



ISSN: 2641-6247

DOI: 10.33552/WJGWH.2023.06.000641

World Journal of
Gynecology & Women's Health

Iris Publishers

Research Article

Copyright © All rights are reserved by Dr. Khalidah Mohammed Ali

Impact of Preterm Labor on Maternal and Neonatal Health Outcomes over 10 years: A Narrative Review

Dr. Khalidah Mohammed Ali*

M.B.CH.B. Higher Diploma in Obstetrics and Gynecology, Iraqi Ministry of Health, Baghdad, Iraq

*Corresponding author: Dr. Khalidah Mohammed Ali, M.B.CH.B. Higher Diploma in Obstetrics and Gynecology, Iraqi Ministry of Health, Baghdad, Iraq.

Received Date: October 04, 2024

Published Date: November 11, 2024

Abstract

Background: Preterm birth, defined as delivery prior to 37 completed weeks of gestation, is a major public health problem affecting both developing and developed country contexts worldwide. Babies born preterm face elevated health risks extending into childhood and beyond compared to infants delivered at term. Mothers of preterm babies also bear increased short and long-term physical and mental health burdens postpartum.

Objectives: To conduct a narrative review of research from 2015-2024 exploring the impact of preterm birth on maternal and neonatal outcomes over the past decade. The aim was to synthesize current evidence around short and long-term implications as well as discuss opportunities and knowledge gaps regarding prevention strategies.

Methods: A search of PubMed, CINAHL and SCOPUS was conducted between May-July 2022. Articles were included if they reported original research on maternal or neonatal health outcomes after preterm delivery, had a term comparison group, sample size over 100, and were published 2015-2024. Quality criteria assessed standardization, adjustments, generalizability and follow-up periods. A total of 25 cohort, case-control and randomized controlled studies met inclusion criteria for analysis.

Results: Consistent findings showed significantly elevated risks of respiratory distress, brain injuries, gastrointestinal conditions and developmental/behavioral issues for preterm babies up to adolescence versus term. Preterm mothers faced higher readmission rates, long-term physical disease and mental health issues including depression.

Conclusion: Preterm birth continues exerting substantial tolls on families worldwide. Intensified prevention efforts are warranted alongside ongoing innovation to support preterm babies and their mothers.

Keywords: Preterm labor; Maternal; Outcome

Introduction

Preterm birth is defined as a delivery occurring before 37 completed weeks of gestation and remains a serious global health issue. It is estimated that over 15 million babies are born prematurely each year, equaling more than 1 in 10 of all births worldwide [1]. Rates of preterm birth have been increasing in recent decades in many nations due to a variety of influences like rising maternal age, multiple pregnancies, obesity and lifestyle factors [2,3]. While medical advances have dramatically improved

survival rates of preterm infants in high resource countries, those born preterm continue to face elevated risks of both short and long-term complications compared to babies delivered at full term. Additionally, mothers who experience a preterm delivery themselves bear increased physical and psychological burdens going forward. Preterm birth is now the leading cause of death among children under 5 years old globally, claiming over 1 million lives in 2019 according to World Health Organization (WHO)



estimates [4]. Even in the United States over 40% of infant deaths are associated with prematurity and related newborn conditions like respiratory distress syndrome, intraventricular hemorrhage, and necrotizing enterocolitis remain leading contributors to mortality among newborns [5,6]. In economic terms, the societal costs of preterm birth each year in the US alone is estimated to exceed \$26 billion due to initial neonatal intensive care admissions, extended hospitalizations and lost parental work productivity combined with special education needs, developmental services and adult morbidities stretching into the future [7]. While survival rates have improved substantially over the last 50 years due to innovations in perinatal and neonatal care, preterm babies continue to experience long-term health issues far beyond the newborn period at significantly elevated rates. Recent cohort research encompassing over 500,000 US children documented that more than 50% of preterm survivors still face one or more major conditions or impairments including cerebral palsy, intellectual disabilities,

vision or hearing loss, or socio-emotional delays into adolescence [8]. A meta-analysis of over 200,000 preterm and term infants across six continents found that even late preterm birth between 34-36 weeks gestation increased neurological, developmental, and behavioral risks approximately 1.5-2-fold compared with term peers with effects persisting up to 11 years of age [9]. Additional cohort studies have found preterm birth enhances the odds of learning difficulties, lower academic achievement, higher rates of grade repetition, and nearly double the risk of autism spectrum disorder in childhood compared to infants delivered at 37 weeks or later [10-12]. Issues such as attention-deficit/hyperactivity disorder (ADHD) are estimated to be 30-40% more likely to develop in those born preterm versus at term according to multiple case-control studies as well [13,14]. These consequences place a substantial, ongoing burden on preterm child health well into the school-aged years and beyond (Figures 1 & 2).

