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Preterm Birth: A Concerning Global Issue

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ABSTRACT

This article reviewing literature to focus the problem- "Increase preterm child birth" analysis through problem tree, which is the participatory tool of mapping out main problems, along with their causes and effects. Child born preterm has a greater effect on their life than infants born at term in respect of mortality and a variety of health and developmental problems. However, those children born nearer to term represent the greatest number of infants born preterm and also experience more complications than infants born at term. The enormous effects of preterm birth include acute unstable health, central nervous system, hearing, and vision problems, as well as longer-term motor, cognitive, visual, hearing, behavioral, social-emotional, health, and growth problems. The birth of a preterm infant can also bring considerable emotional and economic costs to families and have implications for socioeconomic sector. The impact of preterm child birth is the raising number of mortality and economic burden to the family as well as to the society. Preterm birth is a complex cluster of problems with a set of overlapping factors of influence. Its causes may include maternal health related problems, individual-level behavioral and psychosocial factors, environmental exposures, medical conditions. Many of these factors occurring combination, particularly in those who are socioeconomically and educationally disadvantaged.

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Introduction

A preterm child is one who is born too early, before 37 weeks of pregnancy. Premature child may have more health problems and higher risk of death. About 15 million children born too soon each year (5% to 18% of all deliveries) and now globally preterm birth and its complications are the most common cause of death among fewer than five years children. In many countries rates of premature births have increased between the 1990s and 2010s [1].

Recent advances in the care of premature infants have resulted in increasing rates of survival. However, the increased prevalence of medical disabilities, learning difficulties, and behavioral and psychological problems among surviving preterm infants has raised concerns that these infants may have difficulties in coping with adult life. The rate of preterm birth in developed countries has risen, rather than fallen, over time. Moreover, the survival rates for very early preterm births have increased because of technological advances and the collaborative efforts of obstetricians and neonatologists. However, biologically, preterm infants are more susceptible than are their term counterparts. Although most organs are immature, the brain and lung are especially susceptible to the consequences of preterm birth, which leads to high rates of long-term neurological and health problems [2].

An estimated 15 million babies are born too early every year. Almost 1 million children die each year due to complications of preterm birth. Many survivors face a lifetime of disability,

including learning disabilities and visual and hearing problems. Globally, prematurity is the leading cause of death in children under the age of 5. And in almost all countries with reliable data, preterm birth rates are increasing. Inequalities in survival rates around the world are stark. In low-income settings, half of the babies born at or below 32 weeks (2 months early) die due to a lack of feasible, cost-effective care, such as warmth, breastfeeding support, and basic care for infections and breathing difficulties. In high-income countries, almost all of these babies survive. World Prematurity Day on November 17, 2015 is a key moment to generate global and national attention on the leading cause of deaths of children under 5 - complications from preterm birth accounted for more than 1 million child deaths in 2015. In Bangladesh, 439,000 babies are born too soon each year and 26,100 children under five die due to direct preterm complications [1, 3].

The incidence of preterm delivery and the survival rate of preterm newborns are rising, due to the increased use of assisted reproductive technology, which is associated with multiple gestations, and the improvement of technology in obstetrics and in neonatology, which increase the probability of saving preterm infants at earlier gestational ages. The survival rate of infants born at 24-25 weeks of gestation has significantly increased in 2005 compared to 1994 (36 to 47%), probably due to the improvement of neonatal intensive care; care for infants born at 22–23 weeks of gestation, instead, remains unsuccessful with death of newborns in the immediate postnatal period. In preterm newborns, prenatal, perinatal, and postnatal determinants can give rise to adverse neurological outcomes through complex causal pathways, with

hypoxia/ischemia and infection/inflammation playing a major role. The risk of immature growth of brain and subsequent adverse clinical outcomes increases with decreasing gestational age (preterm birth) [1, 4, 5].

An increased prevalence of cognitive impairment and poorer educational achievement has been repeatedly observed among school-age children of extremely low birth weight mostly history of preterm birth, as compared with those born at full term. Such children were born before the wide introduction of antenatal treatment with corticosteroids and surfactants. These agents are important determinants of the increased survival of extremely preterm infants and might be expected to improve long-term outcomes [1, 5].

