

### **Maternal Influence on Neonatal Morbidity and Mortality**

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#### **Abstract**

This study explored mothers knowledge, beliefs and practices in recognizing and providing home care to protect against the neonatal morbidity and mortality. Home care of deliveries instead of obstetric units, child birth and postnatal period during which there are neonatal morbidities and mortalities. There are some sufferings of pregnant mothers including HIV and associated infections. Diabetes, hypertension, cardiovascular renal consequences, early and late onset of pre-eclampsia, polyhydraminious (excess amniotic fluid), macrosome (birth weight > 4000 g), fetal growth restrictions and malignancies. Non immunization coverage, fever during labor. Surgical interventions, anesthesia, cesarean sections, premature rupture of membranes, uterine rupture in labor, cleansing of birth canal and antisepsis. Newborns born to adolescent mothers or as a result of child marriage. Treatments and interventions during pregnancy, such as treatment with magnesium sulphate, postpartum influenza vaccination, use of chlorhexidine to reduce maternal and neonatal mortality and morbidity, children not receiving adequate immunization, maternal fever

during labor. Use of chlorioamniosis related to premature birth, in addition to Cocaine use during pregnancy. Reduced availability of oxygen is associated with fetal growth retardation. Neonatal exposure to antibiotics for management of intra-amniotic infections. Dependence on opioids, maternal mental health, personality including obesity and body weight is also related to neonatal morbidities. Exposure to partner violence in the perinatal period, besides; smoking during pregnancy and exposure of pregnant mothers to substance of abuse. Mal-nutrition of pregnant mothers, besides; inefficient dietary advice for women with gestational diabetes. There are many maternal factors responsible for the neonatal morbidity and mortality which are entailed in the review.

To accomplish the target on maternal influence on neonatal morbidity and mortality, peer-reviewed English language articles published during the last 38 years (1980 to 2018), were selected from Pub Med, Pub Med Central, Science Direct, Up-to-date, Med Line, comprehensive databases, Cochrane library, and the Internet (Google,

Yahoo). This review is studied under the following headings:

**(1) Knowledge, beliefs and practices of pregnant mothers**

Low levels of maternal education have great influence on child mortality. Many outcomes are investigated, representing child mortality morbidity, illness management, service utilization and health behaviours. Maternal education is a significant correlate of each of the outcomes, and even low levels of education increase child survival prospects and health-related behaviours, except for neonatal mortality and the effective management of diarrhea (Basu and Stephenson, 2005). Mothers' knowledge and care practices can be improved through health education and this should be extended to the community to reach mothers that deliver at home. Mechanisms to support mothers to sustain good practices should be put in place by taking advantage of existing village health teams and social support (Nabiwemba et al., 2014).

**(2) Gestational diabetes**

Gestational diabetes is a type of diabetes that occurs during pregnancy. Women with gestational diabetes are more likely to experience adverse health outcomes such as pre-eclampsia or polyhydramnios (excess amniotic fluid). Their babies are also more likely to have health complications such as macrosomia (birthweight > 4000 g) (Biesty et al., 2018).

**(3) Maternal Obesity, gestational weight and diabetes**

Native American race, gestational diabetes mellitus, overweight and obese BMI, and excessive gestational weight gain for BMI were the most significant maternal factors associated with high infant birth weight. Mothers with any one risk factor gave birth to heavier infants. Mothers with all risk factors had infants

with the highest mean birth weights in South Dakota. Overweight or obese BMI and excessive GWG are more likely to give birth to high birth weight infants. At-risk mothers should be educated regarding the risks and potential complications of high birth weight infants (Halvorson et al., 2017).

**(4) Maternal birth weight**

There is evidence from singletons that maternal birth weight is positively related to offspring gestational length and birth weight, and some evidence of an inverse relationship with preterm birth. Among twins very preterm birth is the major cause of neonatal mortality and of immediate and later morbidity, including neurodevelopmental impairment (Morley et al., 2007).

**(5) Diabetic gestation**

Evidence from 19 trials assessing different types of dietary advice for women with gestational diabetes mellitus suggests no clear differences for primary outcomes and secondary outcomes assessed using GRADE, except for a possible reduction in caesarean section for women receiving a DASH diet compared with a control diet (Han et al., 2017).

Singh et al., (2017) reported that metformin may be used as a safe and effective oral hypoglycaemic agent in GDM, especially in low-resource settings where cost, storage and compliance are logistic issues. However, long-term follow up studies are needed to solve issues related to its safety in pregnancy.

**(6) Reduced oxygen fetal growth retardation**

One of the highest inhabited areas in the world, have reported that reduced availability of oxygen is associated to fetal growth retardation and lower birth weight, which are established predictors of morbidity and

mortality during the first year of life (Rothhammer et al., 2015).

### **(7) HIV exposed children**

The mortalities of HIV-exposed children were high, which called for the development of programs on early infant diagnosis. Measures should be taken to prevent pneumonia and other infectious diseases, together with nutrition support and monitor program on growth (Wang et al., 2017).

Continued breastfeeding is associated with reduced risk of diarrhea-related morbidity and mortality among uninfected children born to HIV-infected mothers in this low-resource setting despite provision of replacement and complementary food and counseling. HIV-infected women in Lusaka, Zambia, were randomly assigned to breastfeeding for 4 months only or to continue breastfeeding until the mother decided to stop. Replacement and complementary foods were provided and all women were counseled around feeding and hygiene. Diarrhea morbidity and mortality were assessed in 618 HIV-uninfected singletons alive and still breastfeeding at 4 months. Intent-to-treat analyses and comparisons based on actual feeding practices were conducted using regression methods (Fawzy et al., 2011).