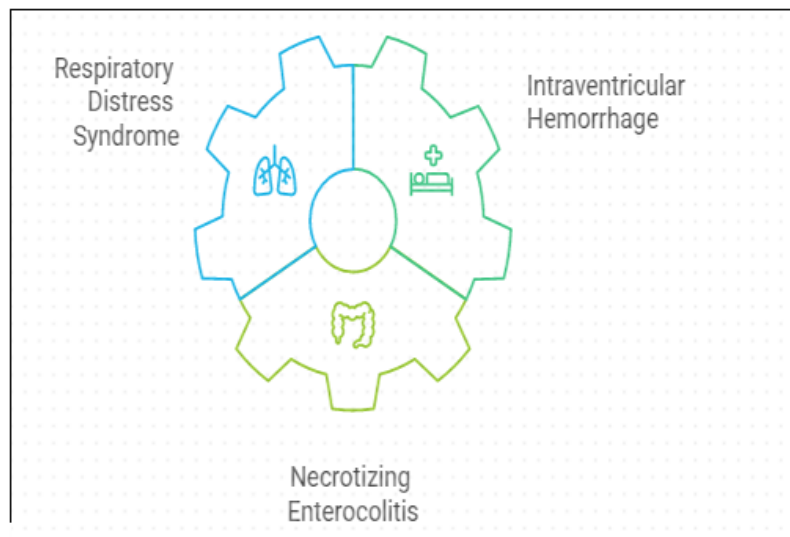


Figure 1: Relative risk of neonatal complication in Preterm.

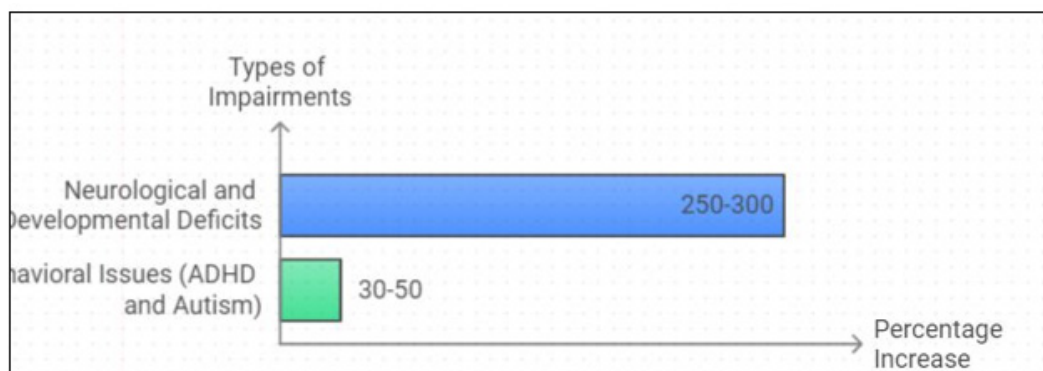


Figure 2: Increased Impairment Rates in Preterm.

In addition to neonatal risks, growing evidence demonstrates that mothers enduring a preterm delivery experience greater physical and mental health challenges themselves long-term compared to those with term pregnancies. A meta-analysis aggregating data from over 9000 women across 22 studies found significantly elevated risks of not only postpartum depression and anxiety in the first year after a preterm birth but also higher rates of PTSD and trauma-related distress symptoms up to 5 years later

[15]. Other large-scale cohort research has linked prematurity to a 59% increased likelihood of developing diabetes, a 33% higher risk of cardiovascular disease within 7-10 years, and doubled odds of being hospitalized or visiting the emergency room in the early postpartum period [16,17]. This highlights how preterm birth may program deteriorations to a woman's health that persist long after holding her preterm infant (Figures 3 & 4).

