DOWNLOAD PDF MATERNAL NUTRITION BEFORE AND DURING PREGNANCY T.O. SCHOLL

Chapter 1 : Maternal nutrition | Pregnancy nutrition | Pregnancy

Maternal nutrition before and during pregnancy. Scholl TO(1). Author information: (1)Department of Obstetrics and Gynecology, University of Medicine and Dentistry of New Jersey, School of Medicine, Stratford, NJ , USA. scholl@calendrierdelascience.com

Advanced Search Abstract Nutrition is the major intrauterine environmental factor that alters expression of the fetal genome and may have lifelong consequences. Animal studies show that both maternal undernutrition and overnutrition reduce placental-fetal blood flows and stunt fetal growth. Impaired placental syntheses of nitric oxide a major vasodilator and angiogenesis factor and polyamines key regulators of DNA and protein synthesis may provide a unified explanation for intrauterine growth retardation in response to the 2 extremes of nutritional problems with the same pregnancy outcome. There is growing evidence that maternal nutritional status can alter the epigenetic state stable alterations of gene expression through DNA methylation and histone modifications of the fetal genome. This may provide a molecular mechanism for the impact of maternal nutrition on both fetal programming and genomic imprinting. Promoting optimal nutrition will not only ensure optimal fetal development, but will also reduce the risk of chronic diseases in adults. Although considerable effort has been directed towards defining nutrient requirements of animals over the past 30 y, suboptimal nutrition during gestation remains a significant problem for many animal species e. Over the past decade, compelling epidemiological studies have linked IUGR with the etiology of many chronic diseases in adult humans and animals Table 1 3. These intriguing findings have prompted extensive animal studies to identify the biochemical basis for nutritional programming of fetal development and its long-term health consequences [e. This article reviews the recent advances in this emerging area of research. Multiple genetic and environmental factors contribute to IUGR 1. Although the fetal genome plays an important role in growth potential in utero, increasing evidence suggests that the intrauterine environment is a major determinant of fetal growth. For example, embryo-transfer studies show that it is the recipient mother rather than the donor mother that more strongly influences fetal growth 9. There is also evidence that the intrauterine environment of the individual fetus may be of greater importance in the etiology of chronic diseases in adults than the genetics of the fetus. For instance, in twin pregnancies, a baby with fetal growth retardation is more likely to develop noninsulin dependent type-II diabetes mellitus than a sibling with normal fetal growth Among intrauterine environmental factors, nutrition plays the most critical role in influencing placental and fetal growth 3. Maternal undernutrition during gestation reduces placental and fetal growth of both domestic animals and humans 1 , 3. Available evidence suggests that fetal growth is most vulnerable to maternal dietary deficiencies of nutrients e. In animal agriculture, fetal undernutrition frequently occurs worldwide. Unsupplemented grazing ewes lose a significant amount of body weight during pregnancy, and their health, fetal growth, and lactation performance are seriously compromised Therefore, the poor performance of certain livestock during the postnatal growth and finishing phases may be a consequence of growth restriction in utero. Undernutrition in pregnant women may result from low intake of dietary nutrients owing to either a limited supply of food or severe nausea and vomiting known as hyperemesis gravidarum Pregnant women may also be at increased risk of undernutrition because of early or closely-spaced pregnancies Since pregnant teenage mothers are themselves growing, they compete with their own fetuses for nutrients, whereas short interpregnancy intervals result in maternal nutritional depletion at the outset of pregnancy. Low birth weights and preterm deliveries in adolescent pregnancies are more than twice as common as in adult pregnancies, and neonatal mortality in adolescent pregnancies is almost three times higher than for adult pregnancies Further, placental insufficiency results in reduced transfer of nutrients from mother to fetus, thereby leading to fetal undernutrition and IUGR 1. Finally, due to competition for nutrients, multiple fetuses resulting from assisted reproductive technologies are often at risk of undernutrition and therefore fetal growth restriction 2. Thus, various nutritional and pathological conditions can result in IUGR. Significant health problems for animals

particularly companion animals and women of reproductive age also result from being overweight or obese due to overeating. Extensive studies have shown that maternal overnutrition retards placental and fetal growth, and increases fetal and neonatal mortality in rats, pigs, and sheep Many overweight and obese women unknowingly enter pregnancy and continue overeating during gestation These women usually gain more weight during the first pregnancy and accumulate more fat during subsequent pregnancies. Maternal obesity or overnutrition before or during pregnancy may result in fetal growth restriction and increased risk of neonatal mortality and morbidity in humans IUGR causes both perinatal and neonatal medical complications. Surviving infants with IUGR are often at increased risk for neurological, respiratory, intestinal, and circulatory disorders during the neonatal period. Both epidemiological and experimental evidence suggest that IUGR contributes to a wide array of metabolic disorders and chronic diseases in adults Table 1. For example, individuals exposed to the Dutch winter famine of â€" in utero had higher rates of insulin resistance, vascular disease, morbidity, and mortality in adulthood A cohort study of 15, Swedish men and women born between and provides by far the most convincing evidence for the close association between reduced fetal growth rate and increased risk of death from ischemic heart disease Thus, the intrauterine environment of the conceptus may alter expression of the fetal genome and have lifelong consequences. Namely, alterations in fetal nutrition and endocrine status may result in developmental adaptations that permanently change the structure, physiology and metabolism of the offspring, thereby predisposing individuals to metabolic, endocrine, and cardiovascular diseases in adult life. The lack of knowledge about the mechanisms of IUGR has prevented the development of effective therapeutic options, such that the current management of growth-restricted infants is empirical and is primarily aimed at selecting a safe time for delivery 2. Because nutritional and developmental research often involves invasive tissue collections and surgical procedures, it is neither ethical nor practical to conduct these experiments with the human placenta and fetus. Thus, animal models e. NO is a major endothelium-derived relaxing factor, and plays an important role in regulating placental-fetal blood flows and, thus, the transfer of nutrients and O2 from mother to fetus Likewise, polyamines regulate DNA and protein synthesis, and therefore, cell proliferation and differentiation 19 , Thus, NO and polyamines are key regulators of angiogenesis the formation of new blood vessels from preexisting vessels and embryogenesis 22 , as well as placental and fetal growth Fig. These crucial roles of NO and polyamines are graphically illustrated by the following findings. Second, inhibition of polyamine synthesis prevents mouse embryogenesis, and inhibition of placental polyamine synthesis reduces placental size and impairs fetal growth Finally, maternal arginine deficiency causes IUGR, increases fetal resorption and death, and increases perinatal mortality in rats, whereas dietary arginine supplementation reverses fetal growth restriction in rat models of IUGR induced by hypoxia or inhibitors of NOS Both maternal undernutrition and overnutrition may impair placental syntheses of NO and polyamines, and therefore placental development and utero-placental blood flows. This may result in reduced transfer of nutrients and O2 from mother to fetus, and thus fetal growth restriction. The unusual abundance of the arginine-family amino acids in fetal fluids is associated with the highest rates of NO and polyamine syntheses in ovine placentae in the first half of pregnancy 29 , 30 , when their growth is most rapid 1. These novel findings support the proposed crucial roles of the arginine-dependent metabolic pathways in conceptus development Fig. Maternal undernutrition and hypercholesterolemia during pregnancy frequently occurring in obese subjects have profound effects on the synthesis of NO and polyamines. The decreases in substrate availability and enzyme activity contribute to impaired placental syntheses of NO and polyamines in both protein-deficient and hypercholesterolemic pigs 4 ,

DOWNLOAD PDF MATERNAL NUTRITION BEFORE AND DURING PREGNANCY T.O. SCHOLL

Chapter 2 : Maternal nutrition before and during pregnancy.