Rates of perinatal human immunodeficiency virus transmission are higher among HIV-infected mothers with more advanced disease, but effects of maternal disease on HIV-uninfected offspring are unclear. Children born to HIV-infected mothers with advanced disease who escaped perinatal or early breastfeeding-related HIV infection are nonetheless at high risk of mortality and morbidity during the first few months of life. HIV-related immunosuppression appears to have adverse

consequences for the health of infants, in addition to risks of vertical transmission (Kuhn et al., 2005).

Background HIV-exposed uninfected children have a higher risk of infection and mortality compared to HIV-unexposed children and the reasons for this vulnerability are still under investigation. This study indicates that HIV pre-ART conditions in mothers may influence the rate of specific immunoglobulins transfer, increasing infants vulnerability to respiratory infections (Baroncelli et al., 2016).

### **(8) Hypertensive complications of pregnancy**

Hypertensive disorders in pregnancy are a worldwide health problem for women and their infants complicating up to 10% of pregnancies and associated with increased maternal and neonatal morbidity and mortality. In Europe, 2.3-3% of pregnancies are complicated by preeclampsia. Gestational diabetes, obesity, no previous or multiple births, maternal age less than 20 or greater than 35 years old and thrombophilia can be some of the possible factors related to increased risk for hypertension in pregnancy. Complications of hypertension during pregnancy affect both mothers and their infants (Antza et al., 2017).

The hypertensive disorders of pregnancy are a frequent cause of neonatal morbidity and mortality. 259 newborns of hypertensive women were studied to establish the relationship between some maternal findings and the subsequent neonatal complications. The severity, early onset of hypertension, proteinuria and the gestation of 32 week or less, are related with special risk of small-for-date, anoxia, seizures and neutropenia. Preeclampsia was related with foetus more compromised. Also hyperuricemia, thrombocytopenia and cesarean section were light predictors of neonatal trouble. These findings can orientate the neonatologist to select

the newborns prone to complications, watching them closely to start the treatment, if necessary, as soon as possible (Martinez Oro et al., 1991).

### **(9) Anesthesia and pregnancy**

Epiu et al., 2017 reported that there is a significant lack of essential equipment for the delivery of safe anaesthesia. This is compounded by the shortage of trained providers and inadequate supervision. It is therefore essential to strengthen anaesthesia services by addressing these specific deficiencies. This will include improved training of associate clinicians, training more physician anaesthetists and providing the basic equipment required to provide safe and effective care. These services are key components of comprehensive emergency obstetric care and anaesthetists are crucial in managing critically ill mothers and ensuring good surgical outcomes.

### **(10) Maternal smoking**

Hypothermia is related to increased morbidity and mortality in very preterm infants; continuous temperature monitoring is necessary. Thermoregulation is limited in preterm infants. A larger study is needed to examine associations between NTD (Neural Tube Defect) and race, maternal smoking history, and infection. NTD might be used as a biomarker to guide acute clinical care and identify infants at risk for acute and chronic morbidity (knobel-Dail et al., 2017).

Few studies have examined the possible pregnancy-related risk factors for Necrotizing Enterocolitis (NEC)-associated deaths during infancy. Maternal smoking during pregnancy is associated with increased risks of infant mortality due to NEC in preterm babies, especially in white race and female babies (Ding et al., 2017).

Maternal smoking during pregnancy is one of the most modifiable causes of morbidity and mortality for both

pregnant women and their fetuses. The long-term effects of prenatal exposure to smoke on child behavior and development have been the subject of more extensive research than have the short-term effects. The behavior of 282 healthy full-term newborns was assessed using the Neonatal Behavior Assessment Scale (NBAS) at 48-72 h of life. Sixty-two mothers smoked during pregnancy (no mother smoked more than 15 cig/day) and 17 were exposed to secondhand smoke. After adjusting for socio-demographic and obstetric factors, both newborns whose mothers smoked and those whose mothers were exposed to secondhand smoke showed significantly lower scores in the habituation cluster than non-smoking mothers. Exposure to secondhand smoke was also related to lower motor system cluster scores as well as some supplementary items and the newborns of smoking mothers showed significantly lower scores in the state regulation cluster and in some items of the state organization cluster than the newborns of non-smoking mothers. The authors concluded that active and passive smoking during pregnancy affects several aspects of neurobehavioral development, regardless of socio-demographic, obstetric and pediatric factors (Hernandez-Martinez et al., 2012).

### **(11) Prenatal smoking and partner violence**

In Chile, infant morbidity and mortality attributable to prenatal smoking are unacceptably high. Comprehensive individual and population-based interventions for tobacco control should be a public health priority in the country, particularly among female adolescents and young women who will be the mothers of future generations (Cerda et al., 2017).

Exposure to intimate partner violence in the perinatal period is associated with obstetric complications, poor

maternal mental health, neonatal complications, and increased risk of infant mortality and morbidity (Alhusen et al., 2018). Women who experienced perinatal intimate partner violence were significantly more likely to smoke pre - pregnancy and sustain smoking into the last 3 months of pregnancy. Through behavioral and physiological pathways, smoking cessation may be uniquely challenging for women experiencing (Alhusen et al., 2018).

### **(12) Maternal substance use disorders**

Infants born to mothers with substance use disorders are at higher risk for adverse health outcomes in the perinatal period and are also more likely to be pre-hospitalized in the first year of life (Hwang et al., 2017).