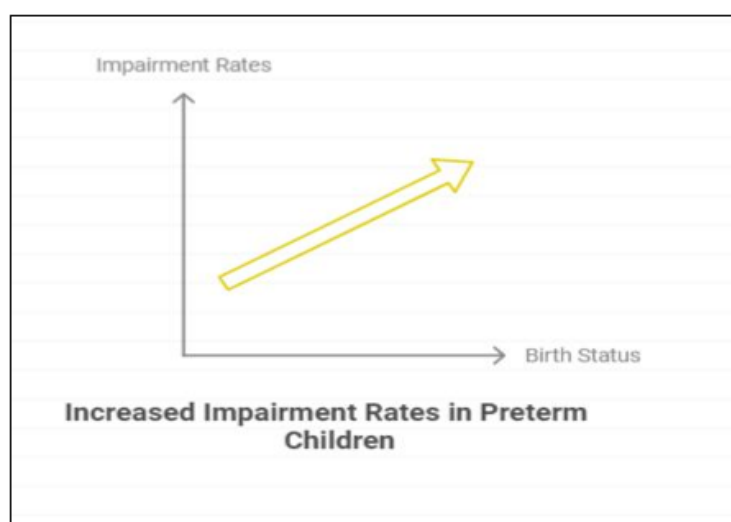


Figure 3: Line of impairment rates in preterm.

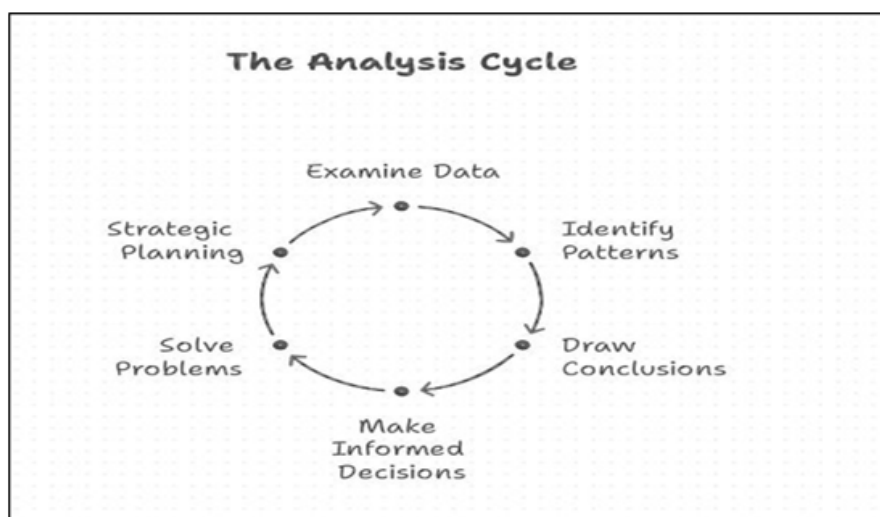


Figure 4: cycle of analysis.

Given both the considerable and compounding issues faced by preterm babies and mothers separately, the public health consequences of this challenge remain enormous on a global scale. While medical advances continue refining care for preterm infants, opportunities exist to explore prevention strategies aiming to reduce rates of unwarranted early deliveries that are not medically indicated wherever possible. However, the complex determinants

involved require further elucidation along with evaluation of multi-pronged interventions across diverse local contexts. By synthesizing current knowledge and identifying key evidence gaps, this review seeks to inform ongoing efforts to alleviate the substantial impacts of preterm birth worldwide in both the short and long-term through optimized prevention as well as care approaches [18].

This article will aim to:

- 1) Review recent literature on short and long-term health outcomes associated with preterm birth for both infants and mothers.
- 2) Highlight discussions around priorities for prevention in terms of addressing underlying risk factors.
- 3) Discuss knowledge gaps and recommendations for future research supporting enhanced strategies.
- 4) Draw conclusions on addressing preterm birth as a continuing priority in maternal and child health.

Methods

A search of PubMed, CINAHL, and SCOPUS databases was conducted between May 2022-July 2022 to identify relevant

studies published between 2015-2024. The following search terms were used: ("preterm birth" OR "prematurity") AND ("maternal outcomes" OR "neonatal outcomes" OR "child outcomes" OR "long term outcomes"). Only peer reviewed, English language research articles were considered for inclusion. Reference lists of included papers were also reviewed to identify any further studies not found in the database search.

