



Consensus Statement on Healthy Mothers-Healthy Babies: How to Prevent Low Birth Weight

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Conference Panel Chair

Dr. Shoo Lee, Scientific Director, Integrated Centre for Care Advancement through Research (iCARE), Capital Health, Edmonton

Conference Expert Chair

Dr. Anthony Armson, University of Toronto

Conference Moderator

Dr. Ian Lange, Calgary Health Region and University of Calgary

■ **Process**

This consensus statement was prepared by an independent panel of health professionals, academics, and public representatives based on: 1) relevant published studies assembled by the scientific research committee of the consensus development conference; 2) presentations by experts working in areas relevant to the conference questions; 3) presentations by parents of low birth weight babies; 4) questions and comments from conference attendees during open discussion periods; and 5) closed deliberations by the panel.

The conference was held in the province of Alberta, Canada. The consensus statement therefore often refers to the situation in Alberta, although data were not only drawn from that area, but also from other parts of Canada and from many other countries.

This statement is an independent report of the panel and is not a policy statement of the conference partners, conference sponsors, or the Government of Alberta.

■ **Conference Questions**

The consensus panel used the evidence presented to them at the conference to determine answers—in the form of a consensus statement—to the following questions:

- 1) **What is Low Birth Weight and how frequently does it occur?**
- 2) **What are the implications of Low Birth Weight?**
- 3) **What are the factors that contribute to Low Birth Weight?**
- 4) **What can we do to reduce Low Birth Weight?**
- 5) **What are the most effective service delivery models to reduce Low Birth Weight?**
- 6) **What further research is needed (clinical and policy)?**

■ Introduction

Low birth weight babies are more likely than normal birth weight babies to experience significant adverse health and developmental outcomes that have profound short and long term impact on families, society, and the health care system. Preterm birth accounts for the majority of low birth weight babies and is the single largest cause of infant death and cerebral palsy. It consumes significant health care resources in pediatric facilities in Canada today. Low birth weight constitutes an important public health issue that demands urgent attention in Canada, and particularly in Alberta.

■ Question #1

What is Low Birth Weight and how frequently does it occur?

Low birth weight is defined as a birth weight of less than 2500 grams. Low birth weight includes babies who are born preterm (less than 37 weeks gestation) and babies who are small for their gestational age (less than 10th percentile of birth weight for gestational age). The rate of low birth weight has been used as an index of perinatal health and for international comparisons of population health status. However, the use of low birth weight as an indicator is problematic because trends in its component rates (for example preterm birth rate) may be masked. In Canada, between 1995 and 2004, the low birth weight rate was relatively stable, ranging between 5.5% and 5.9%. During that same time period, the rate of small-for-gestational-age babies decreased from 10.1% to 7.8%, while the rate of preterm birth increased from 7.0% to 8.2%. In Alberta, the rate of preterm birth is higher than the national average (9.1% in Alberta versus 8.0% in Canada in 2004).

Since low birth weight rate does not accurately reflect component trends, small-for-gestational-age and preterm birth should be considered separately. This approach would require that accurate gestational dates be established in every pregnancy, and would improve our knowledge and reporting about the differences in risk factors and health outcomes associated with both preterm and small-for-gestational-age babies.

PANEL RECOMMENDATIONS

- 1) All pregnant women should have access to accurate pregnancy dating. Accurate gestational age should be confirmed by ultrasound performed no later than 20 weeks gestation.
- 2) Rates of preterm birth and small-for-gestational-age should be reported separately.

■ Question #2

What are the implications of Low Birth Weight?

The implications of low birth weight are profound and felt by individuals and their families both emotionally and financially; by the health care system due to increased costs and the use of scarce resources; and by society as a whole as it provides support and works to more fully integrate individuals with lifelong disabilities.

The short and long term implications for low birth weight babies may differ for those who are born preterm or small-for-gestational-age. As well, there are differences among babies that are very preterm (born prior to 32 weeks), moderately preterm (born at 32 or 33 weeks), and those that are late preterm (born at 34 to 36 weeks of gestational age).