Survival rates have greatly improved in recent years for infants of borderline viability; however, these infants remain at risk of developing a wide array of complications, not only in the neonatal unit, but also in the long term. Morbidity is inversely related to gestational age; however, there is no gestational age, including term, which is wholly exempt. Neurodevelopment disabilities and recurrent health problems take a toll in early childhood. Subsequently hidden disabilities such as school difficulties and behavioral problems become apparent and persist into adolescence. The mortality rates have fallen; the focus for prenatal interventions is to develop strategies to reduce long-term morbidity, especially the prevention of brain injury and abnormal brain development. In addition, follow-up to middle age and beyond is necessary to identify the causes, especially for maternal health and pregnancy characteristics that are likely to be specified [6].

This review would be mapping out of the core problem “Increase preterm birth of the child” through problem tree. The aim of the problem tree is to structure summarize and organize the findings regarding the problem “Increase preterm birth of the child.” It involves identifying the negative aspects of an existing situation that is Problems and establishes the “cause- effects relationships” between the problems [7].

Directs Causes of Increase Preterm Birth of the Child

- Poor Maternal Physical health
- Complicated features during pregnancy
- Poor Maternal Psychological health

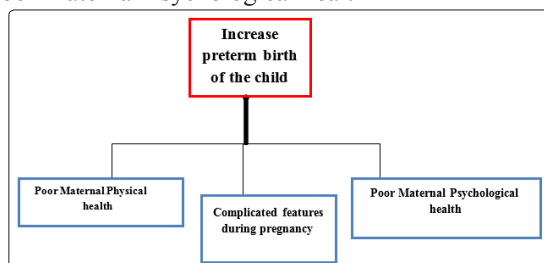


Figure 1: Direct causes of preterm birth of the child

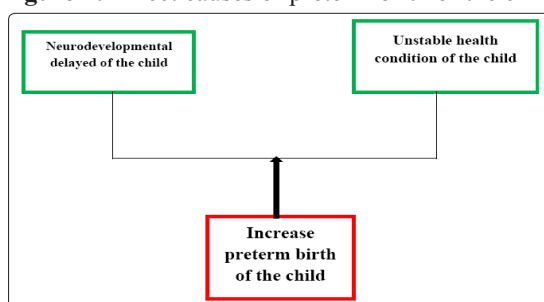


Figure 2: Directs effects of preterm birth of the child

Roots of the Causes

Poor Maternal Physical Health

Different author's shows that women have high rates of low birth weight caused poor physical health status. Nutritional deficiency or malnutrition and level of physical activity or hard physical labor influence directly the poor maternal physical health. In border aspect the maternal socio-demographic characteristics associated with preterm birth including low socioeconomic and low educational status of women [2].

Poor Nutritional Status

- The nutritional status can be described by indicators of body size such as body-mass index (BMI), nutritional intake, and serum assessments for various analyses. For example, a low pre-pregnancy BMI is associated with a high risk of spontaneous preterm birth [2].

- There are many potential mechanisms by which maternal nutritional status might affect preterm birth—such as -

- Spontaneous preterm birth can be caused by maternal thinness associated with decreased blood volume and reduced uterine blood flow.
- Obese women are more likely to have infants with congenital anomalies, such as neural-tube defects, and these infants are more likely to be delivered preterm. Obese women are also more likely to develop pre-eclampsia and diabetes, and have indicated preterm births associated with these disorders [2].

Hard Physical Labor

Observational studies of the type of work and physical activity related to preterm birth have produced conflicting results. Investigation of work-related risk is made difficult by confounding factors; however, even after accounting for population differences, working long hours and undertaking hard physical labor under stressful conditions are probably associated with an increase in preterm birth. The level of physical activity is not consistently related to the rate of preterm birth [2].

Complicated Features during Pregnancy Maternal Age

The majority of the studies reviewed found that older maternal age (above 35 years) was associated with preterm birth. Several studies have examined the association between older maternal age and adverse pregnancy outcome, including preterm birth with delivery of a small- or large for-gestational-age neonate and elective or emergency Cesarean section. These studies have reported that preeclampsia, gestational hypertension and gestational diabetes spontaneously increase preterm birth through elective or emergency Cesarean section [2].

