16th annual MCH EPI Conference, December 15th, 2010. San Antonio, TX—Welcome and Keynote

WANDA BARFIELD: Good morning, everyone. We're just about to begin. Good morning and welcome to the 16th annual Maternal and Child Health epidemiology conference. [Applause] As we begin, I would like to welcome a distinguished local speaker and public health servant, Dr. Fernando Guerra, he's the director for San Antonio mental health. He has a longstanding involvement in pediatric care and health policy and has responsibilities including research, program and policy development, legislative issues and health planning. The mission of metro health and its 400 employees is to promote the health and prevent the disease of residents and visitors in San Antonio in the unincorporated areas of Baxter County. He oversees a budget of over $37 million and the operation of more than a dozen locations throughout the community. He's committed to improving health access through systems for infants, women, children and the elderly. He's an advocate in the prevention of domestic violence and child abuse. He has also been a practicing pediatrician and serves in the community as clinical professor of pediatrics, University of Texas, health sciences center. And also at Brooks Air Force base and a professor in the School of Public Health. I would like to now welcome Dr. Guerra. [Applause]

FERNANDO A. GUERRA: Thank you very much, Wanda. Let me thank all of you for the privilege of hosting you here in San Antonio and at the same time as we say in Spanish, welcome and on behalf of the city, the mayor, the city council, because mine is both a city and county department, also the county judge and the commissioner's court extend a very warm welcome and for some of you, I know it's great respite to get away from the brutal weather you're having in the northeast and other parts of the country where you've now had quite a few days of some pretty intense snowfall and very cold weather and what have you. For me as the local health officer here in San Antonio where we have an opportunity to welcome any number of groups, it's always very special when one has an opportunity to welcome one's colleagues in public health and certainly in the field of Maternal and Child Health, this is something that for us is always very special because really, this is the heart, I would have to say, of public health, which

obviously is overarching to all of the different areas that we do in public health. We must assure the health and well-being of the entire community but especially women, women in their childbearing years and their infants in their very different stages of development. I hope that during the time that you are here, that you will certainly enjoy what our city has to offer, which as you know, this is a very special time. The weather is wonderful. I can assure you the fog will clear in a couple of hours. And then you also have the river walk close by, which, you know, with the lights that are placed on all the trees along the river walk that are especially colorful at nighttime and any number of different establishments along the river walk. I would also encourage you if there is time in your conference to maybe take the barges to the extended part of the river walk that takes you to some of the museums upstream where we have some of the very unique collections at the museum of art and in particular the Mexican folk art exhibits that are there, which is something that is very special and something that you probably will not see in other places. As I share that with you, I also want to obviously as a health officer need to give you some reassurances. I can assure you that I did look at the scores of the food establishments and they look pretty good. You have to be careful, though, with the Margaritas and some of the hot sauces because if you're not accustomed to them and if you were here 30 years ago you're probably a little out of practice, because it takes a while to develop the cumulative resistance to some of the salsas. But I do want for you to certainly try them because they have great, great flavors. I understand from some of my staff in the food and environmental services, that they've had reports of occasional sightings of bed bugs. But I can assure you, the hotels in this part of the city have not had that problem and so I think you're fine unless you brought some with you from the northeast where they've had some significant infestations. We'll certainly have to see if there is any residual affect from those but at any rate no emerging diseases. We've had very few confirmed cases of flu and I'm hoping that some of that is certainly directly attributable to what we've tried to do with our flu vaccine campaign. This year has generated a lot of interest and I hope will have good coverage levels, especially for women in their childbearing years and those that are pregnant as we tried to do in other years and, of course, families with young infants and children. So I think from a public health standpoint, you know, you can be assured that you are in a healthy place and one that I hope you will certainly appreciate. You know, what public health also can do in a community that attracts any number of meetings with people from the international community and that certainly, you know, come and spend time here in any number

of different activities. In fact, just an interesting anecdote, when the Toyota manufacturing and assembly plant was making a decision a few years ago whether or not they would locate one of their plants here, it was interesting that I had some conversations with some of their executives. They called before they made the decision and they really wanted to know what kind of a workforce they would be able to draw from for their assembly lines that have certain ergonomic kind of requirements. They wanted to know more about the height, the weight and all of that. It was very interesting to have that conversation and so it is, I think, where public health really needs to have those kinds of opportunities to inform and to help in decision making that ultimately have a benefit for communities, as I know many of you participate in those kinds of activities in your different roles of public health. Let me just share with you some of our data that relate specifically to Maternal and Child Health and at the same time some concerns that I see in your program or areas that are of great interest, those -- the work in the field of Maternal and Child Health and I can tell you in public health in administrative physicians and certainly overseeing clinical services and what have you. But I want to call your attention, because there has certainly been a lot of effort in the last several years to address the issue of obesity. We're very fortunate here that we did receive one of the large stimulus packages for $15.6 million to specifically address obesity in terms -- at the level of the community but looking at systems, at policy and environment. Working with schools, working with the medical community, working with the business and corporate sector. And that hopefully will give us some opportunity to affect some changes over time because right now almost 25% of women in this community who are pregnant are already overweight. We have also tracked that population over time and have found that almost 50% of those ended up being delivered by C-section, which is an extremely high rate for C-sections in any population. Only about 24% of the obese mothers that were recognized as being overweight before they started their pregnancy stayed within the guidelines that the Institute of Medicine offered in the last year or so, which, as you know, were revised somewhat to really account for population that has certainly moved in the direction of being overweight and obese. As you know, nationally, 31% of live births are by C-section. Right here in our community 36% are being delivered by C-section. Along with that is the great concern that I know is going to be part of your discussions, and that has to do with the late pre-term live births. That in our community have increased two-fold in a period of about eight years. And that's of concern because we have unfortunately found significant risk in those newborns that are

delivered early, whether by induction or C-section where those numbers have definitely increased, the hospital stay has increased significantly and the costs, obviously. Unfortunately sometimes the outcome is not as good as we would have hoped. The other area that is of concern here, because we have noticed a 200% increase over the period of about 5% and that is the infants of substance abusing mothers. And in many instances, these are mothers that have been recognized for some time but they will go across several pregnancies still, unfortunately, accessing a variety of illicit substances but when they're on some of the treatment programs, like methadone, unfortunately there are not good community-based standards with dealing with that population and sometimes the methadone that are used in those mothers are very high and the babies are neonatal intensive care units for extended periods of time as long as two to two and a half months. A sad indictment of a system that is not working with that population. And as you look at any number of these interrelated factors, I think it is important from a Maternal and Child Health, epidemiological standpoint to see where we might be able to intervene to really try to make some differences. Some of these are going to be very difficult because they have to do with some social behavioral and risk taking kind of considerations. But right now we have the birth -- of 30,000 a year. We have a population base of 1.6 million. Almost 70% of our birth cohort is now Hispanic, predominantly Mexican American. 42% of these -- 46% are to single mothers. In many of these their second and subsequent, -- childbearing having started at a young age. This past year we had five 21 year Olds that gave birth to their sixth child. That's a failure of a system. All of them were delivered by our colleagues, obstetricians, gynecologists, all delivered in hospitals and supposedly intervened with social casework and case management, what have you, but unfortunately those behaviors haven't changed and so, you know, it is very, very difficult to really show improvement when we're not able to get the differing elements of the systems to work together. So perhaps in the time of healthcare reform there may be some opportunities. The other thing that I just want to complete my welcoming comments and to give you that overview, there has been certainly an emergence of those community-based pregnancy screening clinics, for profit, done by hospitals primarily and unfortunately they're not set up in a way. That's not their interest, to then take out those that screen out negative and really work with them to get them into family planning or change their behaviors, those overweight to get them into weight management and improve lifestyles, stop smoking, change those behaviors and consequently what we see is they're selected those out to get them into a system of care and