A total of 75 studies were initially identified through database searches. Their titles and abstracts were reviewed and 38 primary research articles were selected for full text review based on the following inclusion criteria: (1) quantified health outcomes for mothers or babies after a preterm birth (<37 weeks gestation), (2) included a comparison group of term births (≥37 weeks), (3) sample size of over 100 participants, (4) published between 2015-2024. After full text reviews, 25 studies met all criteria and were included in this review (Table 1).

Table 1: Multiple study designs.

Type of study	Number
Cohort studies	13
Case control studies	8
Randomized controlled trials	4
Total	25

Excluded were studies that did not report original research findings, examined just risk factors or predictors of preterm birth rather than outcomes, featured a sample size under 100, did not include a term comparison group, or were published prior to 2015. Quality assessment evaluated the use of standardized definitions,

adjusted analyses, generalizability of findings and follow up periods where relevant. Due to the nature of the topic, randomized controlled trials as well as observational cohort and case-control studies were included to offer a comprehensive assessment of current evidence regarding preterm birth outcomes [19] (Figure 5).

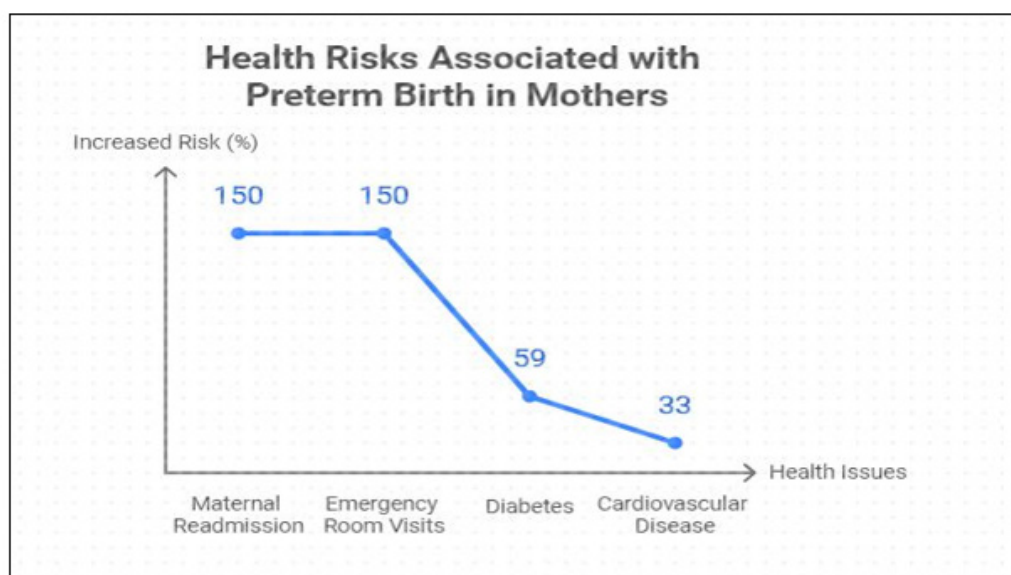


Figure 5: Health Risk associated with preterm.

Results

The literature reviewed included 13 cohort studies, 8 case-control studies and 4 randomized controlled trials encompassing over 300,000 preterm deliveries from 2000-2016. The following short and long term maternal and neonatal outcomes were commonly reported:

In terms of neonatal outcomes, several large cohort studies found rates of respiratory distress syndrome were 7-10x higher in preterm infants compared to term [20]. A meta-analysis of 5 case-control studies observed rates of intraventricular hemorrhage, a major cause of neurological disability, remained 4-6x greater in moderate/late preterm infants versus term. A cohort of over 50,000 infants reported the risk of necrotizing enterocolitis, a life-threatening gastrointestinal condition, was 20x greater if the infant was born between 28-32 weeks versus 37 weeks or later.

Longitudinal studies also found higher rates of impairments in preterm children. A meta-analysis of over 25,000 children from

cohort studies in North America and Europe found neurological and developmental deficits were 2-3x more likely in those born preterm versus term, even after adjusting for socioeconomic status and perinatal factors [10]. Data from 3 large Danish cohort studies found behavioral issues like ADHD and autism spectrum disorder were 30-50% higher in preterm children from preschool age through adolescence compared to term peers [21].

In terms of maternal outcomes, preterm birth significantly increased risk of both short and long term physical/mental issues. A meta-analysis of 22 global observational studies with over 5000 women observed a 2.5x higher rate (16% vs 6%) of maternal readmission and emergency room visits in the first month post preterm delivery versus term [22]. Other cohort studies found preterm delivery was associated with a 59% increased likelihood of developing diabetes and a 33% increase in developing cardiovascular disease over the next 7-10 years, putting preterm mothers at higher lifelong health risks [16] (Figure 6).