There is controversial evidence to determine if young maternal age (below 20 years) is an independent and direct cause for preterm birth, or a risk marker that exerts its influence on gestational age or birth weight or both through its association with age-dependent confounders.

The association between young maternal ages or old maternal ages and preterm birth remains dependents on the socio-economic and reproductive factors [2, 4].

Inter/ Intra Uterine Problems

Persistent or recurrent inter/intrauterine infections probably explain many repetitive spontaneous preterm births. The underlying disorder causing indicated preterm births, such as diabetes, hypertension or obesity, frequently persists between pregnancies, increased systemic inflammation, increasing stimulation of the infection or inflammation pathway might explain some of the

increases in preterm births associated with multiple risk factors [2]. There are many inter/ intrauterine characteristics that have been associated with preterm birth, such as-

- Infection or inflammation
- Ischemia or hemorrhage
- Uterine over distension
- Other immunologically mediated processes [3,4].

Previous History of Premature Deliveries

The recurrence risk in women with a previous preterm delivery ranges from 15 % to more than 50% to birth preterm child, however it dependent on the number and gestational age of previous deliveries. The study reported that women with previous preterm deliveries had a 2.5- fold increased risk in their next pregnancy. The risk of another preterm birth is inversely related to the gestational age of the previous preterm birth. The mechanism for the recurrence is not always clear, but women with early spontaneous preterm births are far more likely to have subsequent spontaneous preterm births [2, 4].

Unintended of Pregnancy

An unintended pregnancy is commonly defined as a pregnancy that is mistimed (e.g. earlier than desired) or unwanted (e.g. not wanting to be pregnant at any time). Several studies have found that unintended pregnancies, especially unwanted pregnancies, are related to preterm delivery. Compared to women whose pregnancies are intended, women with unintended pregnancies are more likely to receive inadequate prenatal care. These are behaviors that contribute to poor pregnancy outcomes such as preterm delivery [2, 4].

Multiple Gestations

Multiple gestations are high risk pregnancies, which may be complicated pre-eclampsia, anemia, postpartum hemorrhage, intrauterine growth restriction which lead to preterm birth. That might be caused – spontaneous preterm birth (associated with preterm, prelabour rupture of the membranes or spontaneous preterm labour) and iatrogenic preterm birth (arising from a medical decision to deliver the baby or babies) occur more frequently in twin and triplet pregnancies than in singleton pregnancies. More than 50% of twins and almost all triplets are born before 37 weeks of gestation and extreme prematurity (birth at less than 28 weeks of gestation) also occurs more frequently in twin and triplet pregnancies [2,4, 8].

Short Inter-Pregnancy Interval

Several causal mechanisms have been proposed to explain the association between short inter- pregnancy interval and preterm birth such as- less time to restore maternal body nutritional status for another gestation, genital infections, maternal depletion and postpartum stress. Some authors found a stronger effect of short inter-pregnancy interval on very preterm (less than 33 weeks) than on late preterm (33–36 weeks) birth [2, 4].

Poor Maternal Psychological Health Depression

Clinical depression during pregnancy has been reported in up to 16% of women, with up to 35% having some depressive symptoms. Although the results are inconsistent, several reports suggest a relation (risks generally rose <2-fold) between depression and preterm birth. Depression is associated with an increase in smoking, and drug and alcohol use; therefore, the relation between depression and preterm birth might be mediated by these behaviors. Nevertheless, in some studies that adjusted for smoking

and drug and alcohol use, the association between depression and preterm birth persisted, suggesting that this relationship might be because by more than confounding [2].

Stress

The belief that a mother's emotional or psychological state during pregnancy may influence the development of her fetus has existed since ancient times across all cultures. Empirical studies examining the effects of prenatal psychosocial stress first appeared in the literature in the mid- 1950s. Several recent studies showed, "high" levels of psychosocial stress, at (approximately 25– 60%) increased risk for preterm birth compared to women reporting "low" levels of stress [2].