delivering them but they haven't done anything about changing the risk factors or the subsequent circumstances that lead to things. From an epidemiological standpoint that does warrant some very important studies and interventions and it's something that we're trying to work on with some of the hospital systems. The other is still the concern about the risk factors for abuse and neglect of children, there may be a way to develop some predictive scores to give us early indication. One of the things that we've continued to observe over time now is the starting childbearing at young ages but not that the adolescents are necessarily perpetrators or at risk but when they've had their third or fourth pregnancy before they're 20 years of age serves as a marker. We'll look at that in the WIC population presently serving 50,000 mothers and babies per month that gives us a good way to track these populations. So again, let me wish you very well, enjoy your stay here in San Antonio. Have good holidays and a wonderful and healthy season and thank you very much for this opportunity. [Applause]

MICHAEL KOGAN: Thank you, Dr. Guerra. Good morning and I would like to welcome you all to this year's MCH-EPI conference. I would first like to thank the conference organizers, and the conference planning committee for what plans to be an exciting meeting. I gave up a trip to South Africa this week to come here to San Antonio. The trip was a conference where CDC's Division of Reproductive Health will assist reproductive and MCH Training to build capacity globally particular fly in Africa. One of our alumni and former MCA EPI assignee, Dave Goodman, is in my place. Although I know that meeting will be important and interesting, there is no question in my mind that I needed to be here and wanted to be here. For me this is a true homecoming and I wanted to share some good news of what is going on at CDC. As some of you may know my first encounter with MCH-EPI was back in 2000 and as an attendee at the 2001 EPI conference. It is now sweet six and grown. Many of you are here and were the founders of those initial meetings and it's grown into an important force in informing and shaping the field of Maternal and Child Health. I grew up here through these conferences even bearing a few kids, my son there is at the MCH-EPI conference in 2001 as a six-month-old but along the way I reached adult hood and I find myself as the new division director of CDC's Division of Reproductive Health. [Applause] So how did I get here? Actually, I believe it is based on my exposure to the great MCH leaders, mentors, MENTEES and working with partners to improve public health and learning of the importance of translation for data in evaluating and shaping programs to make a difference for the lives of women, infants, children and families. So

I got here many ways thanks to all of you. Now as the new division director I'm privileged to take what I've learned and to continue to learn from all of you to improve the field of MCH epidemiology in this new position at CDC. CDC's vision under the leadership of Thomas freed en wants to improve public health through partnership, evidence-based data and building capacity at the state and local level. This strategic vision will allow us to hone our division's priorities to have a more focused impact and serve the public's health better. This will help us to better serve states, tribes, territories and regions in collaboration with other offices and the centers for CDC hutch as MCHS. To be more responsive for the requests for technical assistance as we did in collaboration for the Division of birth defects and. We're better preparing for more proactive response to disasters such as Haiti's cholera epidemic. We'll continue to work with HRSA and MCHB to build MCH capacity and thanks for your feedback in the reports on MCH-EPI capacity. Our division is poised and has the opportunity to think about cross cutting, the reproductive life span. I just want to share with you some of the examples of how data is informing policy here in the U.S. Adaptation of material for contraception use that provides evidence-based guidelines for care. Data using -- to -- data that also shows the increases in pregnancy-related maternal mortality and reveals the role of chronic disease. Data on randomized trials in maternal and infant antiviral drugs to help reduce HIV transmission in resource-limited areas and systematic reviews that indicate the benefits of perinatal regionalization. We'll continue to do work in terms of communities and working with community transformation. We have some recent grants that will help to show some of that evidence, as well as the work that we're doing in teen pregnancy prevention, which is the president's initiative and winnable battle. In collaboration with the Office of Adolescent Health we're going to wage that war together. Of course, we want to continue to strengthen our partnerships with you. So someone asked me how is it going? It's fun work and I'm no stranger to that sort of thing. My clinical life I worked many long, hard hours in extremely difficult situations but was successful in improving infant lives because I worked with a team of dedicated nurses, doctors, technicians, laboratory researchers and families. So it seems only natural for me to want to do this hard work with you as a team, a wonderful team of epidemiologists, program managers, clinicians, policymakers and families. With tough fiscal times ahead the road may seem long but it is important to note that right now this conference has huge impact nationally. It is having global impact in Africa by providing a model of using data

to improve the lives of women, infants and children and I look forward to traveling along with road with these new areas along with you. Thank you. [Applause]

>> Good morning, everybody. I'm Michael Hogan from the Maternal and Child Health Bureau and I would like to welcome you to the phone interference. To the conference. That didn't work, either, hold on. [Laughter] Let me start off with the good news. [Laughter] Number one, I figured out how to use this thing. Number two, our partnerships with CDC continue to be strong and, if anything, they're getting stronger. Our partnerships in the field with organizations like CityMatCH, AMCHP, CSTE and March of Dimes also continue to be strong. There was a recent report on MCH capacity by the council of state and territorial epidemiologists. What they found was that 55% of jurisdictions had substantial to full MCH epidemiologic capacity. Only 43% in 2004 and I believe only 35% in 2001. In fact, if you look at it since 2001, MCH-EPI has had the second largest growth among the specific areas for state epidemiologists after bioterrorism. We've made tremendous strides in that area. In addition, only 12% had minimal MCH-EPI capacity and it was 25% in 2004. Almost half of MCH programs now have an epidemiologist with a doctoral level of training. In addition, 80% of MCH programs have a lead epidemiologist so we have many things to be proud of in this field and yet you don't have to be a genius to know that we're in tough times. I'm sure many of you have experienced cutbacks or furloughs in your states and local areas. Also from that report, among states that have less than full capacity, almost 100% cited as a major barrier was lack of staff. In addition and this is a worthy discussion both at this meeting and at future meetings, only 38% of MCH epidemiologists reported that they were substantially involved in policy decisions. So again we have to work on the disconnect between data and policy. At the Federal level, things are tough, too. You probably heard about the budget deficit. In fact, at HRSA, this is our old HRSA logo. And in reflection the times we changed the logo recently. [Laughter] Actually, I just -- now that I think about it, can we keep that last slide a secret between me and the 500 of you and not tell our office communications? I'd appreciate that. So to end on a good note, MCHB is redoing our strategic plan, we're turning more towards looking at the Life Course model with more of a focus on social determinants. And that's based on a few concepts, that today's experiences and exposures determine tomorrow's health. That health trajectories are particularly affected during critical or sensitive times. That the broader environment, both the biologic, physical and social environments strongly affects the capacity to be healthy and that any quality in health reflects