Thirty babies died or had serious disability. There were five cases of Sudden Infant Death Syndrome (SIDS) and 19 babies had major malformations, including seven with cleft lip/palate. Six babies had significant gastrointestinal disorders or feeding difficulties. The incidence of clefting was 10 times the normal rate and SIDS five times the expected incidence. In a group of mainly socially disadvantaged women, the abuse of narcotics, amphetamines and other substances, with possible suboptimal nutrition, may have been contributory to this high morbidity and mortality (Thomas, 1995).

Cocaine was previously regarded as a soft drug causing only mild damage. Its use during pregnancy, however, creates a variety of grave medical problems which necessitate immediate attention not only on the part of internists and psychiatrists but also, and more particularly, by obstetricians and pediatricians. The pregnancy of a cocaine-using woman must be carefully managed and regarded as a high-risk one. This in view of the numerous obstetric risks caused by the drug, notably premature separation of the placenta, increased incidence

of stillbirths, congenital malformations, premature births, and intrauterine growth retardation. The neonatal monitoring must be focused on prevention of complications resulting from the withdrawal syndrome and associated conditions such as pneumonia, severe weight loss, and contagion from the mother. Moreover, efforts must be made to ensure a strict observation of the infant outside the hospital in view of the far greater incidence of idiopathic infant death in such cases. Owing to the sharp rise of the regular and occasional use of the drug and since pregnant women tend on anamnesis to deny any drug taking, the authors recommend a test of maternal urine for cocaine and other drugs whenever a suspicion to this effect arises. It is also advisable to test for the presence of such drugs in the urine of the neonate in cases of reasonable suspicion of maternal use during pregnancy, though a negative outcome of the urine test naturally does not rule out a possible use. Strict monitoring of positive cases, accompanied by preventive treatment, may contribute a great deal toward a reduction of perinatal morbidity and mortality associated with cocaine use (Rosenak et al., 1990).

Brogly et al., (2016) observed a 16-fold increase in the number of mother-infant pairs affected by opioid dependence in Ontario over the past decade. Adverse birth outcome rates were high. Expanded services for opioid-dependent women and their children are needed. Infants born to opioid-dependent women are admitted to intensive care units for management of neonatal abstinence syndrome (NAS), serious morbidity, and prevention of mortality; however, the disadvantages of this approach include infants experiencing more severe NAS and exhibiting a greater need for pharmacotherapy owing to

the interference with mother-infant bonding. To implement a rooming-in program to support close uninterrupted contact between opioid-dependent women and their infants in order to decrease the severity of NAS scores, lessen the need for pharmacotherapy, and shorten hospital stays (Newman et al., 2015).

### **(13) Magnesium sulphate**

Antenatal magnesium in preterm labor for neuro protection decreases the incidence of cerebral palsy. However, there are no guidelines on the dose and duration of magnesium infusion for neuro-protection. As increased neonatal serum magnesium concentrations may be related to higher risk of morbidity and mortality, the role of total amount of magnesium and maternal serum magnesium concentrations associated with safe neonatal serum magnesium concentrations is not known.

Total dose of magnesium infused to the mother correlates with neonatal serum magnesium concentrations. To keep neonatal serum magnesium concentrations within a range that is effective for neuro-protection and safe for the neonates, the total dose received by the mother needs to be monitored and limited (Borja-Del-Rosario et al., 2014).

### **(14) Chorioamnionitis related to premature birth**

Chorioamnionitis is closely related to premature birth and has negative effects on neonatal morbidity and mortality. Chorioamnionitis not only causes premature deliveries, but is also associated with neonatal complications and increased mortality.

Clinical findings and infectious markers in mother or infant do not predict the diagnosis of histological chorioamnionitis. Therefore, placental histopathology may have a role in

predicting neonatal outcome in premature deliveries, especially those below 30 weeks (Erdemir et al., 2013).

### **(15) Home birth conditions**

Drawing attention to home birth conditions and subsequent neonatal infections is a key starting point to reducing neonatal morbidity which are a main cause of mortality in sub-Saharan Africa. Use of clean delivery surfaces needs to be improved as well as washing after latrine-related activities. Diarrhoea was far less common than expected. Since rural Mother-Infant pairs spend the majority of their post-delivery time around the homestead, hygiene impacts neonatal infections to a large degree, possibly even more so than delivery practices (Hopp, 2017).

The babies of 'higher risk' women who plan birth in an OU appear more likely to be admitted to neonatal care than those whose mothers plan birth at home, but it is unclear if this reflects a real difference in morbidity. Rates of intra-partum related morbidity and mortality did not differ statistically significantly between settings at the 5% level but a larger study would be required to rule out a clinically important difference between the groups (Li et al., 2015).

### **(16) Fetal growth restriction, cardiovascular and renal consequences**

Individuals born after intrauterine growth restriction (IUGR) have an increased risk of perinatal morbidity/mortality, and those who survive face long-term consequences such as cardiovascular-related diseases, including systemic hypertension, atherosclerosis, coronary heart disease and chronic kidney disease. In addition to the demonstrated long-term effects of decreased nephron endowment and hyperactivity of the hypothalamic-pituitary-adrenal axis, individuals born after IUGR also exhibit early alterations in vascular structure

and function, which have been identified as key factors of the development of cardiovascular-related diseases (Yzyhdorczyk et al., 2017).