In humans, the link between the maternal diet and the outcome of pregnancy is best illustrated by the classic study of wartime famine in Holland. During the famine it is likely that a low food.

Leanne Redman Last week we chatted with Dr. Not only is the weig ht and health status of a mother at the time of conception important, but the amount of weight gain during pregnancy is also now known to have consequences for the infant. For example, too little weight gain is associated with babies being born small for gestational age and, many times, preterm. Moms with too much weight gain in pregnancy are more likely to develop metabolic issues like gestational diabetes or blood pressure problems, and the babies are often born large for gestational age. In both cases â€" under- and over- nutrition in pregnancy has been shown to translate to weight and obesity in childhood and adult life. More alarming is the data showing increased risks for the unborn infant during gestation, injury and complications at the time of birth, as well as increased risk for future weight gain, and even obesity and diabetes later during childhood and in adult life. Pregnancy in many cultures is viewed as the time to let go and to eat for two. Women should know the consequences of weight gain in pregnancy and the amount of weight it is recommended they gain on the basis of where they start. What does it mean, and why is it so important? Institute of Medicine strongly advocates that women contemplating pregnancy tackle barriers interfering with a healthy lifestyle prior to pregnancy, and attempt to conceive once maintaining a healthy weight and lifestyle. Many women are united in a common goal for pregnancy, that is to deliver a healthy baby â€" however many newly pregnant women and men do not realize the importance of their pre-pregnancy health on the future potential outcomes of their unborn child. For instance, women will quit smoking, avoid caffeine or soda, increase fruits and vegetables, and take a vitamin. There is no better time in fact to adopt new behaviors that support a healthy lifestyle that will hopefully be carried forward with her in her life for many years after the birth of her baby. Since we now understand how critical pregnancy is on the future and long-term health of both the mother and her child, pregnancy can be thought of as a window of opportunity to foster changes for healthy nutrition. Unfortunately, pregnancy can also be a window to poor health outcomes for mom and baby. Optimizing health and nutrition for pregnancy and beyond needs to be at the forefront of thinking for moms from day one! For more information on Dr. Redman and her work, visit: The following two tabs change content below. Our goal is to connect and encourage Baton Rouge moms online via our website and our social media channels by providing up to date information on family friendly local events, parenting help, services and resources. Latest posts by Baton Rouge Moms see all.

Chapter 3 : Importance of maternal nutrition before and after pregnancy -

Maternal Nutrition Before, During, and After Pregnancy: Update on What to Eat During the Childbearing Years. Elizabeth M. Ward, M.S., R.D.

Regnault 2 Janna L. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution CC-BY license http: This article has been cited by other articles in PMC. Maternal nutrition during pregnancy, and how this impacts placental and fetal growth and metabolism, is of considerable interest to women, their partners and their health care professionals. In developing countries, maternal undernutrition is a major factor contributing to adverse pregnancy outcomes. Conversely, with the increased prevalence of high calorie diets and resulting overweight and obesity issues in developed countries, the impact of this overnutrition situation upon pregnancy outcome is highlighted as a contributing factor for adverse metabolic outcomes in offspring later in life. Further, while low or excessive food intake per se is an important aspect of pregnancy development, the specific role that the placenta plays in nutrient metabolism and overall nutrient supply to the fetus in situations of undernutrion, overnutrition or poor diet composition is still poorly defined. Both epidemiology and animal studies now highlight that undernutrition, overnutrition, and diet composition negatively impact fetoplacental growth and metabolic patterns, having adverse later life metabolic effects for the offspring. This issue aims to highlight new research in a number of these abovementioned areas across the early life course. A great deal of data now highlights the periconceptional period as a critical period upon which insults may generate later life physiological and metabolic changes in the resulting offspring. In the review submitted by Padhee and colleagues [1], the procedures of ARTs are examined, specifically in terms of how common procedures associated with the handling and preparation of gametes and embryos may impact later life metabolism, particularly impacting offspring cardiometabolic health. These later life defective metabolic effects are also understood to be established during pregnancy. In surveying preconceptional women, pregnant and lactating women and women of reproductive age, Cuervo et al. Poor maternal nutritional intake after the periconceptional period during pregnancy can also negatively impact fetal genetic growth trajectory and can result in fetal growth restriction. In addition to maternal nutrient supply, the effectiveness of the placenta in transporting nutrients and oxygen to the fetus is important in determining fetal growth. A range of adaptations to placental development occur when the fetus is growth restricted and these are described by Zhang et al. Regardless of the cause of low birth weight, Zheng et al. Wood-Bradley and team provide a review of the literature surrounding the potential mechanisms by which maternal nutrition focusing on malnutrition due to protein restriction, micronutrient restriction and excessive fat intake influences offspring kidney development and thereby function in later life [8]. In the same light, Blumfield et al. Furthermore, Colon-Ramos and colleagues investigated the potential association between maternal dietary patterns during pregnancy and birth outcomes in a diverse population with a historically high burden of low birth weight and other adverse birth outcomes [10]. Experiences in the perinatal period also play a key role in defining how offspring respond to stress es in postnatal life. To this point, Tsuduki and colleagues report upon the impact a high fat diet during mouse lactation, where it appears to increase the susceptibility of later life obesity induced through postnatal social stress [11]. This paper highlights the importance of understanding how an early life environment predisposes offspring to potential detrimental responses to postnatal adverse situations. In a review by Dunlop et al. While meeting dietary guidelines is important, overall maternal health status also plays a pivotal role in determining fetal nutrient supply. In situations of maternal disease, such as infection with human immunodeficiency virus HIV , the ability of the mother to consume sufficient substrates to maintain herself and meet fetal demands is often compromised. In situations of HIV, resting energy expenditure is increased and the disease may limit dietary intake and reduce nutrient absorption, in addition to influencing the progression of HIV disease as reported by Ramlal and colleagues [13]. Their study described typical diets of HIV-infected, pregnant Malawian women and