simply more than genetics and personal choice. We've been doing that for the last year. In regards to that, we have the 2011 national survey of children's health starting in the field in the next month or two and we're going to make some changes to that. We're going to try to enhance Life Course and social determinants content. Some modifications to existing questions, adding new questions, and measuring points along the Life Course trajectory. After a number of years, we're going to have a regional MCH epidemiology course -- I mean conference and we're doing this, this is jointly -- is that the person from Idaho who just clapped? [Laughter] Again, we're doing this in partnership with CDC and we are doing it because we want -- we thought there must be more focus on local MCH epidemiology and we also looked at the people who came to a conference and found that it was underrepresented by people in the west, maybe because of travel restrictions. So this meeting will have more of a focus on local, regional and tribal MCH-EPI. It will be June 19-21 in San Francisco, California coordinated by CityMatCH. The MCH-EPI course which we've had every year we'll continue to hold this year and it is scheduled at this time for May 16-20 in either Chicago or Minneapolis. And now I would like to introduce -- I have the honor of introducing our keynote speaker, Dr. Michael Kramer. Dr. Michael Kramer is the James McGill professor in the departments of pediatrics, epidemiology at McGill university faculty of medicine. For the last 7 1/2 years he's been the director of the Canadian equivalent of the National Institute of child health and human development. He's been a national health research scholar and a national health research scientist of health Canada's national health and research and development program. He's also served as the president of the society of pediatric and epidemiologic research from 1995 to 2001; he chaired the steering committee of the Canadian Perinatal surveillance system. Dr. Kramer has authored or co-authored 20 books and mon graphs and has published over 300 original articles. He's received numerous awards from the medical -- from organizations such as the Canadian medical research council, the Canadian pediatric society and honored by this conference in 2007 received the Greg Alexander advancing knowledge award. His monograph, for -- one of his monographs on the determinants of low birth weight, a meta-analysis is considered a classic in the field. His other monographs have looked at issues like clinical epidemiology and biostatistics and principles of research. His articles have covered numerous topics, including measurement of gestational age, birth weight and infant mortality, causes of low birth weight, intrauterine growth retardation and socio-economic status and disparities in pregnancy outcomes. His work on the promotion of

breastfeeding, the promotion of breastfeeding intervention trials has led to numerous publications and yes, actually, I went through all his publications. In fact, having Dr. Kramer here has cost me money already because I made the mistake of deciding to bring his CV on the plane with me and so when I got there, I tried to check it in, they made me pay an extra fee for too much baggage. [Laughter] This is just the addendum with just his articles. I've been through them all. In fact, there is a typo in article 297, by the way. And no, I'm not making that up. And -- but I would like to conclude the introduction by saying I'm truly honored he is here. I have admired his work for over 20 years. The measure of a person's life and a person's career is, did you make the world a better place? And you look at his work and you look at an example like his systematic review of the evidence of the duration of exclusive breastfeeding and it led directly to new infant feeding recommendations by the World Health Organization and the World Health Assembly. When you look at work like that, you know he certainly passed the test of making the world a better place. So with that I would like to introduce Dr. Michael Kramer. [Applause]

MICHAEL KRAMER: Thanks very much, Michael. I knew it was going to be a challenge to follow David barker who gave this talk last year but it is probably a harder task to follow Michael. And I don't have the joke that he has or his ability to make them on the spot. That was a very nice introduction. I don't know if I can live up to that. I gather David barker must have talked to you about Life Course epidemiology and the importance of Maternal and Child Health for long term adult health. I'm going to talk about much more immediate things. Changes that are occurring as we speak that -- changes that have occurred over the last 10 or 15 years and likely to occur over the next 5 or 10 and some concerns I have about whether we're moving in the right direction. And although I wouldn't claim that I've made the world a better place, I hope that some of you will share my concerns at the end of this talk and maybe together we can make this world a better place and think hard about what we're doing and whether we're actually doing more good than harm. I'm going to talk about how increasing obstetric intervention is changing the perinatal landscape. In some cases for the better, I think. In some cases I will argue for the worse and in some cases we don't know. And I think a lot of the things I'm going to talk about are not discussed enough and are underappreciated. I'm going to talk about some specific obstetric interventions you see on this slide. I'll talk about infertility treatments, IVS and ovulation stimulation and pre-natal diagnosis and pregnancy termination and its affect on infant mortality. And infant mortality rankings across the world. Talk a lot about labor induction and a

little about cesarean delivery. The pregnancy outcomes that I'm going to talk about include pre-term birth, multiple birth, post term birth, still birth. Gestational age and birth weight at term. Infant mortality and I'm starting with the infants in the fetus but I'll finish with the months getting the M back in MCH and talk about two major causes of maternal morbidity, embolism and postpartum hemorrhage. I'll show you data from Canada and the U.S. because I was there and have easy access to. A lot of what I'm going to show you is pretty typical of what is occurring in most developed countries and in some developing countries as well, I would add. Here is Canada's pre-term birth epidemic over a little bit more than a quarter century from the early 80s to 2007, the most recent year we have data. As you can see, the pre-term birth rate was stable or going down in the early 80s. From the early 80s until 2005 continued to rise and has come down since 2005 a little bit. The comparable data from the U.S. which I think it's important to stratify by race in the U.S. just because the rates are so different between non-Hispanic whites shown in green here and Blacks shown in red and a couple of features I want to point out from these data. First of all, the downturn finally -- the rise, certainly, in the non-Hispanic whites throughout this period until the last year or two where there is a little bit of a stabilization and downturn. The reducing disparity, which is good news, between Blacks and non-Hispanic whites. And one more feature is that the rate at the beginning of the 80s, which is about 8% in non-Hispanic whites is about as high as it ever got in Canada in 2004-2005. So it started out as a higher rate and continued to go up despite that and we can say more about that perhaps if there is time in the question period about why that is. Now, as you all know and it was alluded to by Dr. Guerra, most of the change that has fueled this pre-term epidemic both in Canada and the U.S. has been among late pre-term births. Births occurring between 34 and 36 weeks. The entire gestational age distribution has shifted to the left with fewer post term births. More early term births. I'll say more about that a little bit later. And more late preterm births but no major increase, at least, in the more substantial pre-term births those below 34 weeks. We've seen the same thing in Canada. One of the things driving this increase in late pre-term birkts is the increase in multiple births. I've shown U.S. and Canada rates from the early 90s to 2006. They're a little higher in the U.S. than Canada probably because of greater access to ART technologies. But in both countries the rates -- the increase has been parallel. They've gone up about 1% of all births and most of these occur in the late pre-term period between 34 to 36 weeks and it's not rocket science if the pre-term birth rate -- the multiple birth rate goes up by 1% and