Preterm births account for more than 80% of all complications and deaths arising around the time of birth. Information on long term health outcomes has been collected mostly for preterm babies born at less than 1250 grams or before 29 weeks gestation. These babies are typically included in a follow-up program for periods of varying length, usually less than 5 years after birth. All categories of preterm babies are more likely than term babies to die or suffer adverse health problems during the first year of life. For instance, extremely preterm singleton babies (born before 28 weeks) are 170 times more likely to die in the first year after birth compared to full term babies, whereas late preterm babies are 4.5 times more likely to die within the same period.

Adverse long term outcomes in very preterm babies include respiratory problems (including respiratory distress syndrome and bronchopulmonary dysplasia); motor and sensory impairment (including cerebral palsy, visual impairment, and hearing impairment); and neurocognitive impairment (including lower IQ, lower academic achievement, behavioral problems and Attention Deficit Hyperactivity Disorder). Very little is known about late preterm babies as follow-up is not typically done in a systematic way with this group. It is known that they may require intensive hospital care after birth and constitute a significant cost to the health care system due to their larger numbers as compared to very preterm babies, as well as their need for continuing care (including hospital readmissions).

Health implications of small-for-gestational-age babies depend on the gestational age at birth. Small-for-gestational-age babies can have some of the same long-term health concerns as preterm babies. Overall health depends in part on whether these babies develop symmetrically (head and body are proportionate but both are abnormally small) or asymmetrically (head is a normal size but body growth is underdeveloped). Small-for-gestational-age babies who develop symmetrically are more likely to have a poor prognosis because the brain is underdeveloped and there is often an underlying genetic or infectious

cause. Babies who develop asymmetrically have a better prognosis for long-term health, but may have increased risk of cardiovascular disease (for example, hypertension) or metabolic dysfunction (for example, diabetes) in adulthood.

Estimation of costs for low birth weight babies is complex and highly dependent on the assumptions made. They are time sensitive and are affected by changing technologies and care practices. In Canada, the problem is compounded by lack of availability of good cost data from the health care system. Consequently, cost estimates may not be precise. Despite these factors, it is important to estimate the financial costs to our health care system, as well as to individuals, their families and society.

Direct medical costs of singleton preterm births in Alberta were recently estimated to be at least \$20 million per year for the initial hospital admission (in 2005 dollars). When estimating the costs per infant for the initial hospital admission, as well as direct medical costs for the following seven years, the amounts were dependent upon how preterm the babies were. For example, on average, costs for an infant born at 36 weeks gestation were \$1,000 for the initial hospital admission and \$4,000 for the following seven years. For a baby born at 27 weeks, the costs were \$19,000 for the initial hospital period and \$8,500 for the following seven years. These estimates included physician costs, laboratory, and hospital inpatient care costs (as well as ambulatory care costs for the follow-up care). Future cost estimations should include other direct medical costs that were not previously measured such as emergency room visits, home care, outpatient drug costs, day procedures, community therapy services (occupational therapy, physiotherapy and speech therapy), residential treatment centre care and capital costs. Cost estimations should be made from a societal perspective and include the financial costs to individuals, their families and society, such as lost income of parent(s), transportation, accommodation (for long distance travel), special needs renovations to the home, food supplementation, aids to daily living (for example, wheelchairs), child care, respite services, and education.

In addition to financial costs, families may experience adverse psychosocial and emotional impacts including family disruption, breakdown of relationships, changes in self-esteem, deterioration in mental health, and domestic violence. These are equally important implications that need to be measured.

PANEL RECOMMENDATIONS

- 1) Longitudinal studies of health outcomes for preterm babies and small-for-gestational-age infants should be conducted. This is necessary to capture more accurate data on the long-term implications of preterm birth (and in particular, late preterm birth) and small-for-gestational-age births.
- 2) Studies of impact should include implications on health outcomes, financial costs and the non-financial burden of preterm and small-for-gestational-age babies separately. Estimates of costs should be conducted from a societal perspective.