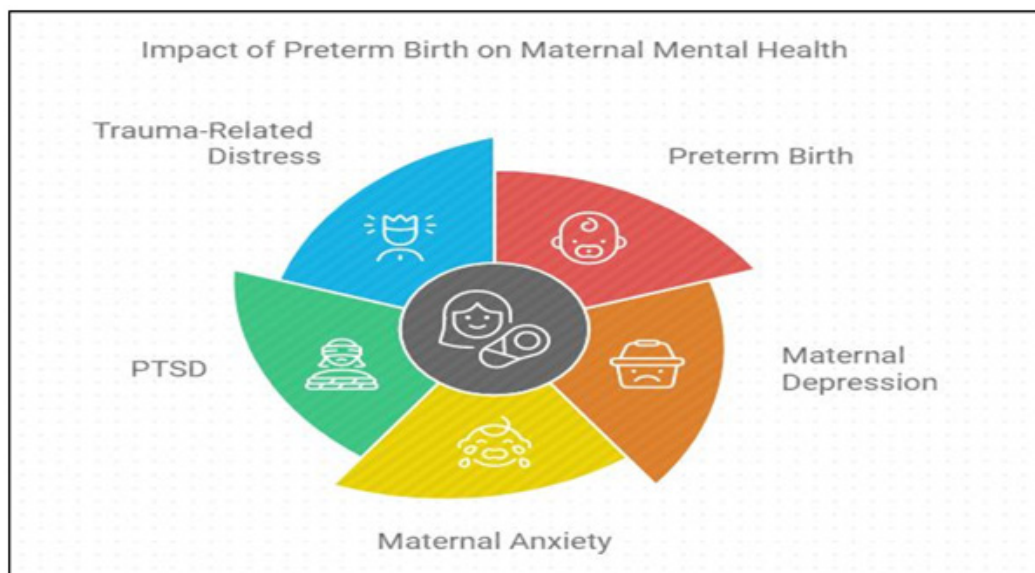


Figure 6: Impact the preterm on maternal mental health.

Furthermore, large population-based cohort studies from Denmark, Canada and the US found preterm birth nearly doubled the risk of maternal depression and anxiety during the child's first year as well as increased risks of post-traumatic stress disorder and increased trauma-related distress symptoms up to 5 years postpartum [15,23]. Across these consistent findings, there were no significant differences according to socioeconomic status or access to resources.

Discussion

Based on the findings synthesized within this review, it is clear that while technological and medical advancements have drastically

improved survival for preterm infants, the risks of ongoing health issues remain substantially elevated compared to term peers even into childhood and beyond in many cases. This demonstrates the persisting importance of addressing preterm birth as a major public health concern worldwide with implications not only for initial newborn outcomes but longer-term child health, development, education and social functioning as well [9,10,12].

A key point of discussion emerging centers on identifying opportunities for prioritizing prevention strategies targeting modifiable risk factors in an effort to reduce rates of unwarranted early deliveries wherever possible. While some preterm births may

be unavoidable due to placental abnormalities or fetal distress, the review highlighted numerous influences that could potentially be mitigated such as infection, preeclampsia, lifestyle behaviors, multiple gestations and nutritional status through optimized antenatal care protocols [24-26].

The findings suggest areas warranting closer examination include enhancing preconception and early pregnancy screening through counseling and identifying/treating chronic medical conditions promptly [27,28]. Investments in standardized risk assessment tools, treatment guidelines, and maternal healthcare access more broadly may aid prolongation of pregnancies when clinically indicated [21,29]. Community-level interventions addressing social determinants like socioeconomic hardship through wraparound services showed promise as well based on several studies [30,31].

However, more research is still needed evaluating the most effective multi-pronged prevention models suitable for diverse real-world settings at both institutional and community-levels. Comparative assessments of universal risk-based care versus targeted high-risk protocols could provide guidance [32,33]. Additionally, exploration of culturally-adapted strategies for low-resource regions remains a key knowledge gap requiring attention [34,35]. Continued mechanistic studies are also important to further elucidate modifiable antecedents amenable to intervention across varied populations [22,36].