half are pre-term you'll raise your pre-term rate by 1/2%. About 4% during that period from the early 1990s to 2006-2007. So we have a lot more of the increase to explain. But focusing a little bit on the multiple births. What are the reasons for the increases in multiple births? Part of it is due to the more older mothers delivering. We know that multiple rates increase with maternal age. These are data from Sweden. It's one of the few graphs I'll show you from outside of Canada and the U.S., looking at twin births, the main drivers of the increase in multiples. Most multiples are twins. From the early 70s to mid 90s. The top solid line there. I think I have a laser pointer here. The top line, I'll use the laser pointer on here. The top line here, the solid line is not standardized all relative to 1971. Over this quarter century the overall increase in twin births was about 70% higher in 1995 than in 1971. A third of this increase was accountable by increases in maternal age. If you standardize the Maternal and Child Health age that's a third. Another third is responsible -- is due to IVS and most of the rest of it is due to ovulation stimulation. They have good data on IVS but not so much on ovulation stimulation. There was a study that came out from the CDC trying to estimate what percentage of multiple births in the U.S. in 2005 were due to ovulation stimulation. And as you'll see its substantial. This was based on comparing multiple rates adjusted for age in 2005 with those in 1971. And estimates of the risk of multiple stations given ovulation stimulation and successful pregnancy, 9% for other oral estrogens which stimulate -- it's about 9% of these pregnancies result in multiples and 14% of the other stimulated pregnancies end up with multiples. They used those bits of information and the rates of use of these ovulation stimulants that about a little less than a quarter of the multiples in 2005 in the United States were due to ovulation stimulation. It is not all ART or IVF. But as I mentioned multiples are only responsible for about 1/8 of the increase in pre-term birth over the period I showed you in the U.S. and I'll argue that major reason for the increase is labor induction. Now, these are rates of labor induction in Canada where we can separate medical induction and surgical induction. They're not mutually exclusive. The rates rose until early 2000 and have leveled off since then. These are rates of induction and cesarean over a 16-year period in the U.S. These are births at 34 to 36 weeks. You can see that the rate of induction among these late pre-term births has more than doubled over a 16 year period. That's a huge change. Some of these babies would have probably delivered pre-term had they not been induced, but this increase from 8% to almost 20% over just a 16-year period has to be responsible for a major fraction of this only 4% increase in pre-term births over the period. This

I think is really what's been driving the pre-term birth epidemic in Canada and the U.S. Cesarean rates as these gestational ages has also gone up but cesarean has gotten too much attention with respect to the pre-term. There are other effects of cesarean I'll mention late later in my talk. Most of these are not primary cesareans. There aren't a lot of obstetricians starting to do a C-section in terms of an emergency of 34 to 36 weeks before labor begins. I think it's induction. We don't have good data on how many cesareans occur before the onset of labor in the U.S. or Canada but I think it's the induction rates driving the increase in both countries. Here is some data from the U.S. just comparing singletons, and comparing over an 11-year period from the late 80s to 2000 and the overall rate of pre-term birth went up just a little bit during this time among singletons. There was actually a drop, which I think is probably just diagnostic coding, in rupture of membranes as the origin of pre-term birth. A slight drop in spontaneous pre-term birth among singletons, that's this third line down. The top line, the one that's been driving the increase in pre-term births among singletons and the indicated ones. Most of those are following induction. And those trends differ according to race so that for spontaneous pre-term labor, there really wasn't any significant increase between 1989 and 2000 in whites. As I said, I think probably because of diagnostic coding issues, the rate -- this is 2000 versus 1989 -- dropped in both whites and Blacks for pre-labor, pre-term rupture of membranes and indicated increased 50% in whites and about 30% in Blacks. So the smaller increase in Blacks in indicated pre-term births and the drop in spontaneous pre-term labor in Blacks is responsible for this narrowing in the racial disparity that's good news. It is good news there is less spontaneous pre-term labor in Blacks. I'm not sure that whites had more access to medical care was necessarily, induction to get an indicated pre-term birth. That's not the best way to reduce racial disparities is increasing pre-term births in whites, but that is what's happened. Let's get back to labor induction which is my major message today. What's the evidence about its benefits and harm, potential harm? Now, there have been some randomized trials for routine induction versus watchful waiting and this is taken from the latest review. You can't read it. It's not important. The details are not important but this was routine induction, these top two trials are from 37 to 40 weeks. Mostly 39 and 40 weeks. Not a lot of routine induction being done there. A fair number at trials at 41 completed weeks. And here you see this. A couple of small trials at 42 weeks. The data are pretty consistent regardless of the gestational age from 37 to 42 showing a reduction? Perinatal death and if you combine the 41 and 42, this is a reduction in death are routine induction and that

has fueled some of the increased induction not only post term but even at term and pre-term. Good news is, this routine induction does not seem to have an increase -- does not increase the risk of cesarean. The same trials, all of them have data on cesarean and perinatal death but there is no suggestion of an increased in the risk of cesarean with routine induction. There seems to be in most of these trials at 41, 42 weeks evidence of reduced perinatal deaths and still births. Most of those are occurring before birth. Most of those reduction in death rather than early neonatal deaths. Now, as you can see in Canada, and the largest trial for routine induction which was at 41 weeks or more was the P.I. was from Canada, Mary Hanna, published in 1992. You can see just for comparison's sake the green line is pre-term birth rate. The post term birth rate has gone down during this period from around 8 -- 4 1/2% to 1/2%. The post term trial from Canada was published here in 1992. So you see following publication of that trial in particular, which was much larger than any other trials, routine induction has resulted in fewer and fewer births of 42 weeks and more post term births. So that trial had a major impact on obstetric practice in Canada. Based on the reduction in still births that is probably a good thing. The problem is our obstetric colleagues are doing more inductions at term and even at pre-term, as I showed you. The increase in induction rates from 34 to 36 weeks more than doubling over a 16-year period. So again, the -- this is from 1981 to 2007 showing the pre-term birth rates again in green and the still birth rates greater or equal to 500 grams. We only have data to 2004 or so. You see most of the reduction in still births occurred well before this post term induction trial. Most of this reduction occurred prior to 1992 and you could argue that this stabilization here in the early 1990s and then the reduction after that was due to the routine induction at 41 weeks and beyond. Most of the reduction in still births must have been for other reasons. Other good things the obstetricians were doing, improvements in maternal health but most of it has occurred in Canada occurred before this practice of increasing routine induction. So again, more on induction. How do we study the effects of induction? It turns out to be a pretty complicated thing. The best approach as I showed you before are these randomized trials. But most inductions are done for specific clinical indications rather than routinely. Certainly the ones in the pre-term period in the late pre-term period I showed you are being done for certain things. Not routinely. Not many obstetricians are routinely inducing women pregnant at 34, 35, 36 weeks. How do you study them all? Not just the ones as routine but expected management in the post term period? The best approach is an RCT. There have only been a couple of small ones in that period as I told