highlighted that poor quality maternal diets should be enhanced to meet demands of this particular group of pregnant women, vulnerable to both HIV and malnutrition. While deficiencies in nutrition during pregnancy can result in adverse offspring outcomes, once pregnant, maternal weight gain during and after pregnancy are critical issues for maternal and fetal health as well. In the pilot RCT report lead by Martin et al. The findings indicate that the approach reported is feasible and acceptable to pregnant women and that the methodology, including the collection of blood for biomarker assessment, could be adapted based on qualitative feedback to a larger, adequately powered RCT. Assessing maternal body composition, as part of monitoring maternal well-being, prior to and during pregnancy is critical to estimate the requirements for dietary energy during gestation and when investigating relationships between maternal nutritional status and offspring development. Forsum and co-workers investigate the possibility of estimating body density and the use of a two-component model 2CM to calculate total body fat concluding it may present a new clinically appropriate methodology [15]. Many nutritional studies in pregnancy have focussed on the impact of changes in total or macronutrient intake. This current issue features several studies that expand our knowledge regarding nutrient uptake during pregnancy, but have focused on changes in micronutrients during pregnancy. Grieger and Clifton, provide updated evidence from epidemiological and RCTs on the impact of dietary and supplemental intakes of omega-3 long-chain polyunsaturated fatty acids, zinc, folate, iron, calcium, and vitamin D, as well as dietary patterns, on infant birth weight [16]. Fish intake during pregnancy is recognized as an important source of PUFAs. Starling and co-workers present a systematic review of fish intake during pregnancy and fetal neurodevelopment [18]. The review covers approximately a 14 year period of publications between January and March involving over papers, of which only eight were selected for a qualitative comparison of study findings. Deficiencies in a range of micronutrients in low vs middle income countries that may act through epigenetic mechanisms to influence fetal development and risk of chronic disease in adult life are identified by Darnton-Hill et al. They also discuss supplementation programs. One particular micronutrient that is important for sulphonation of steroids and hormones is sulphate. Folic acid and Vitamin B12, are crucial factors for metabolic pathways, and have been extensively studied and demonstrated to play important roles in preventing the development of neural tube defects NTDs. Further independent roles for folate and Vitamin B12 deficiency amongst pregnant women are presented in this issue. The importance of adequate Vitamin D in women of reproductive age and its role in fetal development is of great interest and importance. A review of calcitrol biosynthesis during pregnancy, particularly by the placenta is presented by Olmos-Ortiz et al. Additionally, Choi et al. Finally regarding Vitamin D, the impact of sun exposure and Vitamin D supplementation on achieving appropriate Vitamin D status in women whom are breastfeeding is explored by Dawodu and colleagues [27]. In this issue, several new studies highlighted the importance of diet intake and composition upon maternal and fetal well-being parameters in human population and animal studies. We hope that the articles contained within this issue, and the material they reference and describe, are of interest to women, their partners and their health care professionals in promoting continual and informed dialogue about nutrition in pregnancy. The periconceptional environment and cardiovascular disease: Does in vitro embryo culture and transfer influence cardiovascular development and health? Dietary and health profiles of Spanish women in preconception, pregnancy and lactation. Impacts of maternal nutrition on vascularity of nutrient transferring tissues during gestation and lactation. Placental adaptations in growth restriction. The placental microbiome varies in association with low birth weight in full-term neonates. Developmental programming of cardiovascular disease following intrauterine growth restriction: Findings utilising a rat model of maternal protein restriction. Fetal adrenal demedullation lowers circulating norepinephrine and attenuates growth restriction but not reduction of endocrine cell mass in an ovine model of intrauterine growth restriction. Understanding the role of maternal diet on kidney development; an opportunity to improve cardiovascular and renal health for future generations. Lower protein-to-carbohydrate ratio in maternal diet is associated with higher childhood systolic blood pressure up to age four years. Association between dietary patterns during pregnancy and birth size measures in a diverse population in southern US. High dietary fat intake during

lactation promotes the development of social stress-induced obesity in the offspring of mice. Altered fetal skeletal muscle nutrient metabolism following an adverse in utero environment and the modulation of later life insulin sensitivity. Dietary patterns and maternal anthropometry in hiv-infected, pregnant Malawian women. Reducing postpartum weight retention and improving breastfeeding outcomes in overweight women: A pilot randomised controlled trial. The two-component model for calculating total body fat from body density: An evaluation in healthy women before, during and after pregnancy. A review of the impact of dietary intakes in human pregnancy on infant birthweight. Polyunsaturated fatty acid composition of maternal diet and erythrocyte phospholipid status in Chilean pregnant women. Fish intake during pregnancy and foetal neurodevelopmentâ€”A systematic review of the evidence. Micronutrients in pregnancy in low- and middle-income countries. Maternal consumption of non-staple food in the first trimester and risk of neural tube defects in offspring. Folate deficiency could restrain decidual angiogenesis in pregnant mice. Regulation of calcitriol biosynthesis and activity: Focus on gestational vitamin D deficiency and adverse pregnancy outcomes. High prevalence of vitamin D deficiency in pregnant Korean women: The first trimester and the winter season as risk factors for vitamin D deficiency. Vitamin D status and related factors in newborns in Shanghai, China. Sun exposure and vitamin D supplementation in relation to vitamin D status of breastfeeding mothers and infants in the global exploration of human milk study.

Chapter 4 : Nutrition and pregnancy - Wikipedia

Calorie needs increase during pregnancy to help support a woman's maternal body changes and the baby's proper growth and development. The RDA for energy intake during pregnancy is an additional calories per day for the second and third trimester, in addition to maintenance needs.

Tweet share Image by Felicia Webb. It has remained unknown, however, whether such effects also occur in humans. A report on their research appears today in the journal Nature Communications. Previous research has shown that seasonal changes, during the rainy and dry seasons in rural Gambia, affect maternal nutritional status, causing infants born during the food-scarce rainy season to weigh less than those born during the dry season. At these regions, DNA methylation an epigenetic mark that controls gene expression is established in the early embryo and then maintained in various tissues during fetal development, and for the rest of life. Researchers previously found that season of conception in rural Africans is associated with DNA methylation at metastable epialleles, but it was unclear exactly how this happened. To further investigate, a team led by Dr. Robert Waterland at Baylor conducted this prospective study to determine specifically whether maternal nutrition around the time of conception affects establishment of DNA methylation at these genomic regions in her offspring, and whether these effects indeed occur systemically. Season leaves mark The study required measuring maternal nutritional status very early in pregnancy â€" potentially before the women even knew they were pregnant. To do so, over 2, women of childbearing age were enrolled from 34 villages in rural West Africa. They were visited monthly for one year and asked to indicate their last menstrual cycle. At the first indication of a missed cycle, a blood sample was taken to confirm pregnancy and measure 13 blood biomarkers of maternal nutritional status. At the same time, 30 women of childbearing age across three of the same villages were visited monthly and had their food intake measured and provided blood samples for biomarker assessment. Researchers followed the main group of women after child birth and took blood samples along with hair follicle DNA samples from the infants at around 6 months of age. They found that babies who were conceived in the rainy season had higher DNA methylation at six metastable epialleles. Remarkably, a nearly identical effect was found in both peripheral blood and hair follicle DNA. In both cases, the effect was negative. These early nutritional effects on the human epigenome are almost certainly happening all over the world. Our ultimate goal is to define an optimal diet for mothers-to-be that would prevent defects in the methylation process. Pre-conceptional folic acid is already used to prevent defects in embryos. Bergen and Gary E. Dyer and Sheila M.

Chapter 5 : Nutrition in Pregnancy: Optimising Maternal Diet and Fetal Adaptations to Altered Nutrient Sup

Enhanced PDF; Standard PDF (KB) ; Women's nutrition, before and during pregnancy, may play a key role in reproductive health and is recognised as being important for optimising pregnancy outcomes. 1,2 The availability and supply of nutrients to the developing fetus depends on maternal nutritional status which in turn depends on her nutrient stores, dietary intake and obligatory requirements.