#### **(17) Maternal mental health**

Preterm birth remains a major contributor to infant mortality and morbidity including neurodevelopmental delay and childhood disability. Mothers experiencing a preterm birth are at risk for maternal mental health issues, inclusive of depression and posttraumatic stress disorder (PTSD), which may affect mother-infant attachment and infant development. Because early mother-infant interactions are influenced by prematurity as well as maternal mental health, consideration for home interventions that stimulate infant development and encourage mother-infant relationships concurrently are important. Directed interventions may be beneficial for infant development and aid in strengthening the mother-infant relationship, potentially reducing depression and PTSD symptoms in the mother (Anderson et al., 2017).

Special attention to risk of suicide is needed during pregnancy for women with severe mental illness and a history of miscarriage, alcohol or cigarette use, young age and depression in the perinatal period. (Gressier et al., 2017).

#### **(18) Cesarean section related neonatal mortalities**

The cesarean section is one of the most common procedures to prevent health-threatening risks to the mother and infant. Increasing rate of cesarean section attracted the attention of professionals. Despite all the benefits of vaginal delivery compared with cesarean section, in many cases, especially in emergency cesarean section delivery can substantially reduce the maternal and neonatal mortality and morbidity. It is recommended to assess the complications of each method in all pregnant

women about to give birth, and then decide on the method of delivery (Ghahiri and Khosravi, 2015).

#### **(19) Cost of human milk feedings**

Infants born at very low birth weight (VLBW; birth weight <1500 g) are at high risk of mortality and are some of the most expensive patients in the hospital. Additionally, VLBW infants are susceptible to prematurity-related morbidities, including late-onset sepsis, broncho-pulmonary dysplasia (BPD), necrotizing enterocolitis, and retinopathy of prematurity, which have short- and long-term economic consequences. Human milk has been shown to reduce both the incidence and severity of some of these morbidities and, therefore, has an indirect impact on the cost of the NICU hospitalization. Furthermore, human milk may also directly reduce NICU hospitalization costs, independent of the indirect impact on the incidence and/or severity of these morbidities. Although there is an economic cost to both the mother and institution for providing human milk during the NICU hospitalization, these costs are relatively low. Johnson et al., (2014) described the total cost of the initial NICU hospitalization, the incremental cost associated with these prematurity-related morbidities, and the incremental benefits and costs of human milk feedings during critical periods of the NICU hospitalization as a strategy to reduce the incidence and severity of these morbidities.

#### **(20) Breast Milk**

A case study reported a new mother who stopped breast feeding her baby because her breast milk was green. A physical examination and laboratory tests revealed that the abnormal color of her breast milk was related to multivitamin intake. The patient was advised to continue breast feeding despite the odd color (Yazgan et al., 2012).

### **(21) Childbirth and the postnatal period**

Childbirth and the postnatal period, spanning from right after birth to following several weeks, presents a time in which the number of deaths reported still remain alarmingly high. Worldwide, about 800 women die from pregnancy- or childbirth-related complications daily while almost 75% of neonatal deaths occur within the first seven days of delivery and a vast majority of these occur in the first 24 hours. Unfortunately, this alarming trend of mortality persists, as 287,000 women lost their lives to pregnancy and childbirth related causes in 2010. Almost all of these deaths were preventable and occurred in low-resource settings, pointing towards dearth of adequate facilities in these parts of the world. Sakan et al., (2014) reviewed the evidence based childbirth and post natal interventions which have a beneficial impact on maternal and newborn outcomes.

### **(22) Teenage mothers**

In ten years, 242 cases of tetanus were collected with a predominance of cases after the fifth year of life. All mothers of the newborns were inhabiting the city of Abidjan. Their median age was 19 years and 64% were teenagers. Gateways were dominated by umbilical wounds (77.3%) in the NT and skin wounds (59%) in CT. Lethality was 60%. Tetanus remains a real morbidly cause among children in Abidjan University Hospital with high lethality. However, the incidence of NT seems consistent with the incidence threshold desired by WHO (Aba et al., 2016).

### **(23) Maternal child marriage**

To assess associations between maternal child marriage (marriage before age 18) and morbidity and mortality of infants and children under 5 in India. Although bivariate analyses showed significant associations between maternal child

marriage and infant and child diarrhoea, malnutrition (stunted, wasted, underweight), low birth weight, and mortality, only stunting and underweight remained significant in adjusted analyses. The authors noted effect of maternal child marriage on health of boys versus girls. The risk of malnutrition was found higher in young children born to mothers married as minors than in those born to women married at a maturity age (Raj et al., 2010).

### **(24) Adolescent pregnancies**

In a study on perinatal morbidity and mortality among adolescent pregnancies in the semi-urban population of Gorakhpur, Kushwaha et al., (1993) found that the number of eligible couples (females 15-44 yrs) were 24,000. Out of 430 adolescent married girls, 242 (56.3%) became pregnant during the study period. Nineteen (7.8%) of adolescent pregnancies were in the maternal age group less than 15 years and 110 (45.5%) and 113 (46.7%) pregnancies were in the age group 15-17 yrs and 17-19 yrs, respectively. The incidence of low birth weight babies was 67.3% of all live births. Infections during neonatal period, congenital anomalies and birth injuries were seen in 21.6, 8.6 and 13.1% newborns, respectively. Neonatal mortality rate was 136.2/1000 live births. The incidence of LBW, neonatal and maternal morbidity and mortality associated with adolescent pregnancies were significantly higher (Kushwaha et al., 1993).

### **(25) Cleansing the birth canal with antiseptic solution**

Cleansing the birth canal with chlorhexidine reduced early neonatal and maternal postpartum infectious problems. The safety, simplicity, and low cost of the procedure suggest that it should be considered as standard

care to lower infant and maternal morbidity and mortality (Bakr and Karkoour, 2005; Taha et al., 1997).