Chronic and Catastrophic Stress

The stress become chronic and called chronic stressor, such as being imprisoned or homeless during pregnancy or experiencing a catastrophic event like natural disasters – flood, earthquake, and manmade disaster occurring during pregnancy. A study reported chronic and catastrophic stress as a cause of preterm birth [2].

Low Socioeconomic and Educational Status

In the context of underdeveloped and developing country socio-demographical characteristics are associated with an increased risk for preterm birth specially socioeconomic and educational status. Young maternal age and unexpected pregnancy are associated with an increased risk which common in low educational status. Maternal health care, stress, pregnancy relevant causes influence by the socioeconomic condition. Nutrition, work and physical activity, unintended pregnancy, and other psychological factors also directly involved on socioeconomic status. Socioeconomically disadvantaged women experience more stressful life events and more chronic stress. Poverty is associated with poor and crowded housing, living without a partner, unsatisfying marital relationships, violence from an intimate partner, and stressful working conditions. Unintended pregnancies are far more common among socioeconomically disadvantaged women. They also have less social support to limit the impacts of those stressors. Low socioeconomic condition forces the maternal health in vulnerable conditions which increase the risk of preterm birth [2, 4, 8].

Prolongation of the Effects Neurodevelopmental Delayed Of the Child

Cognitive Delayed / Learning Difficulty

Very preterm survivors also have high rates of dysfunction in other cognitive areas, such as attention, visual processing, academic progress, and executive function (which refers to processes that bring about purposeful behaviour, important in a child's cognitive functioning, behaviour, emotional control, and social interaction). Anderson and colleagues reported that preterm child at age 8 years scored less than controls of normal birth weight on full-scale IQ. The cognitive disadvantage between preterm and normal birth child seems to persist into late adolescence and early adulthood. However, cognitive dysfunctions are moderated by environmental factors such as parental socioeconomic status and education, neighborhood effects, schooling, and social backgrounds [2, 9, 10].

The risk of behavioural problems, such as attention deficit hyperactivity disorder, is increased by times in preterm infants in early childhood. They are also especially susceptible to difficulties related to inattention and hyperactivity, and have emotional troubles at school age that affect academic functioning [2, 9, 11, 12].

Delayed Physical Developmental Millstone

The delayed physical developmental millstone mainly showed on cerebral palsy, mental retardation, and sensory impairments (such as visual and auditory deficits). The studies between 1993 to 2002 the mortality rates has been declined after preterm birth (256 to 114 per 1000 live births), but the incidence of cerebral palsy increased over time from 44 to 100 per 1000 live births. Preterm infants also have a high prevalence of minor neuromotor dysfunction and poor coordination. Even extremely preterm infants with very low intelligence and gross and fine motor difficulties [2, 9, 11].

Most studies of very early preterm birth show continued sequelae such as cognitive deficits, academic underachievement, grade failures, and the need for increased remedial assistance during mid-childhood and adolescence [2, 9, 10, 12].