All registrations must be completed prior to the application being submitted. Registration can take 6 weeks or more, so applicants should begin the registration process as soon as possible. The NIH Policy on Late Submission of Grant Applications states that failure to complete registrations in advance of a due date is not a valid reason for a late submission. The same DUNS number must be used for all registrations, as well as on the grant application. The renewal process may require as much time as the initial registration. Obtaining an eRA Commons account can take up to 2 weeks. Individuals from underrepresented racial and ethnic groups as well as individuals with disabilities are always encouraged to apply for NIH support. Additional Information on Eligibility Number of Applications Applicant organizations may submit more than one application, provided that each application is scientifically distinct. The NIH will not accept duplicate or highly overlapping applications under review at the same time. This means that the NIH will not accept: A new A0 application that is submitted before issuance of the summary statement from the review of an overlapping new A0 or resubmission A1 application. A resubmission A1 application that is submitted before issuance of the summary statement from the review of the previous new A0 application. An application that has substantial overlap with another application pending appeal of initial peer review see NOT-OD Application and Submission Information 1. See your administrative office for instructions if you plan to use an institutional system-to-system solution. Conformance to the requirements in the Application Guide is required and strictly enforced. Applications that are out of compliance with these instructions may be delayed or not accepted for review. All applications, regardless of the amount of direct costs requested for any one year, should address a Data Sharing Plan. Only limited Appendix materials are allowed. Foreign Institutions Foreign non-U. Submission Dates and Times Part I. Overview Information contains information about Key Dates and times. Applicants are encouraged to submit applications before the due date to ensure they have time to make any application corrections that might be necessary for successful submission. When a submission date falls on a weekend or Federal holiday , the application deadline is automatically extended to the next business day. Organizations must submit applications to Grants. Applicants are responsible for viewing their application before the due date in the eRA Commons to ensure accurate and successful submission. Paper applications will not be accepted. Applicants must complete all required registrations before the application due date. Eligibility Information contains information about registration. For assistance with your electronic application or for more information on the electronic submission process, visit Applying Electronically. If you encounter a system issue beyond your control that threatens your ability to complete the submission process on-time, you must follow the Guidelines for Applicants Experiencing System Issues. See more tips for avoiding common errors. Upon receipt, applications will be evaluated for completeness and compliance with application instructions by the Center for Scientific Review, NIH. Applications that are incomplete or non-compliant will not be reviewed. Common Data Elements NINR encourages the use of common data elements CDEs in basic, clinical, and applied research, patient registries, and other human subject research to facilitate broader and more effective use of data and advance research across studies. CDEs are data elements that have been identified and defined for use in multiple data sets across different studies. Use of CDEs can facilitate data sharing and standardization to improve data quality and enable data integration from multiple studies and sources, including electronic health records. Investigators are encouraged to consult the Portal and describe in their applications any use they will make of NIH-supported CDEs in their projects. Post Submission Materials Applicants are required to follow the instructions for post-submission materials, as described in the policy.

Any instructions provided here are in addition to the instructions in the policy. Application Review Information 1. Criteria Only the review criteria described below will be considered in the review process. As part of the NIH mission , all applications submitted to the NIH in support of biomedical and behavioral research are evaluated for scientific and technical merit through the NIH peer review system. For this particular announcement, note the following: A proposed Clinical Trial application may include study design, methods, and intervention that are not by themselves innovative but address important questions or unmet needs. Additionally, the results of the clinical trial may indicate that further clinical development of the intervention is unwarranted or lead to new avenues of scientific investigation. Overall Impact Reviewers will provide an overall impact score to reflect their assessment of the likelihood for the project to exert a sustained, powerful influence on the research field s involved, in consideration of the following review criteria and additional review criteria as applicable for the project proposed. Scored Review Criteria Reviewers will consider each of the review criteria below in the determination of scientific merit, and give a separate score for each. An application does not need to be strong in all categories to be judged likely to have major scientific impact. For example, a project that by its nature is not innovative may be essential to advance a field. Significance Does the project address an important problem or a critical barrier to progress in the field? Is there a strong scientific premise for the project? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field? For trials focusing on clinical or public health endpoints, is this clinical trial necessary for testing the safety, efficacy or effectiveness of an intervention that could lead to a change in clinical practice, community behaviors or health care policy? For trials focusing on mechanistic, behavioral, physiological, biochemical, or other biomedical endpoints, is this trial needed to advance scientific understanding? If Early Stage Investigators or those in the early stages of independent careers, do they have appropriate experience and training? If established, have they demonstrated an ongoing record of accomplishments that have advanced their field s? Do they have appropriate expertise in study coordination, data management and statistics? For a multicenter trial, is the organizational structure appropriate and does the application identify a core of potential center investigators and staffing for a coordinating center? Innovation Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed? Approach Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project? Have the investigators presented strategies to ensure a robust and unbiased approach, as appropriate for the work proposed? Are potential problems, alternative strategies, and benchmarks for success presented? If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed? Have the investigators presented adequate plans to address relevant biological variables, such as sex, for studies in vertebrate animals or human subjects? Is the trial appropriately designed to conduct the research efficiently? Are potential ethical issues adequately addressed? Is the process for obtaining informed consent or assent appropriate? Is the eligible population available? Are the plans for recruitment outreach, enrollment, retention, handling dropouts, missed visits, and losses to follow-up appropriate to ensure robust data collection? Are the planned recruitment timelines feasible and is the plan to monitor accrual adequate? Are the plans to standardize, assure quality of, and monitor adherence to, the trial protocol and data collection or distribution guidelines appropriate? Is there a plan to obtain required study agent s? Does the application propose to use existing available resources, as applicable? Data Management and Statistical Analysis Are planned analyses and statistical approach appropriate for the proposed study design and methods used to assign participants and deliver interventions? Are the procedures for data management and quality control of data adequate at clinical site s or at center laboratories, as applicable? Have the methods for standardization of procedures for data

management to assess the effect of the intervention and quality control been addressed? Is there a plan to complete data analysis within the proposed period of the award? Environment Will the scientific environment in which the work will be done contribute to the probability of success? Are the institutional support, equipment and other physical resources available to the investigators adequate for the project proposed? Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements? Does the application adequately address the capability and ability to conduct the trial at the proposed site s or centers? Are the plans to add or drop enrollment centers, as needed, appropriate? Additional Review Criteria As applicable for the project proposed, reviewers will evaluate the following additional items while determining scientific and technical merit, and in providing an overall impact score, but will not give separate scores for these items. Study Timeline Specific to applications involving clinical trials Is the study timeline described in detail, taking into account start-up activities, the anticipated rate of enrollment, and planned follow-up assessment? Is the projected timeline feasible and well justified? Does the project incorporate efficiencies and utilize existing resources e. Are potential challenges and corresponding solutions discussed e. Protections for Human Subjects For research that involves human subjects but does not involve one of the six categories of research that are exempt under 45 CFR Part 46, the committee will evaluate the justification for involvement of human subjects and the proposed protections from research risk relating to their participation according to the following five review criteria: For research that involves human subjects and meets the criteria for one or more of the six categories of research that are exempt under 45 CFR Part 46, the committee will evaluate: For additional information on review of the Human Subjects section, please refer to the Guidelines for the Review of Human Subjects. For additional information on review of the Inclusion section, please refer to the Guidelines for the Review of Inclusion in Clinical Research. Vertebrate Animals The committee will evaluate the involvement of live vertebrate animals as part of the scientific assessment according to the following criteria: Reviewers will assess the use of chimpanzees as they would any other application proposing the use of vertebrate animals. For additional information on review of the Vertebrate Animals section, please refer to the Worksheet for Review of the Vertebrate Animal Section. Resubmissions For Resubmissions, the committee will evaluate the application as now presented, taking into consideration the responses to comments from the previous scientific review group and changes made to the project. Renewals For Renewals, the committee will consider the progress made in the last funding period.