■ Question #3

What are the factors that contribute to Low Birth Weight?

Epidemiologic studies describe associations with low birth weight, small-for-gestational-age births, and preterm births, either alone or in combination. While a host of risk factors are associated with low birth weight, few meet the strict conditions required to be considered conclusively causative. In fact, the strength of these associations, based on the scientific rigor of the supporting studies, is highly variable. In this section, only moderate to strong associations are described unless otherwise stated. Some of the risk factors are amenable to change while others are not modifiable.

Women younger than 20 years of age or over age 35 are more likely to have a preterm or low birth weight baby. Women who themselves were born small-for-gestational-age are also more likely to have a small-for-gestational-age baby. A mother, who has a subsequent baby within 18 months, or after more than 60 months following her last baby, is more likely to have a low birth weight baby, preterm baby and/or a small-for-gestational-age baby. If the mother's previous baby was born preterm it is more likely her next baby will be preterm and/or low birth weight. If a mother was underweight prior to conception or had poor weight gain during pregnancy, she is more likely to have a preterm or low birth weight baby.

Preterm birth is associated with mothers who experience acute or high levels of chronic stress, racial discrimination, and anxiety. Low birth weight is also related to maternal stress, a lack of social support, and being a single parent. Having a small-for-gestational-age baby is reported as being associated with acute maternal stress. Violence/abuse and maternal trauma is correlated with having a preterm birth or a low birth weight baby. Mothers residing in poor neighborhoods and living in an ethnically dense setting (social segregation) are associated with a greater likelihood of a preterm birth baby. Aboriginal women experience a higher rate of preterm birth but not a corresponding increase in low birth weight.

Women who smoke, are exposed to second-hand smoke, drink alcohol, or use cocaine/narcotics are more prone to having a preterm or low birth weight baby. Indeed, smoking is a causative factor for low birth weight. Women who are employed in physically demanding occupations are more likely to have a preterm baby, a low birth weight baby, or a small-for-gestational-age baby. Mothers with infectious diseases such as syphilis, gonorrhea, urinary tract infection, or HIV, are more likely to have a preterm baby, a low birth weight baby, or a small-for-gestational-age baby. Maternal medications such as anticonvulsants have been associated with small-for-gestational-age babies. Chronic pre-existing medical conditions such as hypertension, Type 1 diabetes, renal failure or asthma are associated with preterm births, low birth weight babies or small-for-gestational-age babies. Conditions arising during pregnancy such as pre-eclampsia can result in preterm birth and small-for-gestational-age

babies. Women with short cervical lengths, as determined by an endovaginal ultrasound scan performed during pregnancy are more likely to have a preterm baby. Assisted reproductive technologies have been associated with mothers having preterm babies and low birth weight babies. Whether arising from assisted reproductive technologies or spontaneously, multiple births are associated with preterm births and low birth weights including small-for-gestational-age babies. An increase in medically indicated inductions has been associated with preterm births and low birth weight babies.

Women likely experience more than one risk factor and there is interaction among these factors.

The majority of the recent increase in preterm births is thought to be associated with increased maternal age, assisted reproductive technologies, increased multiple births, and obstetric interventions.

PANEL RECOMMENDATION

- 1) More rigorous research is needed to establish the causes of preterm and small-for-gestational-age births, including biological, psychosocial, and environmental factors and the interplay between them.

■ Question #4

What can we do to reduce Low Birth Weight?

Society and governments should ensure that education for a healthy lifestyle begins during the early school years. This would focus on obesity prevention, physical fitness, avoidance of smoking and illicit drug use, and the implications of alcohol abuse, especially in pregnancy. The ideal program would encourage both males and females to plan sexual activity and make a reproductive life plan. Strategies to recognize and respond appropriately to violence should be included.