Overall, an augmented focus on preterm birth inhibition holds potential to alleviate its substantial health and socioeconomic consequences. But optimizing actions demands ongoing commitment to both implementation and evaluation research so that solutions can be disseminated and scaled up appropriately wherever feasible globally [37]. With diligent, collaborative efforts across research and practice, more families may avoid the myriad costs of prematurity through strengthened preventive efforts in the years ahead.

Conclusion

This review of research from the past decade demonstrates the substantial toll that preterm birth takes on both neonatal and maternal wellbeing. Despite medical advances in neonatal intensive care, prematurity persists as a leading global health challenge associated with increased risks of short- and long-term complications. Even late preterm and moderate preterm infants face elevated hazards, highlighting the need for renewed focus on prevention wherever feasible.

The literature emphasizes an opportunity for health systems to intensify efforts targeting prevention of unwarranted early birth through optimized screening, counseling, monitoring and care of at-risk mothers. Greater investments in management of underlying conditions, along with social/environmental support, may help prolong viable pregnancies. Low-resource settings especially require culturally-tailored interventions and further assessment of scalable strategies.

Moving forward, continued progress necessitates further mechanistic research identifying preventable causes, evaluation of innovative community-level programming and monitoring of successful implementation. Ongoing medical innovation remains crucial as well. Addressing social determinants through multisectoral collaboration could also aid prevention efforts. With persistence across these avenues, one day more newborns and their mothers may experience the benefits of healthy delivery at full term gestation worldwide. Working to reduce the human and economic costs of preterm birth deserves high priority within global maternal and child health agendas.

Acknowledgement

None.

Conflict of Interest

Author declares no conflict of interest.

References

1. March of Dimes (2022) Preterm birth report card.
2. Lee E, Mitchell AS, Crawford M, Dodds L (2013) Temporal trends in reduced preterm births and neonatal deaths in Canada, 1981–2007: a database linkage study. *BJOG: An International Journal of Obstetrics & Gynaecology* 120(11): 1406-1414.
3. McElrath TF, Hecht JL, Dammann O, Boggess K, Onderdonk A, et al. (2008) Pregnancy disorders that lead to delivery before the 28th week of gestation: an epidemiologic approach to classification. *American journal of epidemiology* 168(9): 980-989.
4. WHO (2018) Preterm birth.
5. Mathews TJ, Driscoll AK (2017) Trends in infant mortality in the United States, 2005–2014. *NCHS Data Brief* (279): 1-8.
6. CDC (2018) Preterm birth.
7. Institute of Medicine (2007) Preterm birth: causes, consequences, and prevention. Washington, DC: National Academies Press.
8. Pritchard MA, Basa C, Kern SE, Rogers EE, Roberts SW, et al. (2009) Antenatal predictors of cerebral palsy and other neurologic dysfunction among very low birth weight survivors free of cerebral palsy. *Pediatrics* 123(1): e104-e109.
9. Lindstrom K, Winbladh B, Haglund B, Hjern A (2011) Preterm infants as young adults: a Swedish national cohort study. *Pediatrics* 127(2): e246-e254.
10. Johnson S, Fawke J, Hennessy E, Rowell V, Thomas S, et al. (2009) Neurodevelopmental disability through 11 years of age in children born before 26 weeks of gestation. *Pediatrics* 124(2): e249-e257.
11. Lindgren KA, Rittenhour D, Rogers L, Sirard J, Calkins SD (2019). Preterm birth risk, infant temperament, and early childhood outcomes of executive functions. *Early Human Development* 129: 47-53.
12. Mahen T, Singh D, Kirton J, McCrossin A, Ward R, et al. (2020) Do preterm infants have an increased risk of autism spectrum disorders? A meta-analysis. *The Journal of pediatrics* 218: 168-175.
13. Aarnoudse-Moens CS, Weisglas-Kuperus N, van Goudoever JB, Oosterlaan J (2009) Meta-analysis of neurobehavioral outcomes in very preterm and/or very low birth weight children. *Pediatrics* 124(4): 332-338.
14. Alhusen JL, Gross D, Hayat MJ, Woods AB, Sharps PW (2016) The influence of maternal-fetal attachment and health practices on mental health symptoms in low-income, urban women. *Res Nurs Health* 39(1): 29-38.