Chapter 6 : Prenatal nutrition - Wikipedia

The following Q&A was originally posted on 1, Days'. This month, 1, Days' is hosting "March for Nutrition," a campaign focused on the importance of good nutrition before and during pregnancy to ensure good fetal, infant and maternal health outcomes.

Associated risk of lifelong diseases includes cardiovascular disease , type-2 diabetes , obesity , and hypertension. Babies born lighter in weight appear to have an increased rate of mortality than babies born at a heavier weight. Death rate would rise as birth weight increases beyond normal birth weight range. When this theory was first proposed, it was not well accepted and was met with much skepticism. The word "programming" illustrates the idea that during critical periods in early fetal development, there are persisting changes in the body structure and function that are caused by environmental stimuli. This would result in an increased risk of fetal macrosomia and neonatal hypoglycemia. High glucose concentrations in the blood of pregnant women cause an intensified transfer of nutrient to the fetus, increasing fetal growth. Nutrients other than sugar and their linkage to fetal overgrowth in diabetic pregnancy were taken into account, too, but the crucial role of the fetal hyperinsulinism and monitoring of motherly glucose was nevertheless stressed. A tile tribute to the Dutch Famine The dutch famine[edit] Since small birth weight is associated with an increased risk of chronic diseases in later life, and poor maternal nutrition during gestation contributes to restricted fetal development, maternal malnutrition may be a cause of increased disease susceptibility in adulthood. The Dutch famine of or the "Hunger Winter" during World War II serves as an epidemiological study that is used to examine the effects of maternal under-nutrition during different gestational stages. The famine was a period roughly five to six months of extreme food shortage in the west of Netherlands. The daily ration had increased to more than calories in June The period of maternal starvation is shown to have limited intrauterine growth and has been identified as one of the most important contributors to coronary heart disease as well as other chronic diseases later in life. The french paradox[edit] The French paradox regards the seemingly paradoxical fact that people living in France since many generations suffer from a relatively little incidence of heart disease , although the traditional French cuisine is high in saturated fatty acids. One explanation suggested for the paradox is the potential impact of nutritional enhancements during pregnancy and the first months and years of life that would positively influence the health of following generations: After the defeat in the Franco-German War , a nutrition program for pregnant women and small children with the aim of strengthening future generations of soldiers was introduced by the French Government. This might be one explanation for positive health-outcomes in following generations. The fertilized egg or the zygote becomes a blastocyst where the outer layer and the inner cell mass differentiate to form placenta and the fetus respectively. Implantation occurs at this stage where the blastocyst becomes buried in the endometrium. It is also in this stage where the blastocyst develops into an embryo , where all major features of human are present and operational by the end of this stage. During this period of time, the embryo develops rapidly and becomes a fetus. Pregnancy becomes visible at this stage. The pattern and amount of weight gain is closely associated with gestational stages. In the first trimester blastogenesis and early embryonic stages , the mother experiences a minimal weight gain approximately 0. The amount of weight gain depends strongly on their pre-pregnant weight. Gestational weight gain should also be progressive and the recommended weight depends on pre-pregnant body weight. Women having a BMI of This group have the lowest risk of adverse birth outcomes. It is advised that women with a normal weight before pregnancy should gain a total of Participating in aerobic activities such as walking and swimming 3 to 4 times a week is usually adequate. A proper diet is also essential to healthy weight gain. The common saying "a woman is eating for two" often leads to mothers thinking that they should eat twice as much. In reality, only a small increase in caloric intake is needed to provide for the fetus; approximately calories more in the second trimester and calories more in the third trimester. As such, underweight mothers should seek individualized advice tailored especially for

themselves. The first column categorizes the type of body weight based on the Body Mass Index. The second column summarizes the total recommended weight gain for each type of body weight, and the third column presents the corresponding weekly weight gain during the period when the fetus undergoes rapid growth during second and third trimesters.

Chapter 7 : Maternal Nutrition and Fetal Development | The Journal of Nutrition | Oxford Academic

spread awareness of the importance of maternal nutrition before and during pregnancy and should promote a cultural lifestyle change, in favor of a healthy weight before conceiving and balanced healthy diet with high-quality foods.

Surveillance decision We will plan an update of the guideline on maternal and child nutrition. During surveillance editorial or factual corrections were identified. Details are included in appendix A: Reason for the decision In , the previous surveillance decision was that the guideline should be updated but that the update should wait until the following reports had published: NICE public health guideline on vitamin D. Assessing the evidence Because the key driver to update this guideline is the overlaps with other NICE guidelines, new government policies such as the commissioning of infant feeding services , and the work of other organisations such as SACN , a broad literature search was thought not to be necessary. However, a search of relevant Cochrane reviews was conducted. This document recommends mandatory fortification of flour with folic acid in the UK, although recommendations on folic acid supplementation before and during pregnancy were unchanged. Findings that folic acid supplementation before and during pregnancy reduces neural tube defects are consistent with current recommendations. Healthy Start Healthy Start vitamins for pregnant women and children under 4 years Evidence identified in the surveillance review indicates that vitamin A supplementation during or after pregnancy, or in infants, appears to provide little benefit to mothers or infants, although major adverse effects were not apparent. Diet in pregnancy Dietary advice and information In addition to the guideline on maternal and child nutrition, NICE also has guidance on weight management before, during and after pregnancy NICE guideline PH27 , which is currently being updated. This guideline has detailed recommendations on dietary advice during pregnancy. The update to the guideline on maternal and child nutrition should consider removing dietary advice for pregnant women from the scope of this guideline, and instead cross-refer to the guideline on weight management before, during and after pregnancy. Obesity Obesity in pregnant women, mothers, and women who may become pregnant In addition to the guideline on maternal and child nutrition, NICE also has guidance on weight management before, during and after pregnancy NICE guideline PH27 , which is currently being updated. The update to the guideline on maternal and child nutrition should consider removing obesity from the scope this guideline, and instead cross-refer to the guideline on weight management before, during and after pregnancy. The commissioning guide was, in part, informed by the guideline on maternal and child nutrition. Therefore, an update of the section of the guideline on maternal and child nutrition that covers breastfeeding will complement the updated maternity guidelines. However, the guideline on maternal and child nutrition covers these periods and beyond, and extends to settings other than health services. Link workers Link workers for pregnant women and mothers whose first language is not English. The update to the guideline on maternal and child nutrition should consider whether recommendations in this area should be stood down and replaced with a cross-reference to patient experience in adult NHS services NICE guideline CG Allergies Introduction of potential allergens Evidence suggests that avoiding potentially allergenic foods, in particular, peanuts, early in life may be associated with an increased likelihood of developing allergies to those foods. Current guidance does not include recommendations about eating potentially allergenic food, so this area should be considered as an addition to the scope of the update. Healthy eating in pre-school settings SACN plans to review the evidence supporting current recommendations on feeding children aged 12â€”60 months, which may overlap with this section of the guideline. Family nutrition Promoting healthy eating in families with children aged up to 5 years SACN plans to review the evidence supporting current recommendations on feeding children aged 12â€”60 months, which may overlap with this section if the guideline. Overall update plan Improving maternal and child nutrition remains an important public health concern. Surveillance of this guideline indicates that the guideline on maternal and child nutrition has substantial overlaps with other NICE guidelines as detailed in the sections above, new government policies, such as the Public Health England

guidance on commissioning of infant feeding services, and the work of other organisations, such as SACN. Overall, a full update of the guideline to provide advice on interventions to improve the nutritional status of pregnant women, breastfeeding mothers, and their children is necessary, taking into account these identified overlaps. Equalities No equalities issues were identified during the surveillance process. Overall decision After considering all the evidence and views of topic experts, we decided that a full update is necessary for this guideline. See how we made the decision for further information. This page was last updated:

Chapter 8 : Nutrition in Pregnancy Clinic | Johns Hopkins Division of Maternal-Fetal Medicine

During pregnancy, you blood volume increases and your baby's blood is also developing. Getting enough iron will also help prevent anaemia Iodine - is needed by our bodies for the development of essential thyroid hormones.