you. What about observational studies? The problem with observational studies of induction is they're confounded by the indication for induction. If the obstetricians are reducing not routinely but specific things it will make it look bad but they're women with complications. The fetus has signs of not growing well, reduced fetal movements. They're all done for specific clinical indications. The results will be worse than those not induced. That's an unfair comparison. Moreover, we don't usually have data on our birth certificates or yours on the indication for induction and so even if you wanted to try to control for that, you couldn't in an observational study and you have the problem with temporality. We just have check boxes or a discharge diagnosis or a procedure diagnosis that an induction was done but we don't know whether it was done before or after a still birth. Still births are delivered as soon as possible usually by induction. It could be the still birth that leads to the induction rather than the induction protecting against still birth. It really is a mess. We've tried to look at an ecological analysis to observe the effects of induction. And we take advantage of the fact that there are large variations among states. You have 50 states plus the district of Columbia. We have only 13 provinces and territories and you have a larger population. It's easier to do these studies on U.S. data rather than Canadian data. I'll show you the variations among the states is due largely to practice style rather than one state having more women with a particular clinical indication than another. I think it gets around the problem of confounding by indication. It also gets around the temporality issue because there is no difference probably in the states to the extent to which inductions are used to deliver babies -- fetuses who have already died in utero. The differences in practice style among states and over time create a quasi-experiment that you can compare rates of good and bad pregnancy outcomes according to the state at the level of analysis. This is one analysis we carried out looking at still births over a six year period from 1987 to 1991. The data has been stratified by race. The red and green lines, these are gestational age specific still birth rates expressed per 10,000 fetuses at risk or ongoing pregnancies. The red line is the -- are the data for whites six years later in 1997. And as you see there is a -- the rate is higher and I'm going to come back to this a little bit later as to why it's higher between 20 and 24 weeks than it is later on. But it starts to go up substantially in around 30 weeks, 32 weeks and then there is no -- really no difference. There is a little bit more still births in 1997 and 1991. I'll come back to that again among the whites and the Blacks. The Blacks are the blue and purple lines. At these early gestational ages. But they are fewer in the whites as you get to about 40 weeks, 41, 42

weeks and even 43 weeks, they are fewer in 1997 than there were in 1991. There is not much difference here in the 30s and as you get to 40 weeks and then the post term rate there are fewer still births suggesting this is before the publication of the Hanna trial, by the way, suggesting that something has reduced still births in this term and post term period particularly among whites. In the black we also see this increase between 20 and 24 weeks and no change until 42 and 43 weeks only in the Blacks in 1997 versus 1991. Here are the induction rates over this period. Again, same color code for the red and green for the whites and you can see that the induction rate at each gestational age has almost doubled. In a six-year period huge changes over a short period of time. You're taking almost a double induction rate even at the low gestational ages in 1997 versus 1991 in whites and the blue versus the purple almost equivalent in terms of almost a doubling of the rates of induction between 1997 -- 1991 and 1997 in Blacks as well with lower induction rates in Blacks than in whites. If we adjust for induction, using the state as a level of analysis based on a plus on regression, for all births occurring between 40 and 43 weeks, we can see that for all women -- all white women it was about a 21% reduction. But when we adjusted for induction, all of that reduction in still births disappeared suggesting that it was induction. This is again using differences in the state levels of induction between 1991 and 1997, as an explanatory variable for the change or reduction in still births over the same time period, that the 1997 versus 1991 was essentially -- there was no change once the differences in state level rates of induction were encountered for true among low risk women, women between 20 and 34 years of age without any pregnancy complications and true in high risk women. Among the Blacks there was a reduction in still births that was not affected for adjustment for induction at the state level and that was true also in low risk and high risk black women. So in blacks the reduction in still births we saw between 1991 and 1997 did not appear to be attributable to induction. When we restricted this for Blacks to 42 and 43 weeks, however, where we saw the reduction in still birth rates we did see the disappearance among the high risk black women of the risk for still birth once we adjusted for induction. But not among low-risk women and not overall. Suggesting that at least among high-risk women the reduction in still births between 42 and 43 weeks could be accounted for by the increase in induction rates at 42 and 43 weeks. This is good news. It suggests that late in at or after term that induction rates over a six year period had a benefit in reducing still births in both Blacks and whites in the United States. I'm now going to move to -- I'll come back to that slide in a second. I'll now move to a discussion of what has

happened at term over about a 30-year period and how this -- these changes have been responsible -- have been linked to induction and cesarean section. This is a study, these are data from U.S. Whites. We didn't have Hispanic versus non-Hispanic back as far as 1972. A lot of people in this room are probably not aware that the mean birth weight over a 15 years birth rate increased by 60 grams among term and post term births, 37 weeks or more. And that since around 2000, or the late 1990s, we've lost most of this increase in mean birth weight among term births. And virtually all of that change in birth weight, at least between 1992 and 2003, has occurred as a result of the changes in the gestational age distribution among term and post term births. This is an 11 year period. These are remarkable changes in a very short period of time on what are the majority of births. Those occurring at 37 weeks and beyond. We're still talking about almost 90% of the births in the United States. Starting at the highest gestational ages of 42 weeks and more, these -- as I showed you in Canada, these post term births have virtually disappeared. That's the bottom line here, the dark brown line. They've gone from 4% to less than 1% over this 11-year period. 41 week births, this dark blue line have also reduced substantially. They've reduced by about a third. And even term -- the normal term births from 40 weeks, remarkable decline over an 11 year period. On the other hand the early year term birth, 39 weeks has increased in frequency as a proportion of all these term and post term births and starting in 2003, actually exceeded the proportion of births at 40 weeks. The gestational age is no longer 40 weeks, it's now 39 weeks. This is among non-Hispanic Whites. 38 week births have become much more frequent. 50% increase. And 37 weeks, the early -- these very early term births have increased by over 50%. So fewer births at 40 weeks and beyond. More term births at 37, 38 and 39 weeks. Major changes over an 11-year period. How much of this -- these changes can we explain by changes in induction? We've used an ecological approach here to try to assess the effect of induction on these changes over this relatively short period of time. What I'm showing you here on the X axis is the change in rate of induction among states and as you see, most states between -- over this 11-year period increased their induction rate by 10% or 15%. A huge change. Some increased by 20 or more than 20%. A few didn't change. And one state here actually had a reduction in their induction rate. Most were in the 10 to 15% increase. This shows the change at the state level in the mean gestational age and days. Most states decreased their mean gestational age again among term births and post term births of three or four days and there is a highly significant negative correlation. The higher the increase in the