Certain risk factors have been associated with low birth weight. Specific strategies have been shown to be associated with reducing low birth weight, or developed based on risk factors and these should be incorporated into public health policy, psychosocial and education programs, and medical management and carefully evaluated as to their effect on outcomes subsequently. These encompass approaches at the primary, secondary, and tertiary prevention levels. These strategies include:

Public Policy

- Smoking has been associated with low birth weight, therefore legislation should be enacted to require that all public places and work places in Alberta should be smoke-free
- Consideration should be given to providing for additional financial support to facilitate pregnancy-related parental work leave

Psychosocial

- Enhance mental health assessment and treatment
- Enhance awareness of implications of and interventions for trauma and family violence in pregnancy

Education

- Mandatory education commencing in elementary schools on life skills and health
- Societal education of the optimal biological age range for pregnancy
- Education to health care providers about strategies to improve prenatal care and enhance health outcomes, including such things as folic acid supplementation, optimal age for pregnancy and appropriate inter-pregnancy interval
- Smoking cessation counseling and promoting smoke-free homes and vehicles

Medical Management

Primary Prevention (what can you do before the disease starts?)

- Optimizing maternal health in patients with chronic medical diseases
- Periodontal health

Secondary Prevention (what can you do once the disease starts?)

- The ability to identify women at high risk early in pregnancy may assist with modification of pregnancy management, and identify those patients who may benefit from future prophylactic interventions currently under rigorous research.
- Testing for and treatment of infections to reduce adverse outcomes
- Treatment of urinary tract infections
- Ultrasound surveillance for cervical shortening
- Fetal fibronectin test has high negative predictive value for preterm labour and can identify women not at risk for preterm labor

Tertiary Prevention (what can you do to reduce the impact of the disease?)

- Antibiotic therapy for women with preterm rupture of membranes
- Antenatal steroid administration to women who are between 24 and 34 weeks gestation and at risk of preterm birth within 7 days

In Alberta, in 2005 the overall low birth rate was 6.6% of live births. Of multiple births, 52% are recorded as low birth weight versus 5.0 % of single births. The use of assisted reproductive techniques and ovulation stimulation have caused increased rates of multiple gestation and increased rates of preterm birth and small-for-gestational-age babies. In order to maximize the likelihood of a live birth, multiple embryos have been implanted to enhance live birth rates. Improvements in technology have resulted in an unintended consequence of more multiple births from such techniques. Studies have now shown that a single embryo transfer in good prognosis patients is successful and in countries where this is policy, multiple birth rates have been reduced without compromising live birth rates.

PANEL RECOMMENDATIONS

- 1) Public policy, psychosocial, education and medical management strategies as previously described should be implemented.
- 2) Legislation should be enacted to ban smoking in public places.
- 3) Government should mandate only a single embryo be implanted for each in vitro fertilization cycle unless specifically indicated, and limits should be set on multiple embryo transfer in poor prognosis patients.
- 4) Ovulation stimulation with injectable gonadotropins should be restricted to those providers with certification in their use.
- 5) Registries for assisted reproductive technologies should be established.

■ Question #5

What are the most effective service delivery models to reduce Low Birth Weight?

Current service delivery models are plagued by a number of problems, including a fragmented and uncoordinated approach to maternity care which may not be responsive to the diversity of women's needs. There are also issues with access to care and a critical human resource shortage. Consequently, women often do not have a primary care practitioner, which delays entry into prenatal care. The current model of prenatal care has remained the same for many years, and does not necessarily incorporate strategies to address the many factors associated with low birth weight. In addition, the system does not lend itself to provision of effective preconception care. The system also prevents health care providers from contributing collectively to the provision of high quality care for women.

Models of service delivery from other jurisdictions suggest alternate ways of providing health care that are associated with lower rates of low birth weight and preterm birth. Some of the characteristics of these models include a multidisciplinary, community based approach that is coordinated within a regionalized system that includes secondary and tertiary care, with sustainable core funding.