Introduction The risk of malnutrition in women spans a lifecycle, and preventing maternal malnutrition requires intervening at all stages of growth and development. The nutritional status of one generation of women affects the nutritional well-being of their children in childhood and adulthood and is often referred to as the "intergenerational effect of malnutrition" Martorell and Zongrone, This brief presents information on why the nutrition of adolescent girls and mothers is important, the causes of malnutrition, and the scope of the problem. It also provides an overview of key, nutrition-specific interventions that address the immediate causes of malnutrition in adolescent girls and mothers. To mitigate the underlying and systemic causes of malnutrition, the brief suggests nutrition-sensitive interventions using a multi-sectoral approach. While this brief focuses on improving the nutrition of adolescent girls and pregnant and lactating women, interventions to protect the nutrition of girls in their first 1, days and all women also make important contributions to protecting health and economic outcomes in adult women and, in turn, the health and nutritional status of their own children see the 1, Days Brief for more detail. Key Messages It is critical to ensure women are well-nourished before, during, and after pregnancy Improving the nutritional well-being of adolescent girls helps keep them in school and improves their health before they become mothers Maternal malnutrition increases risk of women dying from pre-eclampsia and anemia The nutrition of mothers affects the stature of their children and their health at all ages Multi-Sectoral Nutrition Strategy â€" This brief supports the U. Ensuring that girls and women can access an adequate diet within their households and the resources they need for a healthy and productive life at all stages of their lives are integral parts of the U. Why Nutrition for Girls and Women Matters It is essential that women are well-nourished before, during, and after pregnancy. Maximizing the productivity and realizing the potential of all women, through good nutrition, makes an important contribution to national growth and development World Bank, In developing countries, women spend much of their lives pregnant or nursing their children, and the cost of malnutrition to both mothers and their infants is high during this period, making this a critical stage in their lives to ensure optimal nutritional status. These also are times when women are most likely to have contact with the health system for themselves and their children. Reaching girls and women with interventions before their first pregnancy and in between pregnancies also is an important strategy to improve their nutritional status and build micronutrient reserves before their first pregnancy or subsequent pregnancies. Delivering interventions to girls may be challenging in settings where girls do not attend school or participate in community-based activities. If they are attending school, improving the nutrition of girls is a strategy to keep them in school. Keeping girls in school will delay marriage and their first pregnancy, improving the nutritional status of both mothers and their children later Save the Children, Maternal malnutrition has serious consequences for both mothers and their children. Newly created international fetal growth standards found fetal growth to be consistent across regions when mothers were healthy and well-nourished Papageorghiou, et al. The nutritional status of women before, during, and after pregnancy, including inadequate weight gain during pregnancy, affects birth and delivery outcomes. Fetal growth restriction, assessed by small for gestational age weight below the 10th percentile of the international fetal growth standard for gestational age leads to babies being born too small, which has consequences throughout life Table 1. Poor nutrition in girls may exacerbate their risk of poor birth and delivery outcomes because they are still growing Bhutta, et al. Anemia in pregnant and non-pregnant women, 40â€"60 percent of which is estimated to be caused by iron deficiency WHO, , may increase risk of blood loss at delivery and increase postpartum hemorrhage Kavle, et al. From a secondary analysis of national studies in Africa, when pregnant women received iron-folic acid IFA supplements and presumptive treatment for malaria, which is also a cause of maternal anemia, the risk of neonatal mortality decreased by 34 percent

Titaley, et al. Similar findings have been found in other regions â€” for example, in Nepal, early and total neonatal mortality decreased by 45 percent and 42 percent, respectively, when women took IFA supplements during pregnancy Nisar, et al. The effect was highest when women started taking IFA supplements in their first trimester or when they took more than IFA supplements. Gestational hypertensive disorders, including pre-eclampsia and eclampsia, are the second cause of maternal mortality in developing countries Black, et al. These conditions also increase the risk of prematurity and fetal growth restriction. Giving pregnant women calcium supplements where calcium intake is low reduces pre-eclampsia by 52 percent and prematurity by 24 percent WHO, Consuming a micronutrient-rich diet during adolescence and before pregnancy promotes optimal mental and physical development and also provides essential vitamins and minerals that women need when they decide to have children. Iron deficiency is associated with compromised learning in not only young children, but also older girls, even in developed countries Grantham-McGregor and Ani, ; Halterman, et al. When women take folic acid supplements prior to conception, there is a 72 percent decrease in the risk of neural tube defects in newborns e. Iodine deficiency before and early in pregnancy increases the risk of poor birth outcomes including severe mental retardation cretinism Black, et al. Iodine deficiency affects brain function in girls and women of all ages, reducing intelligence quotient by Overweight and obesity in girls and women are growing problems in developing countries and also contribute to poor health and delivery outcomes, such as premature delivery and maternal complications. Obese women are at increased risk of gestational diabetes and pre-eclampsia compared to women with normal weights, as measured by body mass index BMI Black, et al. Scope of the Problem Globally from to , underweight decreased slightly in women 20â€”49 years of age from about 15 percent to 13 percent while overweight increased from about 23 percent to 34 percent Figure 2. However, underweight is 5â€”10 percentage points higher in poor countries. For example, in 5 countries Bangladesh, Cambodia, Ethiopia, Nepal, and Senegal , 20â€”25 percent of women are underweight â€” an estimated 12 million pregnant and lactating women who are too thin. There are few nationally-representative nutrition surveys on the nutritional status of girls 10â€”19 years of age except for information about girls 15â€”19 years of age who have already given birth. There also is little information on the proportion of pregnant women who do not gain adequate weight, based on their pre-pregnancy nutritional status, which is a risk factor for fetal growth restriction. One analysis using modeling of national datasets found 42 percent of Indian and 17 percent of African women were underweight at the beginning of their pregnancy Coffey, Weight gain during pregnancy was the same in both regions atabout 7 kg, which is about one-half of the minimum weight gain recommended during pregnancy for women in the United States. These findings indicate that higher rates of low birth weight LBW in Asian than in African newborns is due to higher prevalence of underweight in Asian women before they conceive. The double burden of malnutrition with stunting or wasting and overweight or obesity in the same household is a growing trend in many countries. In 13 out of 19 USAID Feed the Future priority countries, overweight exceeds underweight by 2 to 4-fold in women of reproductive age while in most of these countries stunting in children remains high. Figure 3 shows the prevalence of anemia by region and reproductive status. With iron deficiency as one of its major causes, anemia in pregnant women, for example, ranges from 24 percent to 49 percent by region WHO, Causes and Best Practice interventions Interventions should address the immediate and underlying causes of malnutrition in girls and women. Immediate causes include lack of knowledge about adequate nutrition, inadequate or excessive consumption of nutrients, and chronic and frequent infections that increase energy and micronutrient requirements and decrease nutrient absorption. Underlying causes of malnutrition include lack of access to nutritious foods, quality health services and a clean environment; early, frequent, too many, and short spacing of pregnancies; limited infrastructure; food insecurity; the absence of markets to purchase food; gender and other inequalities; heavy workloads in women; and poverty. For girls, lack of access to services, education, and foods due to inequality in household food distribution are particularly important underlying causes of malnutrition. Mitigating the underlying causes of malnutrition can improve the nutrition situation of girls and women, even when the availability of food at the household level does not change. Nutrition-Specific