Unstable Health Condition of the Child Chronic Health Disorders

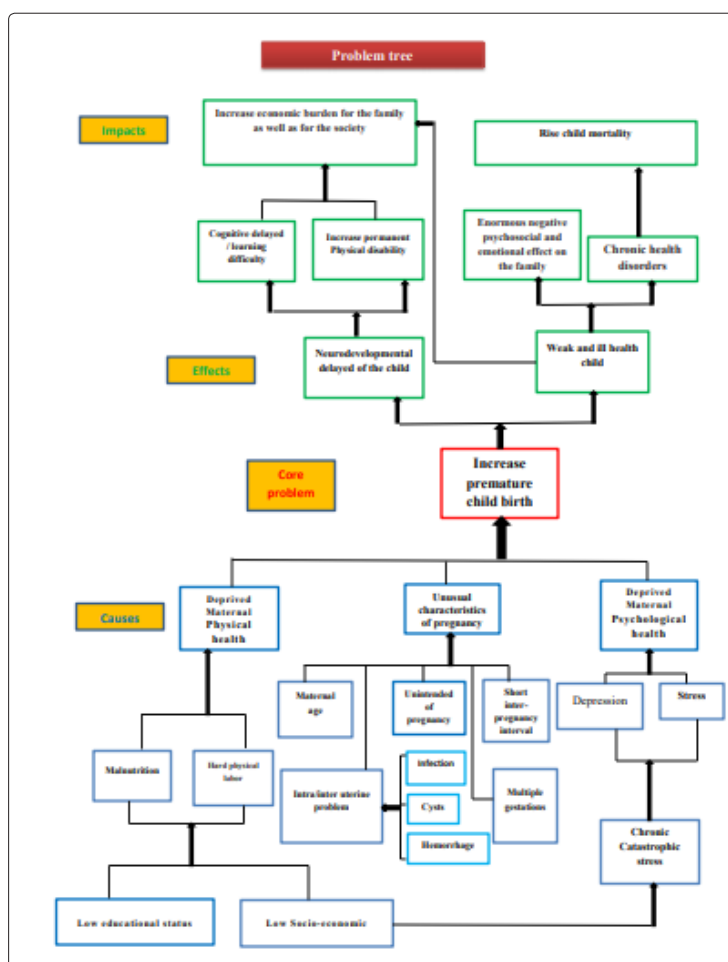
Preterm children have more hospital readmissions and other health problems in the weeks after discharge than do those of term child. In a review, more than a half of preterm children were readmitted to hospital at least once in the first 1–2 years of life, mostly as a result of respiratory illnesses, including lower-respiratory-tract infections; these rates were 2–3 times the rates of readmission of term children. Respiratory syncytial virus also increases the risk of re-hospitalization, especially in very preterm infants. By the time preterm children reached adulthood, there were no differences in acute health disorders or use of health resources compared with term adults, but chronic health disorders remained higher than in young adults of term child. The studies focused

on the cardio respiratory problems, visual impairment, severe hearing impairment, speech problem and other chronic health disorders. The studies have also reported high rates of ill health and increased use of outpatient health care in the early years in survivors who were very preterm at birth. Even at 10–12 years of age, children who had been born before 26 weeks' gestation had greater needs for services such as physician visits, occupational or physical therapy, nursing or medical procedures, and compensatory dependency than did children of term delivery [2, 10, 12].

Enormous Negative Psychosocial and Emotional Effect on the Family

Clearly from all studies focus the effects of preterm birth and its associated sequelae have an enormous negative psychosocial and emotional effect on the family. The effect of psychological distress might have greatest for very preterm with high-risk infants in the first month of life and persisted during the first 2 years of life. By age 3 years, although there were no differences in distress symptoms, parenting stress remained greater than for term child [11].

The effect seems to vary according to medical risk factors, developmental outcome, family environment, and age at reporting. Higher effect was associated with low family income, less parental education, and the severity of the child's functional handicap. Drotar and colleagues showed the negative psychological and emotional effect dependent on low socioeconomic status and abnormal neurodevelopment status on the child of school age, and reported that the effect was more pronounced for the underprivileged preterm child [10, 11, 12].



Impacts

Rise Child Mortality

Infants born preterm are more likely than infants born full term to die during the neonatal period (first 28 days) and infancy (first year), and mortality rates increase proportionally with decreasing gestational age or birth weight. The leading causes of infant mortality in the United States are preterm birth, low birth weight, and birth defects; so preterm birth and low birth weight are major contributors to infant mortality. However, the United States most recently had an increase in infant mortality from 6.8 to 7.0 per 1,000 live births in 2002 and an increase in the preterm birth rate to 12.3 percent in 2003. This is the feature of the developed country so hypothetically can assume the situation of developing and underdeveloped countries. The special health care or neonatal intensive care unit is not sufficient on those countries. As the studies showed that differences in mortality have also been noted by level of neonatal care, which is highest for hospitals without a neonatal intensive care unit than for those with intermediate or non-tertiary care after preterm birth [13, 14].

Increase Economic Burden for the Family as Well as for the Society

The increasing incidence and improved survival chances of infants of preterm birth and low birth weight, combined with the diffusion of new technologies, have increased the demand for and cost of care provided to these infants during the neonatal period and in later life.

A number of studies in the scientific literature have estimated hospital service costs for preterm or low birth weight infants during the neonatal period. The study reported that there are more than 75% more cost needed for preterm child than a full term child. It could be high or low according to the child complications [1, 2, 4, 10].

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