Effective service delivery models need to ensure that women enter their childbearing years in the best possible health. An integrated model of well woman care places an emphasis on the woman first, rather than her reproductive status. This integrative model builds on a continuum that covers well woman care, preconception, prenatal, intrapartum, postnatal, and well baby care, with a focus on health promotion, and primary and secondary

disease prevention throughout the lifespan. Options for delivering this model of care might include a freestanding well woman clinic, service provision within a primary care network, or through private health care providers' offices. Best options should be determined by local needs of the target community.

Ideally, such a model would be staffed by multidisciplinary collaborative teams that could include midwives, nurses, nurse practitioners, family physicians, specialists, and other health care providers. Services should be community based, readily accessible, culturally safe, provide continuity of care, and meet the expressed needs of women and their families in the target population. Attention should be given to assessing risk factors that are associated with preterm birth and low birth weight, and intervening where appropriate. Services should support smoking cessation, achievement of healthy body mass index, identification and treatment of disease (for example, sexually transmitted infections), chronic disease management, family planning, alcohol and substance abuse reduction, mental health promotion, and family violence reduction. Comprehensive high quality prenatal care could be delivered in a variety of ways to most effectively meet women's needs, through either individual or group approaches. Provision of postpartum care and well baby care by members of the same team provides continuity of care and an opportunity to reinforce health promotion and risk reduction in the interval between pregnancies. In addition, long term assessments of treatment modalities for compromised preterm and small-for-gestational-age babies, together with early intervention strategies and support for families must be implemented.

New, innovative, and sustainable funding models must be developed and implemented to allow primary care practitioners (for example, midwives, nurses, nurse practitioners, and family physicians) and specialists (for example, obstetricians and pediatricians) to participate meaningfully in multidisciplinary teams. The funding model should support health care practitioners to contribute to capacity building, program planning and evaluation, and continuing education. To sustain this model, sufficient human resources are required (for example, funding to educate midwives, nurses, nurse practitioners, and physicians).

Ideally, the spectrum of women's health care would begin in primary school with implementation of a mandated curriculum for boys and girls. This curriculum would include information on family planning and healthy reproductive choices, development of self esteem and ability to engage in healthy relationships, and lifestyle choices (for example, nutrition, physical activity, and avoidance of smoking, alcohol and substance abuse).

PANEL RECOMMENDATIONS

- 1) Pilot, evaluate, and where appropriate, institute community-based, multidisciplinary well woman clinics.
- 2) Increase availability of health care professionals (including obstetricians, family physicians, midwives and nurse practitioners) to provide care for pregnant women in both urban and rural regions.
- 3) Fund and integrate midwifery within the health care system.
- 4) Create alternative funding models for primary care providers.
- 5) Establish education program for midwives and expand education programs for nurses, nurse practitioners, physicians, and other health care providers that foster interdisciplinary collaborative health care delivery.
- 6) Establish mandated curriculum for boys and girls beginning at the elementary school level about healthy living.

■ Question #6

What further research is needed (clinical and policy)?

A multidisciplinary approach will be required in the future to address the complex issues around preterm birth. It will also be necessary to develop a comprehensive province-wide population-based database that links maternal and child administrative, clinical, and health service utilization databases with other relevant databases including education, social services, and children's services.

The panel identified three key areas for further research:

- (a) Identification of the key factors accounting for the recent increase in the rate of preterm birth, and ways to reverse this trend. These factors include increases in multiple births and advanced maternal age, and late preterm births driven by medical intervention.
- (b) The major increase in preterm births occurs between 34 and 36 weeks. We need better understanding of the rationale that is driving these earlier deliveries, and to develop ways to reduce late preterm births.
- (c) The baseline preterm birth rate in Canada is higher than those of Scandinavian countries. The underlying factors should be investigated.