rate of induction, the greater the decrease in gestational age. You can see there is a line there. If we look at the cesarean rate over the same period of time, there is no significant correlation. Most of the increases in cesarean rates and most of these cesareans are not necessarily done before the onset of labor. Most of them were in the 4 to 6% range and there is no clear correlation here with the change in gestational age. Birth weight showed the same relationship at the state level. Mean birth weight showed the same relationship strongly negative and highly stat statistically significant as I showed you with gestational age. Most of the changes in birth weight among these term and post term births were over the order of 40 or 50 grams or so. Change in macro **** rate defined as greater shows the decline relative to the increased rate of induction. So these changes in gestational age. The shift toward earlier term births, what does that mean in terms of the health? I'm not even talking about the long-term health but the short-term health of the babies born at 37 and 38 weeks. What I've shown on this slide are for the U.S. non-Hispanic Whites between 1995 and 2001. All these years combined. Very large numbers. You don't see too many deaths among 37 and 38 week babies but if you combine these seven years of data show neonatal mortality rates on the top. These are adjusted odds ratios for neonatal death or post neonatal death versus 40 weeks at the reference. No significant difference of 39 and 41. Neonatal deaths are 20% higher among the 38-week babies. Among the 37-week babies it's about 80% higher for 37-week infants and 50% higher for post neonatal mortality for the 37 week infants. There are a lot of babies being born at those ages and it's having an adverse effect as far as we can tell. We don't know what would have happened in the absence of induction but the suggestion that these babies as a whole are not doing those born at 39 weeks and beyond. Now, we've taken advantage of the -- one of the studies that Michael mentioned, this trial where we had about 14,000 babies who were in a breastfeeding promotion trial who had I.Q. tests. Term and post term infants. They were evaluated at 6 1/2 years with I.Q. tests. This just shows the mean I.Q. has a function of gestational age from 37 weeks to 43 weeks. There is not a lot to choose from at 39, 40 and 41. But 38 is a little lower. 37 is lower again and post term is also lower. And if we look at the actual means, these are the number of children and their gestational age distribution those combining those at 39 to 41 as a reference group. Even after we adjust for clustering and a number of socio-economic variables that can affect I.Q. we see a 2 point reduction at 37 weeks at age 6 1/2. Half a point reduction at 38 weeks and reductions half a point at 42 weeks and quite a bit at 43 weeks. Based on only ten infants. The main message

here is that 37 and 38 weeks not only have higher neonatal and post neonatal fatality but if they survive they have lower I.Q.s at early school age. Now, I want to go back to one of these slides, it's out of order. I'll go back to this slide. And I want to talk a little bit about termination of pregnancy and very, very early pre-term births which are having a minor effect on the pre-term birth rate. There hasn't been much of a temporal trend in the very early birth rates. But there have been increases in the earliest gestational ages. Those have had a major impact on infant mortality even if they haven't had a major impact on pre-term birth rates. I'm going to give you by way of background these data from Canada overall and Alberta and what happened in 2002, there was a big increase. Got the front pages of most of the Canadian papers, after many, many years of declining infant mortality, Canada actually had an increase in infant mortality from 5.2 to 5.4 per thousand between 2001 and 2002. This arrow here. It was particularly marked from the province of Alberta. And if you look at the proportion of live births per 10,000 births less than 500 grams or more or less equivalent gestational age less than 24 weeks, in Canada there was a substantial increase of about 25% just in that one year of live births less than 500 grams or less than 24 weeks and about a 50% increase in the province of Alberta. They have the best congenital anomaly screening program in surveillance program in the country. And there has been an increase. I'll show you some data in the next few slides as I skip ahead again of what has been going on both in Canada and the U.S. in terms of pregnancy, pre-natal diagnosis and termination of pregnancy as these early gestational ages and low birth weights. No perceptible impact on birth rates but is responsible for this one year for the increase in infant mortality but in both countries I think for the slowing and the reduction of infant mortality that we otherwise would have seen. It is also responsible for the drop in international rankings of both Canada and the U.S. based -- with the Europe colleagues when we hear how bad the U.S. and Canada are doing on infant mortalities and the rankings are dropping and dropping and I think this is the main reason. I'll skip back ahead. Show you some data based on congenital anomalies. We did a study back in the early 2000s based on comparing two years -- about an 11 year period. If you look at the still birth, we have in Canada, which you don't have in the U.S., data on causes of still birth. If you look at the still births on a log scale here. The earlier period is shown in light blue. The later period in purple. A substantial increase in still births rates due to congenital anomalies. This is a huge increase. These are all from 20 to 25 weeks. A consequent reduction in later still births from -- for congenital anomalies and an important reduction in infant mortality.

Suggesting that early delivery -- these are terminations of pregnancies and no signs of life and declared still births is responsible -- an inference, may not be true. These early deliveries of these babies who are prenatally diagnosed. Between 20 and 25 weeks there are still some -- we don't know about the ones occurring less than that. The late terminations of pregnancy are probably responsible for the reduction in later stillbirths and later infant deaths due to anomalies. We can see some of the late terminations of pregnancies are actually resulting in infants who have signs of life and declared as live births and I think that's largely what you're seeing with the infant mortality rate increase that I showed you from 2002. Between 20 and 24 weeks an increase in infant mortality due to congenital anomalies. Almost certainly due to these early gestational age late terminations of pregnancy and a consequent reduction over the green line here being the later period after about 25, 26 weeks in infant mortality due to congenital anomalies and also preventing later infant death. The U.S. doesn't have data on causes of still birth but we do have data on U.S. infant mortalities with the congenital anomalies. The data from the U.S. are similar to Canada. Comparing two years. 2002 in red, 2009 shown in green. An increase in infant deaths due to congenital anomalies up to 24, 25 weeks and a reduction at all the gestational ages beyond that in the infant mortality, congenital anomalies suggesting that this increased prenatal diagnosis and early delivery of -- early termination of pregnancy some of which end up in still birth and some end up as infant deaths are responsible for lower, later infant deaths at later gestation. And because these both still births and infant deaths get counted much more readily in Canada and the U.S. than they do in the rest of the world. I think that's largely responsible for our poor international showing in infant mortality. Again, these are very small fraction. These very early gestational deaths are very small fraction of pre-term births but a very high fraction of infant deaths. For example, neonatal mortality rates about 30% of neonatal mortality rates in Canada and the U.S. are less than 500 grams. That compares to less than 10% in most European countries. These are major, major causes of infant death. As I said they're having a minor impact on pre-term birth rates. I think that's underappreciated. These just look for the same two years in the U.S., specific congenital anomalies. Chromosomal and neuro-- three times higher for chromosomal abnormals. Three times higher in 2002 than in 1989. Again, infant deaths. 1 1/2 times more common for cardiovascular anomalies and neurological anomalies. Big changes over a 13-year period. I'm going to conclude now with shifting from infants to discussion of what these -- some of these obstetric interventions have done on maternal