#### **(26) Maternal fever during labor**

Intra-partum fever is an important predictor of neonatal morbidity and infection-related mortality (Petrova et al., 2001).

#### **(27) Early and late onset preeclampsia**

EOP is a distinct and more severe clinical entity with earlier gestational age onset and delivery. EOP might be a fetal-related disease complicated by severe placental and perinatal injuries; LOP might be a maternal-related derived disease condition (Ni and Cheng, 2016).

#### **(28) Uterine rupture in labor**

There is significant controversy about the risks related to attempted vaginal birth after cesarean and the implications for informed consent of the patient. Recent data suggest that women who deliver in hospitals with high attempted vaginal birth after cesarean rates are more likely to experience successful vaginal birth after cesarean, as well as uterine ruptures. The authors conducted a study to evaluate maternal and neonatal morbidity and mortality after uterine rupture at a tertiary care center (Yap et al., 2001).

#### **(29) Rupture of primigravid uterus**

Uterine rupture is a catastrophic obstetric complication, associated with high rates of perinatal morbidity and mortality. The most common risk factor is previous uterine surgery, and most cases of uterine rupture occur in women with a previous cesarean delivery. Traditionally, the primigravid uterus has been considered almost immune to spontaneous rupture. In fact, although spontaneous rupture of the primigravid uterus is indeed a very rare event, a number of such cases have been reported recently. Prompt recognition of uterine rupture and expeditious recourse to laparotomy are critical

in influencing perinatal and maternal morbidity. Not all uterine ruptures present with the typical clinical picture of abdominal pain, hypovolemia, vaginal bleeding, and fetal compromise. Therefore, it is important to maintain a high index of suspicion for uterine rupture in women presenting with some, or all, of these features, regardless of parity. Here we provide a systematic review of cases of spontaneous uterine rupture in primigravid women reported in the literature to date. Clinical presentation, differential diagnosis, common etiological factors, complication rates, and appropriate management of this rare obstetric event are discussed (Walsh and Baxi, 2007).

#### **(30) Premature rupture of membranes**

The management of patients with premature rupture of membranes has changed markedly in the past several years. The basis for this is a combination of a better understanding of newborn physiology, improved neonatal care, refinements in antibiotic therapy, and the widespread use of maternal and fetal monitoring. The best outcome for both mother and infant undoubtedly reflects data based on a combination of factors, among which are gestational age survival, evidence of fetal distress, presence or absence of labor and sepsis, and of course, the cervical condition as it is related to labor-readiness. An important recent advance is the recognition that an active observation management program is associated with less morbidity and mortality than the classic management course of delivery within 12 hours of membrane rupture. The fact that preterm premature rupture of membranes tends to recur in subsequent pregnancies offers an opportunity for prevention. Moreover, advances in perinatal and neonatal care will continue to improve the outcomes of these women and their children (Porna, 1996).

### **(31) Under nutrition and bariatric surgery**

The obesity epidemic in developed countries has led to an increased prevalence of obese women of reproductive age. As maternal obesity has far-reaching consequences for both mother and child, the consensus is that weight loss before pregnancy will reduce obesity-related morbidity and mortality. Therefore, an increasing number of women become pregnant after undergoing obesity surgery. These reports indicate that careful nutritional follow-up during pregnancy after obesity surgery is mandatory, because nutritional deficiencies such as vitamin K deficiency can lead to life-threatening bleeding (Eerdeken et al., 2010).

Under-nutrition--stunting, underweight, wasting and micronutrient deficiencies affect millions of preschool children in both rural and urban settings increasing the risks of morbidity and mortality, impairing cognitive development, reducing productivity and increasing the risk of chronic diseases in later life. In addition under-nutrition has a trans-generational effect. The author has reviewed the evidence for a synergistic effect of inadequate nutrition (breastfeeding, complementary feeding), infection, and inappropriate mother-child interactions on growth and nutritional deficiencies. Underlying socioeconomic, environmental and genetic factors are also explored (Prost, 2009).

### **(32) Nutritional factors and visual function**

Approximately 5-7% of all infants are born prematurely, and birth before 37 weeks is the most common cause of neonatal mortality, morbidity and long-term disability. Premature infants are poorly equipped for life outside the womb, and oxidant stress has been implicated in the aetiology of visual impairment in these infants, who are often exposed to increased O<sub>2</sub> concentrations and high light intensity in neonatal units.

The carotenoids lutein and zeaxanthin, which give the macular area of the eye its yellow colour, are located in the retinal pigment epithelium of the eye, and are believed to play a role in protecting it against oxidative and light damage. The macular pigments are of dietary origin, and green leafy vegetables are the primary source of lutein and zeaxanthin. Lutein is one of the five most common carotenoids found in the diet. There is current interest in the macular pigment in relation to age-related macular degeneration, but these pigments may also have a protective role in the retinal pigment epithelium of the newborn infant. Little information is available on blood lutein and zeaxanthin levels in neonates. Levels of lutein in human milk are two to three times higher than those of beta-carotene, whereas their concentrations in the mothers' blood are approximately the same. Human milk is the main dietary source of lutein and zeaxanthin for infants until weaning occurs. The biochemical mechanisms which mediate the transport of the macular carotenoids into the eye are not known, but tubulin has been identified as the major carotenoid-binding protein, and may play a role in the physiology of the macula (Jewell et al., 2001).