Research should be directed towards both primary and secondary prevention. Primary prevention research includes development of health care delivery high quality models to deliver preconception and prenatal care, and assessment of the effectiveness of prenatal care programs. Secondary prevention of preterm birth will require more research to improve early identification of patients at risk for preterm birth and small-for-gestational-age. This will include research into areas such as genetic polymorphism, biomarkers such as mediators of the

pro- or anti-inflammatory cascade, first trimester prenatal diagnostic screening, stress responses, and environmental, psychosocial, and behavioural factors. This may also target which women and fetuses may benefit from emerging prophylactic interventions such as progesterone.

Despite the best preventive measures, some babies will be born preterm or small-for-gestational-age. Consequently, it is important to ensure that research to enhance the treatment and outcomes of these babies is not neglected. More research needs to be done on the impact on neurodevelopmental outcome at school age of new intervention and treatment initiated in the perinatal/neonatal period and on the efficacy of early intervention programs initiated at the time of or after discharge home.

PANEL RECOMMENDATIONS

- 1) Establish animal and other biomedical models of preterm birth to better understand the epigenetic, biochemical, and molecular mechanism of normal labour, the physiopathology of preterm labour, and the mechanisms of action, as well as the potential toxicity of emerging therapies.
- 2) Establish, in conjunction with provincial, regional and other partners, a comprehensive province-wide population-based database for research that links administrative, clinical, and health service utilization databases with other relevant databases including education, community, social services, and children's services. Capacity to capitalize on these data needs to be developed at both provincial and regional levels. These surveillance systems should enable linkage of maternal and infant data.
- 3) Conduct qualitative and policy research on ways to modify the trend towards late child bearing. These studies should include identification of the factors that influence decisions regarding the age of conception, and assess factors such as work place modifications, educational opportunities, financial and tax incentives, and available and affordable child care.
- 4) Conduct research to better understand the reasons for the recent increase in inductions and deliveries by caesarean section in late preterm pregnancies, and to determine the cost-benefit of early versus delayed deliveries during the late preterm period. This research is important because the trend toward earlier deliveries may be partly driven by an effort to avoid more severe fetal or neonatal compromise if delivery is delayed. A large clinical trial with follow-up to school age may be warranted.
- 5) Research best methods to inform, educate and modify the behaviour of women and men of child bearing age to optimize childbearing, including vitamin supplements, ideal weight, smoking cessation, avoidance of alcohol and other addictive substances, optimum age for pregnancy, and pregnancy intervals.

- 6) Develop and evaluate the efficacy and cost-effectiveness of new models for delivering care to mothers and their babies, including use of community antenatal care facilities, preconception and postpartum care, and interconception services, and use of other health care providers in multi-disciplinary care teams.
- 7) More longitudinal studies of health outcomes for preterm babies and small-for-gestational-age babies should be conducted. This is necessary to capture more accurate data on the long-term implications of preterm birth (and in particular, late preterm birth) and small-for-gestational-age births.
- 8) Further research on the economic impact of preterm birth that includes a more comprehensive analysis of both direct and indirect medical costs is warranted to better evaluate the cost-effectiveness of new policies or interventions.
- 9) Health regions should partner with research funding agencies to develop and provide sustained funds to multidisciplinary teams for investigating complex issues around primary, secondary, and tertiary prevention of preterm birth.
- 10) Research needs to be done to enhance the treatment and outcomes of preterm babies, including family support and early intervention programs after discharge from hospital.

■ Conclusion

Low birth weight is a complex issue with profound short and long term consequences for individuals, families, and society. It has significant cost implications and needs to be urgently addressed because of the continuing rise in preterm birth rates across Canada. Although its etiology is not well understood, it is clear that socioeconomic, psychosocial, and environmental influences play important roles in its patho-physiologic pathway. Consequently, a multidisciplinary approach is needed to reduce the incidence of and to manage low birth weight babies. Intervention strategies include the use of legislative tools, enhanced epidemiologic surveillance and follow-up, establishment of financial incentives and other supports for families, implementation of new models of health care delivery, and development of new therapies and diagnostics. Research is essential to achieve this goal and it is the responsibility of the relevant government ministries and regional health authorities to jointly fund and participate in this endeavor. Finally, this panel recommends the appointment of a ministerial task force of experts on reproductive health in Alberta to provide ongoing advice and to facilitate implementation of strategies to reduce the incidence of preterm birth and small-for-gestational-age births.