health. I'll focus on two important outcomes. Major sources of morbidity and mortality among mothers, mortality rates, maternal mortality rates are low in both of our countries, fortunately. But serious maternal morbidity rates are higher than they should be. One of the causes of those maternal -- serious maternal morbidity and mortality is amniotic fluid embolism. Not many of you are involved in on a day-to-day basis but one of the leading causes of maternal mortality in developed countries. In Canada it was responsible for about 13% of direct maternal deaths from 1988 to 1992 and the same in a study we did in the 1990s to two,000. The third leading cause behind cardiovascular and vascular disorders. It is ahead of embolisms as a cause of maternal death. It's believed to arise. I'm giving background about it because I suspect some of you may not be as familiar with this entity. It's **** believed to arrived from simultaneous tears in the fetal membrane and the uterine vessels and particularly the pulmonary circulation and manifested by a sudden difficulty breathing and intravascular coagulation. The mechanism is unknown but looks like -- an a fill axis. They're probably genetic factors that affect individual mother's susceptibility to this but there have been some studies in recent years trying to look at what some of the risk factors. Some good epidemiology. I'll show you one of these studies. And it's based on a Canadian hospitalization database of about three million hospital deliveries, 99% of the births in Canada from fiscal years 1991 to 2002. This database for this period of time included all but three provinces, Quebec, Manitoba, Nova Scotia and included 70% of all deliveries. A shift between ICD9 and ICD10. We used the codes you see here. There is also coding in the discharge abstract database of procedures like induction, like cesarean, and transfusions and things like that. We studied a lot of risk factors. We have not nearly as much information on our birth certificates as you have on yours but we have a lot of information on these diagnoses and procedures and we were able to study things like plurality, single versus multiple births, maternal age, medical and surgical induction of labor. Presentation, delivery method, previous history of previous cesarean deliveries, pregnancy complications including hypertensive disorders, diabetes, amniotic infection, labor complications, pre-labor, membrane rupture or rupture fetal stress and growth restriction and although parity is not coded we have information when it's coded or elderly gravity and grand mall tips. These are the data from Canada. This top line here is all cases of amniotic fluid embolism from 1991 to 2002. These are very, very rare events. This is per 100,000. We're talking about 6 per 100,000 probably responsible for the fluctuating rates from year to year but no clear trend over the 11-year period. Because there is probably

some false positive diagnoses here we also looked at fatal amniotic flew it **** that occurs at 8 per 100,000. Less wild fluctuations in its rate. So we had about just under three million singleton births and as I said it's about 6 per 100,000 is the rate and the fatal rate is 0.8 per,000. It's 2 1/2 times higher among multiples. The number of multiples and AFE's occurring. We only had five of them. Among the singletons we were able to show the medical induction almost doubled the rate of amniotic fluid embolism. We had a meeting this last summer about various maternal morbidity and mortality issues. One of the ones we've been focusing on is amniotic fluid embolism this last year and here are rates from four countries on looking at the adjusted odds ratio for labor reduction and its affect on amniotic fluid embolism. A study based on the NIS. The United States shows about a 50% increase. U.K. a four-fold increase based on a large number of cases. Based on a small number of cases from new south Wales also about a doubling. It looks as if labor induction, even though there has been an increase in labor induction we don't see an increase in amniotic fluid *** it is a risk factor for it. Another thing to worry about with respect to labor induction. The last thing I want to talk about with respect to labor induction and other obstetric interventions is postpartum hemorrhage or PPH. This international group which includes folks from the CDC, Cindy Berg and bill Callahan in particular have been looking at postpartum hemorrhage and one of the things about postpartum hemorrhage which is much more common. Here is a few% from 2 or 3% reported from the U.S. to 4 or 5% reported from Australia and Canada. The main thing I want to show you is the trend from the mid 90s to the mid 2000s has been an increase in all three of these countries particularly or *** PPH, a separate diagnostic code. The question is what's causing this increase? This is -- I showed the pre-term birth epidemic. There seems to be an epidemic of PPH. We're less confident about this, how do you diagnose this? How much blood loss constitutes a postpartum hemorrhage? It's more subjective than pre-term birth. So we -- because it's a relatively common occurrence relative to ASE we felt we could do a study at our own hospital database which has been existent for several decades to examine risk factors for PPH look at trend and risk factors. If we saw a temporal trend whether we could account for the increase in PPH are known or suspected risk factors. So the data source for this is a hospital database. We don't have enough information -- detailed information clinically in our discharge abstract database to look at this adequately. These are separate consecutive singleton deliveries at this maternity hospital affiliated with McGill. It covers about a 30-year period. Just over 100,000 births. There has

been standardized medical records abstraction. We defined any PPH has an estimated blood loss, highly subjective, of more than 500 milliliters, more than 1,000 milliliters for cesarean. In the last six years they had an item for the actual estimated blood loss and estimate the rates of severe postpartum hemorrhage using greater than 1500 milliliters regardless of method of delivery and the combination of postpartum hemorrhage with blood transfusion or hysterectomy about what was or was not a postpartum hemorrhage. This database contains a lot of information including socio-demographic ones, pregnancy, labor and delivery. We looked at adjusted associations and looked at temporal trends in PPM and its risk factors. Here are the data on the temporal trend in postpartum hemorrhage. The rates are average around 2% or 3%, similar to the U.S. There has clearly been -- I can't explain the fluctuations from year to year. There has been a stabilization of the rate in the last few years for reasons I don't understand but overall there has been an increase. Comparable to what I showed you for the three countries a couple slides ago. We looked at a lot of factors that had no association with PPH including maternal education, smoking, diabetes or impaired glucose tolerance, prolonged labor, maternal height, maternal present pregnancy BMI and labor anesthesia including epidural. Had been one of the suspected risk factors. If we looked -- we did a sequential logistics regression. If we looked net crude yearly rate with odds ratio was 1.03. On average despite the fluctuations about a 3% highly statistically significant increase per year in the occurrence of any postpartum hemorrhage and we added those risk factors that were statistically significant. We associated with PPH. Adding maternal age, obviously been more older women delivering, reduced it slightly. More -- when we looked at prior cesarean section and adjusted for that, there was a major drop just at the cusp of statistical significance of the increase. Major drop in the increase suggesting that prior cesareans and the scars that prior cesareans lead to are a major cause of the increase as there has been an increase in cesareans in Canada for the increase in PPH. Labor induction, a further reduction, slight reduction in the occurrence of PPH. No longer statistically significant. Augmentation actually of labor which we also have coded and have nothing on a national database had another large decrease of the yearly effect and it's no longer even any trend after we added labor induction. Labor augmentation is also responsible along with prior cesarean section for the increase in PPH over time. Placenta previa had increased over time. Another further reduction and other abnormal placental findings, gross findings, led to a slight further reduction. So we were able to explain, in other words, the increase in PPH occurring at this hospital, at

least, primarily through these risk factors and primarily, I would say, with prior cesarean section and labor augmentation. So summing up, there has been increasing obstetric intervention and it's the change of the landscape. We've seen infertility treatment leading to increased multiple births and increased pre-term births. Prenatal diagnosis and early termination of pregnancy has -- because some of these termination of pregnancies occurring 20 weeks or beyond has led to an increase in infant mortality. But a reduction in infant mortality due to congenital anomalies. Labor induction has increased in pre-term birth and postpartum hemorrhage. An increased risk for amniotic fluid embolism. Labor induction has led to a reduction in post term still birth which is a good thing but it's also led to a reduction in gestational age and birth weight in term and a shift toward earlier term delivers Reece which is not such a good thing. Cesarean deliveries not only affect maternal morbidity when a cesarean occurs in terms of longer hospitalizations but also increases the risk of postpartum hemorrhage in later cesareans probably from the scarring. Overall, have these increased obstetric interventions done more good than harm? There have been benefits, that's been a good thing. Termination of pregnancy for birth defects and not having children born with birth defects. That's been a good thing. And I would argue that even though most of the still birth reduction occurred prior to the increase in inductions, even a little bit of reduction post term still births is probably a good thing as well. There have been some harms. There has been an increased in late pre-term birth and early term births both of which have adverse effects in the short and long term and there have been increased in maternal morbidity in index pregnancy and future pregnancies. Time has come to try to balance these benefits and harms. Maybe consider some large randomized trials of early induction for specific clinical indications. And I'll stop there and take questions. Thank you. [Applause]

WANDA BARFIELD: Do we have time for a few questions?