### **(33) Vitamin A deficiency**

Vitamin A deficiency is an endemic nutrition problem throughout much of the developing world, especially affecting the health and survival of infants, young children, and pregnant and lactating women. These age and life-stage groups represent periods when both nutrition stress is high and diet likely to be chronically deficient in vitamin A. Approximately 127 million preschool-aged children and 7 million pregnant women are vitamin A deficient. Health consequences of vitamin A deficiency include mild to severe systemic effects on innate and acquired mechanisms of host resistance to

infection and growth, increased burden of infectious morbidity, mild to severe (blinding) stages of xerophthalmia, and increased risk of mortality. These consequences are defined as vitamin A deficiency disorders (VADD). Globally, 4.4 million preschool children have xerophthalmia and 6 million mothers suffer night blindness during pregnancy. Both conditions are associated with increased risk of morbidity and mortality. While reductions of child mortality of 19-54% following vitamin A treatment have been widely reported, more recent work suggests that dosing newborns with vitamin A may, in some settings, lower infant mortality. Among women, one large trial has so far reported a > or = 40% reduction in mortality related to pregnancy with weekly, low-dose vitamin A supplementation. Epidemiologic data on vitamin A deficiency disorders can be useful in planning, designing, and targeting interventions (West, 2003).

#### **(34) Congenital heart defects**

Congenital gastrointestinal system malformations/abdominal wall defects (CGMWD) may appear as isolated defects (single or complex), or in association with multiple malformations. The high incidence of association of GISM and congenital heart defects (CHD) in patients with syndromes and malformative sequences is known, but less expected is the association of apparently isolated single GISM and CHD. The aim of this study was to investigate the frequency of CHD in newborns with isolated GISM, and the possibility to modify the diagnostic-therapeutic approach just before the onset of cardiac symptoms or complications. The high incidence of congenital heart disease in infants with apparently isolated GISM confirms the need to perform an echocardiographic study before surgery to improve

perioperative management and prevent complications such as sepsis and endocarditis (Schierz et al., 2016).

#### **Conclusion**

This study explored mothers knowledge, beliefs and practices in recognizing and providing home care to protect against the neonatal morbidity and mortality. Home care of deliveries instead of obstetric units, Child birth and postnatal period during which there are neonatal morbidities and mortalities. There are some sufferings of pregnant mothers including HIV and associated infections. Diabetes, hypertension, cardiovascular renal consequences, early and late onset of pre-eclampsia, polyhydraminious (excess amniotic fluid), macrosome (birth weight > 4000 g), fetal growth restrictions and malignancies. Non immunization coverage, fever during labor. Surgical interventions, anesthesia, cesarean sections, premature rupture of membranes, uterine rupture in labor, cleansing of birth canal and antiseptics. Newborns born to adolescent mothers or as a result of child marriage. Treatments and interventions during pregnancy, such as treatment with magnesium sulphate, postpartum influenza vaccination, use of chlorhexidine to reduce maternal and neonatal mortality and morbidity, children not receiving adequate immunization, maternal fever during labor. Use of chlorioamniotis related to premature birth, in addition to Cocaine use during pregnancy. Reduced availability of oxygen is associated with fetal growth retardation. Neonatal exposure to antibiotics for management of intra-amniotic infections. Dependence on opioids, maternal mental health, personality including obesity and body weight is also related to neonatal morbidities. . Exposure to partner violence in the perinatal period, besides; smoking during pregnancy and exposure of pregnant mothers to substance of abuse. Mal-nutrition of pregnant mothers, besides; inefficient dietary advice for

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## References

1. Biesty LM, Egan AM, Dunne F, Dempsey E, Meskell P, Smith V, Ni Bhuiinneain GM, Devane D. Planned birth at or near term for improving health outcomes for pregnant women with gestational diabetes and their infants. *DIABETES Cochrane Database Syst Rev.* 2018 Jan 5;1:CD012910
2. Elizabeth L Nabiwemba, Lynn Atuyambe, Bart Criel, Patrick Kolsteren and Christopher Garimoi Orach. Recognition and home care of low birth weight neonates: a qualitative study of knowledge, beliefs and practices of mothers in Iganga-Mayuge Health and Demographic Surveillance Site, Uganda. *BMC Public Health* 2014, 14:546. <http://www.biomedcentral.com/1471-2458/14/546>
3. Halvorson KL, Vogt HB, Kightlinger L, Stevens D. The Impact of Maternal Diabetes, Obesity and Race on Infant Birth Weights in South Dakota. *S D Med.* 2017;70(2):61-66.
4. Morley R, Moore VM, Dwyer T, Owens JA, Umstad MP, Carlin JB. Maternal birthweight and outcome of twin pregnancy. *Paediatr Perinat Epidemiol.* 2007;21(6):501-6.
5. Han S, Middleton P, Shepherd E, Van Ryswyk E, Crowther CA. Different types of dietary advice for women with gestational diabetes mellitus. *Cochrane Database Syst. Rev.* 2017;2:CD009275.
6. Singh N, Madhu M, Vanamail P, Malik N, Kumar S. Efficacy of metformin in improving glycaemic control & perinatal outcome in gestational diabetes mellitus: A non-randomized study. *Indian J Med Res.* 2017 May;145(5):623-628.
7. Rothhammer F, Fuentes-Guajardo M, Chakraborty R, Lorenzo Bermejo J, Dittmar M. Neonatal variables, altitude of residence and Aymara ancestry in northern Chile. *PLoS One.* 2015;10(4):e0121834.
8. Wang Q, Ma N, Si H, Ma YM, Li N, Nie YG, Sun DY, Wang Z. [Study on the risk of mortality and associated factors among HIV-exposed children in Henan province, 2002-2014]. *HIV - Zhonghua Liu Xing Bing Xue Za Zhi.* 2017 Dec 10;38(12):1629-1633.
9. Fawzy A, Arpadi S, Kankasa C, Sinkala M, Mwiya M, Thea DM, Aldrovandi GM, Kuhn L. Early weaning increases diarrhea morbidity and mortality among uninfected children born to HIV-infected mothers in Zambia. *J Infect Dis.* 2011;203(9):1222-30.
10. Kuhn L, Kasonde P, Sinkala M, Kankasa C, Semrau K, Scott N, Tsai WY, Vermund SH, Aldrovandi GM, Thea DM. Does severity of HIV disease in HIV-infected mothers affect mortality and morbidity among their uninfected infants? *Clin Infect Dis.* 2005;1;41(11):1654-61.
11. Baroncelli S, Galluzzo CM, Mancinelli S, Amici R, Marazzi MC, Vella S, Palombi L, Giuliano M. Antibodies against pneumococcal capsular polysaccharide in Malawian HIV-positive mothers and their HIV-exposed uninfected children. *Infect Dis (Lond).* 2016;48(4):317-321.
12. Antza C, Cifkova R, Kotsis V. Hypertensive complications of pregnancy: A clinical overview. *Metabolism.* 2018 Sep;86:102-111.
13. Martínez Orgado J, Sáez Pérez E, García Aparicio J.[Prediction of complications in children of