■ Panel Members

Panel Chair

Dr. Shoo Lee, Scientific Director, Integrated Centre for Care Advancement through Research (iCARE), Capital Health, Edmonton

Panel Members

Ms. Tracey Bailey, Executive Director, Health Law Institute, Faculty of Law, University of Alberta, Edmonton

Dr. Radha Chari, Perinatologist, Capital Health; Director, Maternal/Fetal Medicine, University of Alberta, Edmonton

Dr. Gillian Currie, Assistant Professor, Health Economics, Paediatrics and Community Health Sciences, University of Calgary, Calgary

Dr. Don Davis, Obstetrician and Gynaecologist; President, Society of Obstetricians and Gynaecologists of Canada, Medicine Hat

Dr. Sandra de la Ronde, Obstetrician, Calgary Urban Project Society Maternal Child Clinic, Calgary

Ms. Catherine Ford, Sessional Instructor, University of Calgary, Calgary

Dr. Maureen Heaman, Associate Professor and Associate Dean, Research, Faculty of Nursing, University of Manitoba, Winnipeg

Dr. Thierry Lacaze, Director, Women and Children's Health Research Institute, Edmonton

Ms. Taunya Madge, Parent; Franchise Owner, Magnetsigns, Calgary

Mr. Rory North, Parent; Chief Operating Officer and Portfolio Manager, North Growth Management, Vancouver

Ms. Lesley Paulette, Midwife, Fort Smith Health and Social Services Authority, Fort Smith, NWT

Dr. P. James A. Ruiter, Family Physician, Bonnyville

Dr. Richard Stanwick, Chief Medical Health Officer, Vancouver Island Health Authority, Victoria

■ Conference Speakers and Topics

What is Low Birth Weight (LBW) and how frequently does it occur?

What is the definition of low birth weight, preterm birth, and small-for-gestational-age? How frequently does low birth weight occur in Canada and the world?

Dr. K.S. Joseph, Associate Professor, Department of Obstetrics & Gynaecology and Paediatrics, Dalhousie University, IWK Health Centre, Halifax

How frequent is low birth weight in Alberta?

Dr. Suzanne Tough, Associate Professor, Departments of Community Health Sciences and Paediatrics, University of Calgary

What are the implications of Low Birth Weight?

What are the health effects of low birth weight?

Dr. Reg Sauve, Professor, Departments of Community Health Sciences and Paediatrics, University of Calgary

What are the economic implications of low birth weight to the family and to society?

Dr. Donald Schopflocher, Director of Research, Institute of Health Economics; Senior Biostatistician, Alberta Health and Wellness, Edmonton

What are the factors that contribute to Low Birth Weight?

What factors contribute to low birth weight?

Dr. Prakeshkumar Shah, Assistant Professor, Departments of Paediatrics and Health Policy, Management and Evaluation, University of Toronto; Staff Neonatologist, Department of Paediatrics, Mount Sinai Hospital, Toronto

How does the health of the mother affect low birth weight rates?

Dr. Paul Gibson, Assistant Professor, Departments of Medicine and Obstetrics and Gynaecology, University of Calgary

How do age and factors that influence the age of conception affect low birth weight rates?

Dr. K.S. Joseph, Associate Professor, Department of Obstetrics & Gynaecology and Paediatrics, Dalhousie University, IWK Health Centre, Halifax

Dr. Suzanne Tough, Associate Professor, Departments of Community Health Sciences and Paediatrics, University of Calgary

How do poverty, substance use, smoking, alcohol, violence, and alternative medicines affect low birth weight rates?