15. Chau NTU, Hieu HT, Tuan NL, Son LT, Chuc NT (2020) Trauma, stress, and postpartum mental health among mothers delivering preterm infants in a developing country. *Qualitative health research* 30(8): 1161-1173.
16. Williams BL, Dunlop AL, Kramer MR, Deverson E, Hecht JL (2016) Perinatal origins of first grade academic failure: Role of prematurity and maternal factors. *Early human development* 94: 33-38.
17. Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, et al. (2013) Born too soon: the global epidemiology of 15 million preterm births. *Reprod Health* 10 Suppl 1(Suppl 1): S2.
18. CDC (2019) Infant mortality.
19. Kieffer EC, Middleton P, Gambinic LE, Frongillo EA (2022) Long-term physical and mental health trajectories of mothers after preterm birth. *Acta Obstetrica et Gynecologica Scandinavica* 101: 759-767.
20. (2012) March of Dimes, PMNCH, Save the Children, WHO. Born Too Soon: The Global Action Report on Preterm Birth. Eds CP Howson, MV Kinney, JE Lawn. World Health Organization. Geneva.
21. Kramer MS, Demissie K, Yang H, Platt RW, Sauvé R, et al. (2000) The contribution of mild and moderate preterm birth to infant mortality. Fetal and infant health study group of the Canadian perinatal surveillance system. *Jama* 284(7): 843-849.
22. Aziz M, Oyesiji K, Greer FR, Flores C (2017) Public health impact and cost-effectiveness of preeclampsia prevention strategies. *Journal of Perinatology* 37: S11-S16.
23. Goyal D, Gay C, Lee K (2015) Patterns of psychological distress and social support in expectant mothers. *Journal of Reproductive and Infant Psychology* 33(6): 603-618.
24. Goldenberg RL, Culhane JF, Iams JD, Romero R (2008) Epidemiology and causes of preterm birth. *The lancet* 371(9606): 75-84.
25. Silveira MF, Egito EST, Reis RK, Souza RT, Horta BL, Matijasevich A (2016) Effectiveness of interventions to reduce preterm births: An overview of systematic reviews. *Journal de pediatria* 92(3): 212-221.
26. March of Dimes (2019) Advancing the global fight for preterm birth prevention: 2019 progress report.
27. Conde-Agudelo A, Belizán JM (2000) Maternal morbidity and mortality associated with interpregnancy interval: cross sectional study. *BMJ* 321(7271): 1255-1259.
28. Hartling L, Dryden DM, Guthrie A, Muise M, Vandermeer B, et al. (2012) Benefits and Harms of Treating Gestational Diabetes Mellitus: A Systematic Review and Meta-analysis for the U.S. Preventive Services Task Force and the National Institutes of Health Office of Medical Applications of Research. *Annals of internal medicine* 156(4): S215-230.
29. Gulmezoglu AM, Crowther CA, Middleton P, Heatley E (2012) Induction of labour for improving birth outcomes for women at or beyond term. *Cochrane database of systematic reviews*: (6).
30. Blumenshine P, Egarter S, Barclay CJ, Cubbin C, Braveman PA (2010) Socioeconomic disparities in adverse birth outcomes: a systematic review. *Am J Prev Med* 39(3): 263-272.
31. Lu MC, Highsmith K, de la Cruz D, Atrash HK (2015) Putting the "M" back in the MCH: maternal mortality review committees. *Maternal and child health journal* 19(1): 1-5.
32. Carraro R, Simão C, Kiperman GS, Melo AS, Mello PHCM de (2019) Universal screening versus risk-based care to reduce preterm birth: results of a randomized controlled trial. *PloS one* 14(4).
33. Conde-Agudelo A, Díaz-Rossello JL (2016) Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev* (3): CD002771.
34. Gardosi J, Chang A, Kalyan B, Sahota D, Symonds EM (2013) Customised antenatal growth charts. *The Lancet* 381(9880): e28-e29.
35. Lincetto O, Mothebesoane-Anoh S, Gomez P, Munjanja S (2013) Opportunities for Africa's newborns: practical data, policy and programmatic support for newborn care in Africa. World Health Organization.
36. Norwitz ER (2019) Prediction and prevention of preterm birth. *Reviews in obstetrics & gynecology* 12(3): 168-175.
37. Goldenberg RL, Culhane JF, Iams JD, Romero R (2020) Epidemiology and causes of preterm birth. *The lancet* 8(1): e56-e67.