- hypertensive mothers]. An Esp  
Pediatr. 1991;35(4):233-7.
14. Epiu I, Wabule A, Kambugu A, Mayanja-Kizza H, Tindimwebwa JVB, Dubowitz G. Key bottlenecks to the provision of safe obstetric anaesthesia in low-income countries; a cross-sectional survey of 64 hospitals in Uganda. *BMC Pregnancy Childbirth*. 2017 Nov 17;17(1):387.
15. Knobel-Dail RB, Sloane R, Holditch-Davis D, Tanaka DT. Negative Temperature Differential in Preterm Infants Less Than 29 Weeks Gestational Age: Associations With Infection and Maternal Smoking. *Nurs Res*. 2017 Nov/Dec;66(6):442-453.
16. Cerda J, Bambs C, Vera C. Infant morbidity and mortality attributable to prenatal smoking in Chile. *Rev Panam Salud Publica*. 2017; 41:e106.
17. Alhusen JL, Geller R, Jellig J, Budhathoki C, Decker M. Intimate Partner Violence, Small for Gestational Age Birth and Cigarette Smoking in the Pregnancy Risk Assessment Monitoring System. *J Womens Health (Larchmt)*. 2018; 27(4):458-465.
18. Ding G, Yu J, Chen Y, Vinturache A, Pang Y, Zhang J. Maternal Smoking during Pregnancy and Necrotizing Enterocolitis-associated Infant Mortality in Preterm Babies. *Sci Rep*. 2017; 31;7:45784.
19. Hernández-Martínez C, Arija Val V, Escribano Subías J, Canals Sans J. A longitudinal study on the effects of maternal smoking and secondhand smoke exposure during pregnancy on neonatal neurobehavior. *Early Hum Dev*. 2012;88(6):403-8.
20. Hwang SS, Diop H, Liu CL, Yu Q, Babakhanlou-Chase H, Cui X, Kotelchuck M. Maternal substance use disorders and infant outcomes in the first year of life among Massachusetts Singletons. *J. Pediatr*. 2017 Dec;191:69-75.
21. Thomas DB. Cleft palate, mortality and morbidity in infants of substance abusing mothers. *J Paediatr Child Health*. 1995;31(5):457-60.
22. Rosenak D, Diamant YZ, Yaffe H, Hornstein E. Cocaine: maternal use during pregnancy and its effect on the mother, the fetus, and the infant. *Obstet Gynecol Surv*. 1990;45(6):348-59.
23. Brogly SB, Turner S, Lajkocz K, Davies G, Newman A, Johnson A, Dow K. Infants Born to Opioid-Dependent Women in Ontario, 2002-2014. *J Obstet Gynaecol Can*. 2017 Mar;39(3):157-165.
24. Newman A, Davies GA, Dow K, Holmes B, Macdonald J, McKnight S, Newton L. Rooming-in care for infants of opioid-dependent mothers: Implementation and evaluation at a tertiary care hospital. *Can Fam Physician*. 2015 Dec;61(12):e555-61.
25. Borja-Del-Rosario P, Basu SK, Haberman S, Bhutada A, Rastogi S. Neonatal serum magnesium concentrations are determined by total maternal dose of magnesium sulfate administered for neuroprotection. *J Perinat Med*. 2014;42(2):207-11.
26. Erdemir G, Kultursay N, Calkavur S, Zekioğlu O, Koroglu OA, Cakmak B, Yalaz M, Akisu M, Sagol S. Histological chorioamnionitis: effects on premature delivery and neonatal prognosis. *Pediatr Neonatol*. 2013;54(4):267-74.
27. Hopp LJ. Delivery practices, hygiene, birth attendance and neonatal infections in Karamoja, Uganda: a community-based study. *Afr Health Sci*. 2017 Mar;17(1):7-13.