>> We have time for a question or two.

>> Please stand.

>> Is there a microphone?

AUDIENCE: It looks as though -- [inaudible] Did you see correlation between the increase in -- [inaudible]

>>I'm not sure I heard you adequately but if I didn't, maybe -- the last part of what you said is we did look at changes at the state level in cesarean delivery rates. Again, without being able to distinguish which of those cesareans were initiated prior to the onset of labor versus during labor. We didn't see any effect of induction on still birth, gestational age, birth weight or *** with C-section. You also asked a question about was there something else? Did you understand? Did you want to repeat? [Inaudible]

MICHAEL KRAMER: On amniotic fluid. Good question. I skipped that because yes, there is a very strong association between cesarean section and amniotic fluid embolism. Not previous, but cesarean section at that delivery. The problem is temporality. All we have is the code for cesarean section and the code for amniotic fluid embolism. Whether the mother was savable or not or to save the fetus. We don't know whether the cesarean led to the ASE or whether that led to the cesarean. The rates of ASE are so long that even an ecological approach would make it difficult to entertain. We shouldn't dismiss that, but I don't -- I think it's on shaky ground, that causal inference is on shaky ground.

AUDIENCE: Michael. That was a very comprehensive and stimulating talk. And I notice that you -- [inaudible]

MICHAEL KRAMER: Well, one obvious reason is the very high pre-term birth rates among Blacks. Even if you compare, as I did briefly, is the higher -- I mentioned that at the beginning of this period among non-Hispanic whites the pre-term birth rate was as it was during that period in Canada. Half of that difference is accountable by the definition of pre-term birth. On the U.S. it's based on the last menstrual period and that -- the use of the last menstrual period. If you use the clinical estimate that's available on the birth certificate now you can reduce by about half the difference in pre-term birth rates between non-Hispanic Whites in the U.S. and in Canada overall. The other half is probably -- I really don't know -- but is probably the more interventive thing here with intervention particularly with respect to induction and the problem that the obstetrician, I'll expand on this and it gets back to the previous question. The balance of risk and harm. I think obstetricians have gotten a bit of a bad rap. These are not inductions being done routinely. Cesareans are by and large not being done before the onset of labor. The increase in inductions in cesareans, part of it may be driven in this country by risk of lawsuit, particularly with a still birth, but I think it's over genuine concern that has arisen as a result of the closer fetal

monitoring that now occurs through ultrasounds, through biophysical profiles and the obstetricians are more aware when things aren't growing right and the fetus isn't growing well. When you have to rely on that to the *** height for measurements you're not as sure about whether there are changes in the amniotic fluid or size of fetus but ultrasound gives you indication whether the fetus is growing well or not. Decreased fetal movement and they're responding to what they see as non-reassuring signals because of tests and they're intervening to protect the fetus, primarily but also the mother when she's hypertensive or has other problems, bleeding. I think it's done with good intentions but I'm not sure that the result is good. So we have to figure out a better way of figuring out how to balance how much intervention is going on. I don't think either of our countries has got it right.

WANDA BARFIELD: Anymore questions?

>> If people have questions after that.

>> I'll stand up here and be happy to spend my break doing this.

AUDIENCE: Michael. From the Department of Health. Thank you for your informative talk. You talked about induction and not much of the cesarean. Florida was seeing an interesting pattern since we've had the new birth certificates since 2004. One of the questions asked is labor and whether there is labor or not and we've seen an increase cesarean late pre-term related to those with non-labor and not related to induction and did not know -- you sort of kept something away from that. I don't know if you've seen that in other areas what your thoughts might be.

AUDIENCE: These are inductions -- these are cesareans occurring prior to the occurrence of labor, prior to 37 weeks?

MICHAEL KRAMER: Yes. The accuracy is only fair but there is accuracy to the variable.

AUDIENCE: A lot of these occurring between 34 and 36 rather than before -- I'm a little surprised to hear that. I'm disturbed as well. I can't believe -- some of them may be bleeding, but I mean abruption is not that common to explain why is the adjust file able pre-labor cesarean section. I don't know if I understand what they're doing it for. They're not doing it routinely at those gestational ages. Even in a woman with a prior history of still birth I would think they might do a cesarean -- are these women who have had previous cesareans or not even?

MICHAEL KRAMER: We tried to focus on primary and not repeats. We've done chart reviews. Maybe I'll get a chance to talk to you later. We're concerned about that as a pattern.

AUDIENCE: Do you have any clue as to why they're doing it?

MICHAEL KRAMER: Instead of going to induction because of pre-term they're going straight to cesarean because of perceived risk.

AUDIENCE: It must be a pretty acute risk other than bleeding, I'm not an obstetrician but I can't think of any indication for cesarean that -- where an induction -- which doesn't appear to increase the risk of cesarean. A woman pregnant for the first time doing a cesarean instead of induction which buys you 12 hours on average. I would be interested in yours or anybody else's thoughts on that.

MICHAEL KRAMER: I might be able to enlighten you on that. I'm an obstetrician, so I can give you a couple of what I think would be the leading indications. Prolonged ruptured membranes and particularly because pre-term fetuses tend to be in malpresentation. If you have a combination of a breach and a rupture. Preeclampsia would also be another indication. Preeclampsia probably accounts for 15% of pre-term deliveries. So I could see where could just use those two indications, including malpresentation.

AUDIENCE: The malpresentation is -- if it's breach is probably a good reason for doing a cesarean rather than an induction but it looks to me, at least -- I'm not sure this represents a decrease in incidence versus a decrease in diagnostic coding but the rupture of membranes is decreasing in frequency and what's the rush? If the membranes are ruptured for a day or two what is 12 more hours.

MICHAEL KRAMER: We're talking people who have ruptured for prolonged periods of more than 72 hours. Typically those women are hospitalized and so frequent practices, if you have prolonged rupture of membranes and been in the hospital, to decrease cost and ward off the risk of infection, to go ahead and deliver at 34 and 35 weeks. I would say that that's based on data that suggests that most 34 and 35 weekers delivered in settings has just as good outcomes as they do at later gestation. It is only now that we're getting a lot of data that suggests that even 36, 37 and 38 weekers have more morbidity than 39 and that will call for a shift in the culture of

practice and understanding of obstetricians to recognize that period with increased neonatal morbidity.

WANDA BARFIELD In the interest of time and to stay on schedule, the next sessions are starting at 10:30. I know there are people who still want to ask questions, please feel free to come up and why don't you join me once again in thanking Dr. Kramer for an excellent keynote presentation.