational scheme. Many times the first challenge for that particular committee is where to start. So by identifying what are these hazards and what can we do, what are we capable of to do when they occur or to prevent them from occurring, that matrix is one good start.

Secondly is that it's really important that this be written by the people that are going to do the response. So another recommendation that I would make to the communities or the public health agencies that may be leading these disaster risk reduction planning is that to have the right people there. So and the broader the stakeholder-ship the better. So it should include not only public health and medical facilities but as I mentioned, public safety, it should include outreach groups, churches, charities, neighborhood programs, local action groups of the community. It can include business and it should include businesses that also have impact in the community. It should include other community leaders as well as other sectors that contribute to the overall reduction of risk. It should include policy makers, people that are involved in city planning and community planning in order to be able to come together. So this is a very broad based approach so I think the second answer to that question is the second component is really to have the right people in the room.

And the third component is to really just start, begin somewhere. You don't have to solve all the hazards, you don't have to have all the answers. But as you can see we've talked a little bit today about heat illness. What is the - look at your own community. What's the big hazard for you? In some areas of the Midwest it's tornadoes. In some areas of that same region it may be floods. When we look along the coastline, the Gulf coastline, Florida, South Carolina on the Atlantic coast, many times the problems there may be hurricanes and storm surge. So look at your own community. Identify what may be a significant hazard and then apply your efforts to that.

And lastly, I just want to emphasize as well that becoming active, being - groups like the Medical Reserve Corp that assist many of the in these communities for many of the kinds of things that reduce susceptibility. Those kinds of efforts are also broad based and also effective in reducing disaster risk even though they may not be focused on disasters. If you're part of an immunization program that immunizes people against influenza, if you're part of a program that increases people's activity, tobacco cessation programs, lowers people's cholesterol, gets people better access to medical care. All those things work at a community level to make people healthier and therefore less susceptible.

So I think recognizing the role of those types of activities and doing those kinds of outreach like the Medical Reserve and other programs are so good at doing, blood pressure testing for example and assisting elderly people in becoming networked socially. Many of those not only affect disaster risk but they affect the long term health and welfare of people even if they never suffer from a disaster. And therefore they're what we refer to as a no-regret intervention. They help even though there is never a disaster. Compared to if we go out and buy expensive disaster response equipment and that response equipment sits there for 20 years and never helps. This is money well spent that doesn't take away from other things as well, it still helps. So thank you for that question, that was really a great point that you – great thing to point out. Thank you.

Michelle Howard:

Thank you Dr. Keim. On behalf of COCA I would like to thank everyone for joining us today with a special thank you to our presenter Dr. Keim. If you have additional questions for today's presenter please email us at coca@cdc.gov. Please put September 18 COCA Call in the subject line of your email and we will ensure that your question is forwarded to the presenter for a response. Again that email address is c-o-c-a@cdc.gov.

The recording of this call and transcript will be posted on the COCA website at emergency.cdc.gov/coca within the next few days. Free continuing education credits are available for this call. Those who participated in today's COCA conference call and would like to receive continuing education credits should complete the online evaluation by October 17, 2012 using course code EC1648. For those who will complete the online evaluation between October 18, 2012 and September 17, 2013 use course code WD1648. All continuing education credits and contact hours for COCA conference calls are issued online through TCE Online, the CDC training and continuing education online system at www.2a.cdc.gov/tceonline. To receive information on upcoming COCA calls, subscribe to COCA by sending an email to coca@cdc.gov and write Subscribe in the subject line. Also CDC launched a Facebook page for health partners. Like our page at facebook.com/cdchealthpartnersoutreach to receive COCA updates. Again thank you for being a part of today's COCA webinar and have a great day.

Operator:

Thank you. Today's conference has ended. All participants may disconnect at this time.

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