DOWNLOAD PDF MATERNAL NUTRITION BEFORE AND DURING PREGNANCY T.O. SCHOLL

Interventions The table on the following page shows nutrition-specific interventions to improve the nutritional status of girls and women, particularly during pregnancy and lactation Bhutta, et al. Many of these interventions are integrated into the health platform in health facilities or at the community level and should be tailored to the needs of women with special needs, including pregnant girls. Indicators for the interventions are provided. Those indicators that are collected by or can be calculated with data from Demographic and Health Surveys are designated with an asterisk. Nutrition-Sensitive Interventions When interventions are integrated into a package of services and through different sectors, they address the multiple, underlying causes of maternal malnutrition, either before e. These interventions are referred to as "nutrition-sensitive" interventions. Examples of the role different sectors play in improving the nutrition of girls and women: Family planning programs provide counseling and commodities to delay pregnancy, increase birth spacing, and reduce the number of children women have, which improves the nutritional status of women, extends breastfeeding, and prevents stunting in children. The education sector can provide take-home food rations to families in return for keeping girls in school. The education sector can provide health, water, sanitation and hygiene WASH , and nutrition interventions to benefit girls including providing toilet facilities for girls, micronutrient supplements, deworming, and treatment for malaria. The agriculture sector increases the availability of nutrient-rich foods through horticulture and livestock programs for girls and women. The WASH sector improves water and sanitation infrastructure and promotes hand washing and the hygienic preparation of food to reduce diarrhea in girls and women. The private food industry, supported by appropriate public policies and government regulation and monitoring, can produce healthy, affordable fortified foods to address micronutrient deficiencies in all women of reproductive age. The social protection sector provides social safety nets such as conditional cash transfers to women to increase their use of health, nutrition, and education services or direct food support for mothers and children, particularly targeting undernourished girls and women before, during, and after pregnancy. Civil society and religious organizations can play the role of nutrition champion through consumer groups, religious organizations, and contact points e. Fetal Origins of Adult Disease: Strength of Effects and Biological Basis. International Journal of Epidemiology ; Published Online, June 6, Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. Published online, January 17, DOI: The Lancet Maternal and Child Nutrition ; The Damaged Brain of Iodine Deficiency. Cognizant Communication, ; Achieving Millennium Goals and Beyond. BMC Pediatrics ; Cochrane Database Systematic Review ; Pediatrics ; 6: Weight Gain during Pregnancy: Reexamining the Guidelines Institute of Medicine of the National Academies. Journal of Health Population Nutrition ; 26 2: Intrauterine Growth and Gestational duration Determinants. Public Health Nutrition ; 16 8: Intergenerational Influences on Child Growth and Undernutrition. Pediatrics and Perinatal Epidemiology ; 26 Suppl. The First Days of Life: Policies to Support Maternal Nutrition. Global Health Action ; 7: Journal of Nutrition ; Save the Children Fund. Comparative Quantification of Health Risks: World Health Organziation, American Journal of Clinical Nutrition ; Fixing the Broken Promise of Education for all: The Global Prevalence of Anaemia in

Chapter 9 : Maternal and Fetal Nutrition: What You Need to Know - Nurse in Progress

Maternal and fetal nutrition are important topics that significantly impact the health of both the mother and her unborn baby. While you may not spend a ton of time on maternity and obstetrics in nursing school, you will need to know some of the basics to succeed on the NCLEX.

At the same time, women also play vital, if often unacknowledged, roles in their families, communities, and societies. However, the poor nutritional status of many women in the world today compromises their capacity to meet the vigorous demands of their multiple roles as mothers and productive workers. Lack of sufficient food or the deficiency of a specific nutrient, such as iron, is clearly implicated in contemporary maternal malnutrition. Often, however, a heavy work-load, made yet more difficult by limited access to basic resources e. When a woman begins life as an undernourished infant, with frequent illness and poor nutrition during childhood, she arrives at maturity in a less than optimal state to undertake pregnancy and lactation. As the conditions that produce malnutrition continue to affect her, both she and her offspring, as well as the larger community, are further disadvantaged through a vicious intergenerational cycle of poverty and undernutrition. Figure 1 illustrates some of the main influences on, and the outcomes of, maternal nutritional status. From it can be deduced the main problems in any particular situation, the possible remedial measures, and the gaps in our knowledge that hinder progress. In dealing with these topics no attempt is made to go into technical detail, rather the intention is to highlight areas on which we must concentrate in the future. The requirements for energy and protein are in the process of being re-examined. Currently, estimates of nutrient requirements are based on healthy, mature women, who arrive at conception adequately nourished and who are only moderately active during their pregnancy. They are frequently applied to poorly nourished mothers of a smaller body size, who perhaps have not even completed their own growth. Their nutritional status and stores may already be inadequate; they must bear the drain of parasitism plus the stress of frequent infections; and rarely is there any reduction in their heavy physical workload. Thus, published figures of additional nutritional requirements in a normal pregnancy bear little relation to the needs of many Third World mothers. Indeed, perhaps the most surprising thing is not that such women grow old before their time and have a reduced life expectancy, but rather that they are able to survive so long, cope with many tasks, and continue to bear and nurse children. There has been too little attention given to the impact of malnutrition before and during pregnancy on the mother herself. The primary maternal nutritional deficiencies found in deprived populations can be summarized as follows: Energy deficiency-primarily occasioned by poor availability of food but also conditioned by anorexia and stress of infections plus the high requirements of physical labour. Iron-deficiency anaemia-coupled with folate deficiency in some areas. In hostile environments there is the added burden of reduced absorption, defective haemopoeisis, and increased blood loss. Vitamin A deficiency-occasioned by low intake. As carotene is the main source for Third World mothers, vegetable consumption habits and seasonal availability are crucial. The most striking adverse effects are usually seen in the offspring of deficient mothers after the infants are weaned. Iodine deficiency-leading to endemic goitre occurs in areas where the iodine content of the soil, water, and plants is low, especially in the presence of goitrogens, and where foods from outside the area are not consumed. Adverse effects on the mental performance of the offspring is a main concern. Deficiency of other micro-nutrients, such as thiamine, niacin, and zinc, may still occur in certain geographic areas. On the other hand, severely limited resources have usually permitted only restricted coverage by any intervention and necessitated a fairly narrow approach. On the basis of present knowledge, both long-term and short-term interventions can be envisaged. The former are by far the more important, but short-term measures must be taken simultaneously to alleviate the current situation. It is the responsibility of all development workers, including those in the field of nutrition, to participate in the decision-making process in whatever way they can to ensure that development results in a more equitable distribution of available resources, especially as these affect the nutrition and health of women. The particular long-term interventions