Nancy Poole, Research Associate, British Columbia Centre of Excellence for Womens Health; Research Consultant, Women & Substance Use Issues, BC Women's Hospital, Vancouver

What is the association between socioeconomic factors, (i.e. neighbourhoods), and low birth weight?

Dr. Patricia O'Campo, Director, Centre for Research in Inner City Health, St. Michael's Hospital; Professor, Public Health Sciences, University of Toronto

Can public policy affect low birth weight?

Dr. Gérard Breart, Professor, Public Health, University Pierre et Marie Curie; Director, INSERM Epidemiological Research on Perinatal and Women's Health, Paris, France

What screening tests and obstetrical interventions, including elective caesarean section and inductions, affect low birth weight?

Dr. Anthony Armson, Expert Chair, University of Toronto, Toronto

Dr. Jo-Ann Johnson, Professor, Department of Obstetrics and Gynecology, University of Calgary

How does having multiples (twins, triplets, etc.) affect low birth weight?

Dr. John Collins, Professor Emeritus, McMaster University, Adjunct Professor, Dalhousie University, Halifax

What can we do to reduce Low Birth Weight?

What strategies are known to work to reduce low birth weight?

Dr. Arne Ohlsson, Professor, Departments of Paediatrics, Obstetrics and Gynaecology, and Health Policy, Management and Evaluation, University of Toronto; Director, Mount Sinai Hospital, Toronto

A promising therapy to reduce LBW: progesterone therapy

Dr. Mark Klebanoff, Director, Division of Epidemiology, Statistics and Prevention Research, National Institute of Child Health and Human Development, Rockville, Maryland

Dr. Anthony Armson, Expert Chair, University of Toronto, Toronto

■ Conference Speakers and Topics (continued)

How should programs be structured to reduce the rate of low birth weight?

Dr. Brian McCarthy, Medical Epidemiologist, WHO Collaborating Center for Reproductive Health, Division of Reproductive Health, Center for Disease Control and Prevention, Atlanta, Georgia

What do people need to know before pregnancy to prevent low birth weight?

Merry-K Moos, Professor, Maternal Foetal Medicine Division, Department of Obstetrics and Gynaecology, University of North Carolina, Chapel Hill, North Carolina

What are the most effective service delivery models to reduce Low Birth Weight?

What can we learn from the experiences of other countries?

Dr. Kerstin Hagenfeldt, Professor Emeritus, Department of Woman and Child Health, Division of Obstetrics and Gynecology, Karolinska University Hospital, Karolinska Institute, Stockholm, Sweden

Do different service delivery models for prenatal care affect low birth weight?

Dr. Jeannette Ickovics, Professor, Yale University, New Haven, Connecticut

What further research is needed (clinical and policy)?

Expert Group:

Dr. Heather Baxter, Department of Family Medicine Regional Obstetrical and Newborn Program Leader, Calgary Health Region, Calgary

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Dr. Stephen Wood, Associate Professor, Department of Obstetrics and Gynecology, University of Calgary, Calgary

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■ Additional Information

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Maternal Risk Factors in Relation to Birth Outcome

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Alberta Perinatal Health Program

Alberta Perinatal Health Program Provincial Perinatal Report 2000-2004

http://www.aphp.ca/publications_links_pub.html

Alberta Centre for Child, Family, and Community

Reproduction in Alberta: A Look at the Preconception, Prenatal, and Postnatal Periods

<http://www.aphp.ca/pdf/Reproduction%20in%20Alberta-2006%2006%2020.pdf>

■ Disclosure Statement

All of the panelists who participated in this conference and contributed to the writing of this statement were identified as having no financial or scientific conflict of interest, and all signed forms attesting to this fact. Unlike the expert speakers who present scientific data at the conference, the individuals invited to participate on the consensus panel are reviewed prior to selection to ensure they are not proponents of an advocacy position with regard to the topic

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