28. Li Y, Townend J, Rowe R, Brocklehurst P, Knight M, Linsell L, Macfarlane A, McCourt C, Newburn M, Marlow N, Pasupathy D, Redshaw M, Sandall J, Silverton L, Hollowell J. Perinatal and maternal outcomes in planned home and obstetric unit births in women at 'higher risk' of complications: secondary analysis of the Birthplace national prospective cohort study. *BJOG*. 2015;122(5):741-53.
29. Yzydorczyk C, Armengaud JB, Peyter AC, Chehade H, Cachat F, Juvet C, Siddeek B, Simoncini S, Sabatier F, Dignat-George F, Mitanchez D, Simeoni U. Endothelial dysfunction in individuals born after fetal growth restriction: cardiovascular and renal consequences and preventive approaches. *J Dev Orig Health Dis*. 2017;8(4):448-464.
30. Anderson C, Cacola P. Implications of Preterm Birth for Maternal Mental Health and Infant Development. *MCN Am J Matern Child Nurs*. 2017 Mar/Apr;42(2):108-114.
31. Gressier F, Guillard V, Cazas O, Falissard B, Glangeaud-Freudenthal NM, Sutter-Dallay AL. Risk factors for suicide attempt in pregnancy and the post-partum period in women with serious mental illnesses. *J Psychiatr Res*. 2017;84:284-291.
32. Ghahiri A, Khosravi M. Maternal and neonatal morbidity and mortality rate in caesarean section and vaginal delivery. *Adv Biomed Res*. 2015;4:193.
33. Johnson TJ, Patel AL, Bigger HR, Engstrom JL, Meier PP. Economic benefits and costs of human milk feedings: a strategy to reduce the risk of prematurity-related morbidities in very-low-birth-weight infants. *Adv Nutr*. 2014;5(2):207-12.
34. Yazgan H, Demirdöven M, Yazgan Z, Toraman AR, Gürel A. A mother with green breastmilk due to multivitamin and mineral intake: a case report. *Breastfeed Med*. 2012; 7:310-2.
35. Salam RA, Mansoor T, Mallick D, Lassi ZS, Das JK, Bhutta ZA. Essential childbirth and postnatal interventions for improved maternal and neonatal health. *Reprod Health*. 2014;11 Suppl 1:S3.
36. Aba YT, Cissé L, Abalé AK, Diakité I, Koné D, Kadiané J, Diallo Z, Kra O, Oulaï S, Bissagnéné E. [Neonatal and child tetanus morbidity and mortality in the University hospitals of Abidjan, Côte d'Ivoire (2001-2010)]. *Bull Soc Pathol Exot*. 2016;109(3):172-9.
37. Raj A, Saggurti N, Winter M, Labonte A, Decker MR, Balaiah D, Silverman JG. The effect of maternal child marriage on morbidity and mortality of children under 5 in India: cross sectional study of a nationally representative sample. *BMJ*. 2010;340:b4258.
38. Kushwaha KP, Rai AK, Rathi AK, Singh YD, Sirohi R. Pregnancies in adolescents: fetal, neonatal and maternal outcome. *Indian Pediatr*. 1993;30(4):501-5.
39. Bakr AF, Karkour T. Effect of predelivery vaginal antiseptics on maternal and neonatal morbidity and mortality in Egypt. *J Womens Health (Larchmt)*. 2005;14(6):496-501.
40. Taha TE, Biggar RJ, Broadhead RL, Mtima V, Justesen AB, Liomba GN, Chipangwi JD, Miotti PG. Effect of cleansing the birth canal with antiseptic solution on maternal and newborn morbidity and mortality in Malawi: clinical trial. *BMJ*. 1997;315(7102):216-9.
41. Petrova A, Demissie K, Rhoads GG, Smulian JC, Marcella S, Ananth CV. Association of maternal

- fever during labor with neonatal and infant morbidity and mortality. *Obstet Gynecol.* 2001;98(1):20-7.
42. Ni Y, Cheng W. Comparison of indications of pregnancy termination and prognosis of mothers and neonates in early- and late-onset preeclampsia. *Hypertens Pregnancy.* 2016;35(3):315-22..
43. Basu AM, Stephenson R. Low levels of maternal education and the proximate determinants of childhood mortality: a little learning is not a dangerous thing. *Soc Sci Med.* 2005;60(9):2011-23.
44. Yap OW, Kim ES, Laros RK Jr. Maternal and neonatal outcomes after uterine rupture in labor. *Am J Obstet Gynecol.* 2001;184(7):1576-81.
45. Walsh CA, Baxi LV. Rupture of the primigravid uterus: a review of the literature. *Obstet Gynecol Surv.* 2007;62(5):327-34.
46. Poma PA. Premature rupture of membranes. *J Natl Med Assoc.* 1996;88(1):27-32.
47. Eerdeken A, Debeer A, Van Hoey G, De Borger C, Sachar V, Guelinckx I, Devlieger R, Hanssens M, Vanhole C. Maternal bariatric surgery: adverse outcomes in neonates. *Eur J Pediatr.* 2010;169(2):191-6.
48. Prost MA. Postnatal origins of undernutrition. *Nestle Nutr Workshop Ser Pediatr Program.* 2009;63:79-92
49. Jewell VC, Northrop-Clewes CA, Tubman R, Thurnham DI. Nutritional factors and visual function in premature infants. *Proc Nutr Soc.* 2001;60(2):171-8.
50. West KP Jr. Vitamin A deficiency disorders in children and women. *Food Nutr Bull.* 2003;24(4 Suppl):S78-90.
51. Schierz IA, Pinello G, Giuffrè M, La Placa S, Piro E, Corsello G. Congenital heart defects in newborns with apparently isolated single gastrointestinal malformation: A retrospective study. *Early Hum Dev.* 2016;103:43-47.