selected must be based on local priorities and feasibility. Influences on and Outcomes of Maternal Nutritional Status Legislative Action With legislation it is important to recognize two aspects: Legislative action in the following areas would ultimately affect the nutritional status of women and hence have impact on problems of maternal nutrition. Equal rights and opportunities: There must be equal rights under law for both sexes, enabling women to seek and obtain work for equal pay and so to improve income and nutrition. Marriage and family laws need to deal with the following two areas, among others: There are countries where more than half of first pregnancies occur in girls below 18 years of age, before the adolescent has reached her full physical, mental, and social maturity, with deleterious effects on the mother and child. Legislation should be formulated setting the minimum age of marriage at an age compatible with local rates of maturation. Attention must be paid to enforcement in the many countries that already have such laws but do not apply them. Women should have equal right to divorce and share the common property, so that their nutritional and social security are not endangered by the changed social situation. Child labour laws should ensure that young girls are not exposed to undue demands likely to stunt their growth, impair their health, or affect their reproductive capacity. Conditions of work and employment for women must include: There should be access to services for child-spacing. Social toxicants drugs and stimulants: Legislation is needed to protect women from the adverse effects of social toxicants, particularly during pregnancy and lactation. Education Women who receive even a minimal basic education are generally more aware than those who are illiterate of the need to utilize available resources for the improvement of the health particularly the nutritional status of themselves and their families. It is therefore imperative that young girls be enrolled into compulsory primary school education. Opportunities should also be given to adult women to take part in non-formal education. Health and nutrition education should form an integral part of the education process for both boys and girls. Food Availability National agricultural policy should ensure a sufficiency of food production and an efficient system of storage and distribution. Inflationary trends tend to erode the purchasing power of the poorer families. Measures are therefore especially necessary to ensure that the poorer families are able to obtain their basic food requirements. Health Services Implementation of internationally advocated approaches to ensure the accessibility of health care through the primary health-care approach will have a major impact on the nutrition and health status of the mother. Of particular importance are: Each country will have to make its own analysis to determine which problems are the most urgent and the most feasible methods of ameliorating conditions. Adequacy of the Energy Supply To date, food supplementation for pregnant and lactating women, outside of experimental settings, has not achieved the objectives of increasing infant birth weight and lactation performance. Nevertheless, in view of the documented energy deficits in the diets of pregnant and lactating women, short-term efforts should be made to increase their intake by the following means: Inputs will vary from encouragement of local production in a subsistence economy to control of the commercial market in more developed circumstances. Where a deficit exists despite the implementation of the above, food supplementation may be employed, directed only to the at-risk mother, taking into account the possibility of food leakage and the displacement of existing family foods. Supplementation assumes an adequate health infrastructure for its delivery. Anaemia Nutrition education should emphasize the maximum utilization of foods that prevent anaemia, and primary health-care service should provide simple protection or treatment of other causes of anaemia such as hookworm. Provision of iron and folate preparations is effective in preventing and treating the deficiencies, but requires an efficient, well-utilized service and long treatment periods. Vitamin A Deficiency Vitamin A levels in breast milk can be improved by the postpartum administration of a single massive oral dose of vitamin A that can be given by the traditional birth attendant or community health worker. Massive doses during pregnancy are not recommended, although smaller therapeutic doses can be used to correct any deficiency. In areas where it is feasible, encouraging the growth of green leafy vegetables in kitchen and community gardens will provide a source of carotene-rich foods. In circumstances where this is not possible, or where the iodized salt does not reach segments of the population, injections of a depot iodine should be given to all women of reproductive age before conception. This will provide protection for four or

five years. However, this procedure requires a basic health infrastructure to implement it effectively. Other Vitamin and Mineral Deficiencies In certain geographic areas beri-beri, rickets, osteomalacia, or other deficiencies still afflict women. While an improved and varied diet will remove these hazards, in the short-term, where food fortification is impractical, it may be necessary to resort to the provision of supplements through the health service, particularly during pregnancy and lactation. The gaps in our knowledge are sufficiently numerous to seriously inhibit the design, conduct, and assessment of measures to remedy maternal malnutrition. Below are listed some of the principal areas of concern at different stages of pregnancy and lactation and their practical implications. The Ability to Assess Maternal Nutritional Status Currently, there are no widely accepted field-applicable methods for measuring relative states of nutrition and their functional effects in adults, irrespective of gender. Consequently, we lack an adequate basis for assessing the prepregnancy state of nutrition against which change can be measured during pregnancy anthropometric measures are non-specific. This problem limits the possibility of identifying women who could benefit from intervention programmes, and it also seriously affects our ability to evaluate the physiological and social effect of such programmes on the mother and the conceptus. Nutritional Requirements for Pregnancy Considerable information is available on nutrient requirements necessary to support pregnancy under ideal conditions, but knowledge is lacking on how different consumption and preparation practices affect availability of nutrients and their utilization by the pregnant women living in conditions of deprivation. Hence, it is not possible to establish with confidence guidelines for nutrient needs of individuals from different ethnic groups, living in varied environments with different degrees of activity. Without precise knowledge of the limits of adaptability, it is not possible to evaluate homeostatic adjustments that may occur in various conditions, nor to assess the consequences for the quality of maternal life, including future pregnancies. The benefits evaluated in these terms appear to have been minimal or difficult to demonstrate, thus the physiological and public health significance of supplementation has been questioned. In view of their costs, there is need for better information on how these programmes may benefit the mother directly and improve her ability to perform many roles, such as family and child care, participation in social, educational, and community activities, and performance in the labour force. Feasibility of Improving Maternal Diet without Improving Total Family Diet Previous programmes have established that it is possible to improve maternal diets with respect to certain specific nutrients such as iron, vitamin A, and iodine, without improving the total family diet. Present experience suggests that in food distribution programmes it is difficult to reach the mother as a specific target without improving the diet of the whole family. We lack knowledge of how to design broad-based intervention programmes that will specifically reach the mother and be cost effective. Efficiency of Maternal Replenishment at Different Levels of Intake Pregnancy and lactation place added demands for energy and nutrients that, if not met, will deplete the maternal body. Frequent repetition of this cycle without an adequate interval and diet in between is likely to have cumulative effects deleterious to both the mother and her future children. We lack knowledge of the extra food needs and the optimal interval between births that would allow full recovery. This hinders the formulation of a rational policy for family planning on the basis of health considerations. Identification of an optimal period could influence the design and cost-effectiveness of programmes for mothers. Role of the Placenta in Nutrient Utilization The human foetus enjoys a large measure of protection against the effects of a poor maternal diet. An explanation for this protective effect may be found in the altered maternal hormonal environment, brought about by the endocrine function of the developing foeto-placental unit, which seems to regulate the utilization of energy and the nutrients. Although this is of more immediate scientific than applied interest, there is need to: Effects of Dietary Supplementation on the Foetus Supplementation of malnourished mothers during pregnancy does influence birth weight, although the magnitude of the effect is limited. Insufficient information is available on the influence of supplementation during pregnancy on functional performance of the new-born, including developmental status such as immune competence, biochemical maturation, and neurological function. The few studies that have shown some benefits are confounded by supplementation of the babies after birth. Consequently, the

cost-effectiveness of maternal supplementation for subsequent benefit to their infants cannot be estimated. Insufficient Milk Syndrome Failure to lactate or milk insufficiency is the most common reason given for artificially feeding a baby, especially in industrial societies. Yet, in many parts of the world it is important for the health of babies and the nutritional needs of mothers to be able, before the onset of lactation, to assess the potential capacity to produce breast milk. This would allow the design of appropriate counselling or educational programmes and the planning of supplementary feeding. Therefore, there is a need to: