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Indonesian Mothers' Perspective on Children's Health After Caesarean Delivery: A Descriptive Exploration

Perspektif Ibu-Ibu Indonesia tentang Kesehatan Anak Setelah Persalinan Sesar: Sebuah Eksplorasi Deskriptif

Zakiudin Munasir[1], Febriansyah Darus[2], Edwin Kinesya[3], Melissa Stephanie Kartjito[4], Tonny Sundjaya[5]*

[1]Division of Allergy Immunology, Department of Child Health, Medical Faculty of Universitas Indonesia, Jakarta, Indonesia
[2]Division of Fetomaternal, Department of Obstetrics and Gynecology, Gatot Soebroto Presidential Army Hospital, Jakarta, Indonesia
[3]Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia
[4]Department of Health Nutrition, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia
[5]Department of Epidemiology, Faculty of Public Health, Universitas Indonesia, Jakarta, Indonesia

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Correspondent:
Tonny Sundjaya
s_ton77@yahoo.com

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ABSTRACT

Background: Cesarean section incidence increases over time in both emergency and elective cases, or with medical indication and social factors. Despite the usefulness of C-section, parents need to be aware of its effect to child health and the countermeasure.
Objectives: This study aims to explore mothers' perspectives about the health effects of C-section to children.
Methods: An open-ended survey was conducted on Indonesian mothers as participants in a cross-sectional study. A compilation of descriptive responses was collected at an online parenting community focused on children's health. The questions are later classified into six particular categories and given an analysis.
Results: A total of 175 inquiries were collected and categorized into 6 groups. In declining pattern, we found parental concern regarding the effect of C-section on the child's immune system (57.14%), nutrition and prebiotics/ probiotics/ synbiotic (22.28%), growth and development (8%), and gastrointestinal system (6.28%). A total of 42 questions (24%) can be categorized into more than one category.
Conclusions: More than half of parents are concerned about the effect of C-section on children's immune system, and one out of five mothers is concerned about the role of nutrition for their children's health. However, the awareness and concern regarding C-section health impact on growth and development, and gastrointestinal system are still very low.

INTRODUCTION

A caesarean section (C-section) is a surgical procedure where a uterine incision (hysterotomy) and an open abdominal incision (laparotomy) are made for the purpose of infant delivery[1]. All over the world, there is rising trend of C-Section over the past decades, with similar trend is observed in Indonesia[2]. The national prevalence of C-Section has increased from 9.8% in 2013[3], to 17.6% in 2018[4] and 25.9% in 2023[5]. In Jakarta, the capital city of Indonesia, the prevalence is even higher; it is estimated that the number is 19.9% in 2013, growing to 31.1% in 2018, and reaches 40.8% in 2023. Caesarean section can be categorized as either emergency or elective. Notable indications for emergency cesarean section include fetal distress, failure to progress in labor, eclampsia, and elective cesarean due to malpresentation, placenta previa, history of C-section, fetal macrosomia, and maternal absolute disproportion making vaginal birth impossible[6,7].

The knowledge, attitude, and perception of mothers and her peers or family play an important role in accepting or declining cesarean delivery. Some of the reasons for this refusal include the view of others that giving birth by cesarean section is a sign of weakness and failure of reproductive ability, taboos based on beliefs, and fear of death[8]. The majority of pregnant mothers were unaware that a cesarean section could have negative consequences for their child[9]. It can affect the gut microbiome (gut dysbiosis). Gut dysbiosis may impact the child's immune system, including susceptibility to infections and allergies. Furthermore, some studies also found the impact of C-section on growth and cognitive

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development as well as behaviour. C-section is also found to impact initial breastfeeding practice[10–15]. The objective of this study is to explore mothers concern regarding C-section and its impact on child health by the use of open-ended questions.

METHODS

Participants and Recruitment

An online parenting community forum exploring the impact of cesarean procedures on the health of children occurred in May 2023. The forum was coordinated by PrimaKu https://primaku.com, one of Indonesia's biggest digital parenting community comprising more than 3 millions parents. After the forum, there was a webinar featuring pediatrician as a speaker and obstetrician-gynecologist as a host to discuss the impact of cesarean sections on child health. The forum and webinar are attended by Indonesian mothers who voluntarily register and participate in the event.

Inquiries Analysis and Presentation

During this online forum, participants have the opportunity to pose open-ended questions on the forum. The questions posed by participants are organized into a list. There are no personal data of participants compiled in this study. Subsequently, the questions were classified into six distinct categories, each reflecting key forum interests and topic concerns, such as: category (i) The influence of a cesarean operation on the child's gastrointestinal system, category (ii) The influence of a cesarean operation on the child's immune system, category (iii) The influence of a cesarean operation on the child's growth and development, category (iv) The influence of a cesarean surgery on the nutritional status of children and the implications of administering prebiotics, probiotics, or synbiotics. category (v) Any further inquiries pertaining to caesarean section that have not been addressed in points i-iv; category (vi) Any other queries that are of lesser relevance to the subject of caesarean section. This classification ensures a structured and engaging discussion tailored to the community's priorities. Each question can be assigned to multiple categories. The findings of the analysis will be presented, and discussion will follow on topics that are commonly inquired about.

RESULTS AND DISCUSSIONS

Throughout the forum, a total of 175 inquiries were collected and then summarized. After categorizing, there were 11 (6.28%), 100 (57.14%), 14 (8%), 39 (22.28%), 9 (5.14%), and 47 (26.85%) questions in categories i-vi accordingly, as shown in Figure 1. Several questions were assigned to multiple categories, with 3 questions appearing in 3 categories, 39 questions appearing in 2 categories, and 133 questions appearing in a single category. An example of question that can be categorized into more than one group is, “Do C-section-born children tend to experience more illness? What kind of nutrition do they need to take? Is breastfeeding helpful?”. There is no missing data.

Among Indonesian parents, the influence of a cesarean operation on the child's immune system/ category (ii) is the most queried in this study (57.14%). Few questions commonly asked are, “Are children born by cesarean section more susceptible to illness?” and “How to optimize the immunity of children born by cesarean section?”. The second rank is occupied by the category of questions that are not relevant to the webinar topic/ category (vi) (26.85%), mostly regarding the field of obstetrics or consultation about neonatal jaundice, bloating, etc. As many as 22.28% of participants wanted to know more about the effects of cesarean section on child nutrition and the implications of giving prebiotics, probiotics, or synbiotics as in category (iv), for example, questions such as “Why do I produce less breast milk after C-section compared to vaginal delivery?” Or, “My breastmilk production is not sufficient, so I use formula-fed for my baby. What kind of ingredients does my baby need?”. Followed by 8% of participant’s questions regarding the effects of cesarean section on child growth and development/ category (iii) with question like, “Does C-section increase the risk of stunting?”. However, only a small number of participants (6.28%) asked about the first category, indicating a lack of participant awareness regarding the effects of cesarean section on the gastrointestinal system, with most questions asking, “Do c-section born children have different intestines or digestive system compared to vaginally born children?”. As many as 5.14% of questions given were about cesarean section but were not included in other categories/ category (v).

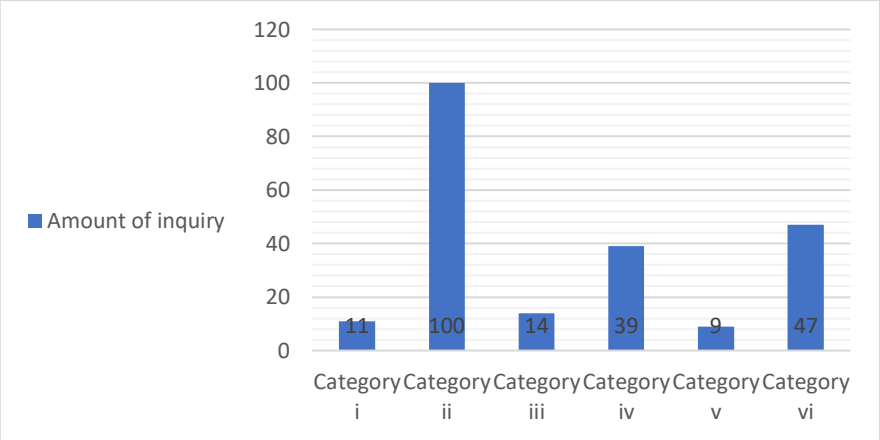

Figure 1. Amount of inquiries for each category

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Subjectively, parents observed more health problems from cesarean-born children than vaginal-delivery-born children. This concern is in align with a recent community-based case-control study based on mother interview showed that caesarean delivery children were more likely to have breathing problem (OR 2.61 [1.90-3.67], 95% CI), frequent illness (OR 5.10 [3.90-6.20], 95% CI), lower food demand (OR 0.45 [0.12-0.98], 95% CI), and lower hours of sleeping (OR 0.69 [0.20-1.00], 95% CI) reported compared to vaginal delivery[16]. Furthermore cesarean born children tend to have higher incidence of respiratory tract infections, type 1 diabetes, and childhood asthma[17–21].

One of the factors contributing to higher prevalence of immunological disorders in infants born via cesarean section is disrupted colonization of bacterial microflora in their skin and digestive tract. Infants delivered via cesarean section exhibited bacterial communities that had considerably lower amounts of *Escherichia-Shigella* (p-value <0.001, q = 0.001) and did not have any Bacteroides (*p*-value = 0.02, q = 0.03) compared to infants delivered vaginally[22]. Several microbiota, including *Enterobacter hormaechei/E. cancerogenus, Haemophilus parainfluenzae/H. aegyptius/H. influenzae/H. haemolyticus, Staphylococcus saprophyticus/S. lugdunensis/S. aureus, Streptococcus australis, and Veillonella dispar/V. parvula*, were found to be more prevalent in feces from C-section infants compared to vaginally born infants[23]. Also, the intestinal microbiota following caesarean birth is marked by a lack of Bifidobacteria species[24], which are essential for establishing a healthy microbial community in the neonate[25].

There are most queried regarding the impact of caesarean birth in child's immune system in this study (57,14%), which is understandable. Currently, there is starting to be a lot of education for the lay public about the relationship between cesarean birth and the development of the immune system, either through webinars, articles via social media such as Instagram, Facebook, as well as access to Google and others. Nowadays, there has not been too many socializations on the C-Section topic in Indonesia as it is a rather taboo socio-culturally. Hence, we aim to start raising awareness on the topic. Many healthcare discussions in Indonesia and other countries focus on the immediate medical reasons for C-sections rather than their potential effects on infant microbiome development and immunity. In addition, there is still limited literature exploring the long-term impacts of cesarean births on a child's immune system.

Mothers' concern regarding C-section health impact on the gastrointestinal system is the lowest in very low – the lowest concern in this study (6.28%). This shows that there is still low awareness among Indonesian mothers that C-section impacts the child's gastrointestinal system. One of the significant factors influencing an infant's microbiome is birth and delivery. Immediately after delivery, newborn infants undergo a swift colonization by microbes originating from their mothers and the surrounding environment[26]. The surrounding environment, such as the mother and hospital, play crucial roles in creating the gut microbiota during the early stages of a child's life. The likelihood of the transmission of bacteria to the neonatal gastrointestinal system is greater when there is prolonged exposure to the vaginal microbiota during vaginal childbirth[27]. Infants born through vaginal delivery acquired bacterial communities that were similar to their mother's vaginal microbiota. These communities were mainly composed of Lactobacillus, Prevotella, or Sneathia spp. On the other hand, infants born through C-section had bacterial communities that resembled those found on the skin surface. These communities were mainly dominated by *Staphylococcus, Corynebacterium, and Propionibacterium sp*[26]. The gut microbiota is a crucial component of gastrointestinal physiology that both influences general health and is affected by several variables. Recent research has emphasised gut microbiota and their significant implications for human health, particularly for the gastrointestinal, immunological, and neurological systems[28]. Hence, the disturbance of gut microbiota in the infant needs to be corrected, one of the strategies including nutrition. Several factors, including the mother's physical state, method of delivery, nutritional intake, disease, therapies used, culture, and physical environment, influence the introduction of microbiota[15,29,30]. Thus, the profile of the infant's microbiota may change as they get older. Changes in microbiota profile result in a higher number of Bifidobacterium bacteria when the infants reach 6 months of age[31]. While the transmission of Bifidobacterium from mother to newborn happens in both delivery procedures, it occurred more in infants vaginally delivered and less frequently in C-section newborns[23,31].

This survey found that about 22.28% of mothers (or about one out of five mothers) are concerned about the role of nutrition for their children's health. Indeed, there are various management strategies to increase the child's immunity through nutritional intake, and the most recommended strategy is through breastfeeding. Breastfeeding affects the diversity and richness of the infant's digestive tract microbiota, including Bifidobacterium and Lactobacillus. The impact of breast milk microbiota on the gut microbiota of infants does not occur by direct transmission of strains but rather through indirect effects, possibly due to the cross-feeding effect facilitated by Short-Chain Fatty Acids (SCFAs)[15,32,33]. Moreover, a longer period of exclusive breastfeeding is linked to an improvement in dysbiosis of the gut microbiota that is associated with diarrhea[34]. For formula-fed babies, another strategy that can be implemented is the usage of formula with supplementation of synbiotics (scGOS/lcFOS and B. breve M-16V) as published by Chua *et al*., 2017. The synbiotic supplementation facilitated the early adjustment of Bifidobacterium in infants born via C-section, leading to the replication of the gut's natural colonization of Bifidobacteria seen in infants born vaginally[15,35]. As a result, the increase in Bifidobacteria led to changes in gastrointestinal milieu of C-section-born infants to be more similar pervaginam babies[36]. Probiotic-enriched formula also enhances the presence of the added bacterial species (e.g. Bifidobacterium and Lactobacillus genus).[37] Meanwhile formula supplemented with

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prebiotic did not provide consistent significant increase of Bifidobacterium of C-section born infant compared to vaginally delivered infant[35,37].

Finally, concern regarding C-section health impact to growth and development is also still very low (8%), just slightly above the concern on the gastrointestinal system. This shows that there is still low awareness among Indonesian mothers that C-section can influence the child's growth and development trajectory. Based on child nutritional status, C-section born children have higher risk of overweight and obesity. Observation of body mass index (BMI) and fat percentage also shows C-section born children have more adiposity than vaginally delivered children[18,38–41]. Regardless of delivery method, children with a higher amount of Bifidobacterium and Collinsella tend to have less adiposity[31]. Nevertheless, the development of obesity can still vary with age, whether there is no difference[38] or a higher risk of developing obesity until adulthood[18,40] between individuals delivered via caesarean section and those delivered vaginally. There may not be an association between this phenomenon and socioeconomic status, since individuals with greater socioeconomic status tend to have a higher likelihood of undergoing a cesarean section[42–44], but obesity is more prevalent among those with lower socioeconomic status[45,46]. The correlation between C-section and obesity in early adulthood was mostly influenced by the maternal prepregnancy BMI, which acted as a confounding factor[40]. The effect of C-section on children's development is needed to be further studied. C-section-born children may have lower cognitive numeracy score[47], as well as slower brain development that seems to be more transient than vaginally delivered children with similiar gestational ages[10]. However, another study found otherwise; there is no difference in developmental delay between both procedures[48]. Hence, even though there are still differing results in the study, the fact that C-Section may impact a child's growth and development cannot be neglected.

C-section children are also associated with a risk of psychological and behavioral problems, this can affect a child's ability to complete tasks and social problems[49,50]. Applicable for C-Section due to medical indications or social factors, C-section children are found to be more hyperactive, impulsive, attention-deficit, have social problems, and slow to complete tasks[49]. It is also associated with higher occurrence of autism spectrum disorder (ASD)[51].

From the results of this study, it is recommended to increase public education regarding the impact of caesarean birth, not only on the child's immune system but also other detrimental impacts.Limitation of this study include an online participation with access to the digital parenting community. This may result in bias due to socioeconomic factors and the availability of smartphone devices and/or internet services. Different participants' background may yield different result and thus can be used as further study analysis.

CONCLUSIONS

More than half of parents are concerned about the effect of C-section on children's immune systems, and one out of five mothers is concerned about the role of nutrition for their health. However, the concern regarding C-section health impact on growth and development, and gastrointestinal system is still very low. There is a clear need for targeted educational interventions addressing misconceptions or gaps in parental understanding of the long-term health impacts of Cesarean section (C-section) deliveries. Healthcare providers, particularly those involved in maternal and child health, should emphasize evidence-based communication about how C-sections may affect immune development, growth, and gastrointestinal health, as well as the importance of early-life nutrition. Future research should explore the reasons behind the low levels of concern regarding the impact of C-sections on growth, development, and gastrointestinal health.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

The authors declare no conflict of interest. No external funding received.

AUTHOR CONTRIBUTIONS

ZM: conceptualization, investigation, methodology, supervision, writing–review and editing; FD: methodology; formal analysis, supervision, writing–review and editing; EK: formal analysis, writing–original draft; MSK: conceptualization, investigation, resources, writing–original draft; TS: investigation, resources, supervision.

REFERENCES

1. Berghella, V., Baxter, J. K. & Chauhan, S. P. Evidence-based surgery for cesarean delivery. *Am. J. Obstet. Gynecol.* **193**, 1607–1617 (2005). https://doi.org/10.1016/j.ajog.2005.03.063.
2. Sungkar, A. & Basrowi, R. W. Rising trends and indication of caesarean section in Indonesia. *World Nutr. J.* **4**, S2:1–7 (2020). https://doi.org/10.25220/WNJ.V04.S2.0001.
3. Badan Penelitian dan Pengembangan Kesehatan Kementrian Kesehatan RI. *Riset kesehatan dasar RISKESDAS* (2013). Available at: https://kesmas.kemkes.go.id/konten/105/0/020417-hasil-riskesdas-2018.
4. Badan Penelitian dan Pengembangan Kesehatan Kementrian Kesehatan RI. *Riset kesehatan dasar RISKESDAS* (2018). Available at: https://kesmas.kemkes.go.id/konten/105/0/020417-hasil-riskesdas-2018.
5. Kementrian Kesehatan Republik Indonesia. *Survei Kesehatan Indonesia Dalam Angka* (2023).
6. Javaid, K. et al. Indications of emergency vs elective cesarean section: cross-sectional study done at Holy Family Hospital, Rawalpindi, Pakistan. *J. South Asian Fed. Obstet. Gynaecol.* **9**,

How to cite: *Munasir, Z., Darus, F., Kinesya, E., Kartjito, M. S., & Sundjaya, T. (2025). Indonesian Mothers' Perspective on Children's Health After Caesarean Delivery: A Descriptive Exploration: Perspektif Ibu-Ibu Indonesia tentang Kesehatan Anak Setelah Persalinan Sesar: Sebuah Eksplorasi Deskriptif. Amerta Nutrition, 9(3), 405–411.*

14–17 (2017). https://doi.org/10.5005/jp-journals-10006-1449.
7. Mylonas, I. & Friese, K. Indications for and risks of elective cesarean section. *Dtsch. Arztebl. Int.* **112**, 489–495 (2015). https://doi.org/10.3238/arztebl.2015.0489.
8. Lawani, L. O., Igboke, F. N., Ukaegbe, C. I. et al. Perception and socio-cultural barriers to the acceptance of caesarean delivery in a tertiary hospital in Abakaliki, South East Nigeria. *Int. J. Womens Health Reprod. Sci.* **7**, 163–168 (2018). https://doi.org/10.15296/ijwhr.2019.27.
9. Naa Gandau, B. B. et al. Maternal perceptions about caesarean section deliveries and their role in reducing perinatal and neonatal mortality in the Upper West Region of Ghana: a cross-sectional study. *BMC Pregnancy Childbirth.* **19**, 350 (2019). https://doi.org/10.1186/s12884-019-2536-8.
10. Polidano, C., Zhu, A. & Bornstein, J. C. The relation between cesarean birth and child cognitive development. *Sci. Rep.* **7**, 11483 (2017). https://doi.org/10.1038/s41598-017-10831-y.
11. Widodo, A.D. & Juffrie, M. Caesarean section and gut microbiota in children. *World Nutrition Journal*. **4**, S2:8–16 (2020). https://doi.org/10.25220/WNJ.V04.S2.0002.
12. Masitoh, S., Nurokhmah, S., Rizkianti, A. & Sugiharti, S. Hubungan operasi sesar dengan inisiasi menyusu dini di Indonesia: Analisis data SDKI 2017. *Media Penelitian dan Pengembangan Kesehatan.* **31**, 1 (2021). https://doi.org/10.22435/mpk.v31i1.3430.
13. Keshet, A. et al. Estimating the effect of cesarean delivery on long-term childhood health across two countries. *PLOS ONE.* **17**, e0268103 (2022). https://doi.org/10.1371/journal.pone.0268103.
14. Sandall, J. et al. Short-term and long-term effects of caesarean section on the health of women and children. *The Lancet.* **392**, 1349–1357 (2018). https://doi.org/10.1016/S0140-6736(18)31930-5.
15. Munasir, Z. & Khoe, L.C. Immune development of children born from caesarean section. *World Nutrition Journal.* **4**, S2:17–25 (2020). https://doi.org/10.25220/WNJ.V04.S2.0003.
16. Rahman, M., Khan, N., Rahman, A., Alam, M. & Khan, A. Long-term effects of caesarean delivery on health and behavioural outcomes of the mother and child in Bangladesh. *Journal of Health, Population and Nutrition*. **41**, 45 (2022). https://doi.org/10.1186/s41043-022-00326-6.
17. Słabuszewska-Jóźwiak, A., Szymański, J.K., Ciebiera, M., Sarecka-Hujar, B. & Jakiel, G. Pediatrics consequences of caesarean section—a systematic review and meta-analysis. *International Journal of Environmental Research and Public Health.* **17**, 8031 (2020). https://doi.org/10.3390/ijerph17218031.
18. Keag, O.E., Norman, J.E. & Stock, S.J. Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. *PLOS Medicine*. **15**, e1002494 (2018). https://doi.org/10.1371/journal.pmed.1002494.
19. Cardwell, C.R. et al. Caesarean section is associated with an increased risk of childhood-onset type 1 diabetes mellitus: a meta-analysis of observational studies. *Diabetologia.* **51**, 726–735 (2008). https://doi.org/10.1007/s00125-008-0941-z.
20. Thavagnanam, S., Fleming, J., Bromley, A., Shields, M.D. & Cardwell, C.R. A meta-analysis of the association between caesarean section and childhood asthma. *Clinical and Experimental Allergy.* **38**, 629–633 (2008). https://doi.org/10.1111/j.1365-2222.2007.02780.x.
21. Blustein, J. & Liu, J. Time to consider the risks of caesarean delivery for long term child health. *BMJ*. **350**, h2410 (2015). https://doi.org/10.1136/bmj.h2410.
22. Azad, M.B. et al. Gut microbiota of healthy Canadian infants: profiles by mode of delivery and infant diet at 4 months. *CMAJ: Canadian Medical Association Journal.* **185**, 385–394 (2013). https://doi.org/10.1503/cmaj.121189.
23. Bäckhed, F. et al. Dynamics and stabilization of the human gut microbiome during the first year of life. *Cell Host & Microbe*. **17**, 690–703 (2015). https://doi.org/10.1016/j.chom.2015.04.004.
24. Biasucci, G., Benenati, B., Morelli, L., Bessi, E. & Boehm, G. Cesarean delivery may affect the early biodiversity of intestinal bacteria. *The Journal of Nutrition.* **138**, 1796S–1800S (2008). https://doi.org/10.1093/jn/138.9.1796S.
25. Francavilla, R., Cristofori, F., Tripaldi, M.E. & Indrio, F. Intervention for dysbiosis in children born by C-section. *Annals of Nutrition and Metabolism.* **73**, Suppl. 3:33–39 (2018). https://doi.org/10.1159/000490847.
26. Dominguez-Bello, M.G. et al. Delivery mode shapes the acquisition and structure of the initial microbiota across multiple body habitats in newborns. *Proceedings of the National Academy of Sciences of the United States of America*. **107**, 11971–11975 (2010). https://doi.org/10.1073/pnas.1002601107.
27. Shao, Y. et al. Stunted microbiota and opportunistic pathogen colonization in caesarean-section birth. *Nature*. **574**, 117–121 (2019). https://doi.org/10.1038/s41586-019-1560-1.
28. Kartjito, M.S. et al. Defining the relationship of gut microbiota, immunity, and cognition in early

How to cite: *Munasir, Z., Darus, F., Kinesya, E., Kartjito, M. S., & Sundjaya, T. (2025). Indonesian Mothers' Perspective on Children's Health After Caesarean Delivery: A Descriptive Exploration: Perspektif Ibu-Ibu Indonesia tentang Kesehatan Anak Setelah Persalinan Sesar: Sebuah Eksplorasi Deskriptif. Amerta Nutrition, 9(3), 405–411.*

life—a narrative review. *Nutrients.* **15**, 2642 (2023). https://doi.org/10.3390/nu15122642.

29. Adlerberth, I. & Wold, A. Establishment of the gut microbiota in Western infants. *Acta Paediatrica.* **98**, 229–238 (2009). https://doi.org/10.1111/j.1651-2227.2008.01060.x.
30. Matamoros, S., Gras-Leguen, C., Le Vacon, F., Potel, G. & de La Cochetiere, M.F. Development of intestinal microbiota in infants and its impact on health. *Trends in Microbiology*. **21**, 167–173 (2013). https://doi.org/10.1016/j.tim.2012.12.001.
31. Dogra, S. et al. Dynamics of infant gut microbiota are influenced by delivery mode and gestational duration and are associated with subsequent adiposity. *mBio.* **6**, e02419-14 (2015). https://doi.org/10.1128/mBio.02419-14.
32. Li, Y. et al. The effect of breast milk microbiota on the composition of infant gut microbiota: a cohort study. *Nutrients.* **14**, 5397 (2022). https://doi.org/10.3390/nu14245397.
33. Fehr, K. et al. Breastmilk feeding practices are associated with the co-occurrence of bacteria in mothers' milk and the infant gut: the CHILD Cohort Study. *Cell Host Microbe*. **28**, 285–297.e4 (2020). https://doi.org/10.1016/j.chom.2020.06.009.
34. Ho, N.T. et al. Meta-analysis of effects of exclusive breastfeeding on infant gut microbiota across populations. *Nat. Commun.* **9**, 4169 (2018). https://doi.org/10.1038/s41467-018-06473-x.
35. Chua, M.C. et al. Effect of synbiotic on the gut microbiota of cesarean delivered infants: a randomized, double-blind, multicenter study. *J. Pediatr. Gastroenterol. Nutr.* **65**, 102–106 (2017). https://doi.org/10.1097/MPG.0000000000001623.
36. Lay, C. et al. A synbiotic intervention modulates meta-omics signatures of gut redox potential and acidity in elective caesarean born infants. *BMC Microbiol*. **21**, 191 (2021). https://doi.org/10.1186/s12866-021-02230-1.
37. Carpay, N.C. et al. Microbial effects of prebiotics, probiotics and synbiotics after caesarean section or exposure to antibiotics in the first week of life: a systematic review. *PLoS One.* **17**, e0277405 (2022). https://doi.org/10.1371/journal.pone.0277405.
38. Masukume, G. et al. Association between caesarean section delivery and obesity in childhood: a longitudinal cohort study in Ireland. *BMJ Open*. **9**, e025051 (2019). https://doi.org/10.1136/bmjopen-2018-025051.
39. Mueller, N.T., Zhang, M., Hoyo, C., Østbye, T. & Benjamin-Neelon, S.E. Does cesarean delivery impact infant weight gain and adiposity over the first year of life? *Int. J. Obes*. **43**, 1549–1555 (2019). https://doi.org/10.1038/s41366-018-0239-2.
40. Quecke, B. et al. Caesarean section and obesity in young adult offspring: update of a systematic review with meta-analysis. *Obes. Rev.* **23**, e13368 (2022). https://doi.org/10.1111/obr.13368.
41. Li H.T., Zhou Y.B., Liu J.M. The impact of cesarean section on offspring overweight and obesity: a systematic review and meta-analysis. *International Journal of Obesity.* **37**, 893–899 (2013). https://doi.org/10.1038/ijo.2012.195.
42. Islam M.D.A., Shanto H.H., Jabbar A., Howlader M.D.H. Caesarean section in Indonesia: analysis of trends and socio-demographic correlates in three Demographic and Health Surveys (2007–2017). *Dr Sulaiman Al Habib Medical Journal.* **4**, 136–144 (2022). https://doi.org/10.1007/s44229-022-00011-0.
43. Idris H., Anggraini R. Highest economic status increases risk of cesarean section in women of childbearing age. *Universa Medicina*. **41**, 129–138 (2022). https://doi.org/10.18051/UnivMed.2022.v41.129-138.
44. Manyeh A.K., Amu A., Akpakli D.E., Williams J., Gyapong M. Socioeconomic and demographic factors associated with caesarean section delivery in Southern Ghana: evidence from INDEPTH Network member site. *BMC Pregnancy and Childbirth*. **18**, 405 (2018). https://doi.org/10.1186/s12884-018-2039-z.
45. Stamatakis E., Wardle J., Cole T.J. Childhood obesity and overweight prevalence trends in England: evidence for growing socioeconomic disparities. *International Journal of Obesity*. **34**, 41–47 (2010). https://doi.org/10.1038/ijo.2009.217.
46. Williams A.S., Ge B., Petroski G., Kruse R.L., McElroy J.A., Koopman R.J. Socioeconomic status and other factors associated with childhood obesity. *Journal of the American Board of Family Medicine*. **31**, 514–521 (2018). https://doi.org/10.3122/jabfm.2018.04.170261.
47. Deoni S.C., Adams S.H., Li X., et al. Cesarean delivery impacts infant brain development. *AJNR American Journal of Neuroradiology*. **40**, 169–177 (2019). https://doi.org/10.3174/ajnr.A5887.
48. Zhou H., Ding Y., Yang Y., et al. Effects on developmental outcomes after cesarean birth versus vaginal birth in Chinese children aged 1-59 months: a cross-sectional community-based survey. *PeerJ*. **7**, e7902 (2019). https://doi.org/10.7717/peerj.7902.
49. Shi X.Y., Wang J., Zhang W.N., et al. Cesarean section due to social factors affects children's psychology and behavior: a retrospective cohort study. *Frontiers in Pediatrics.* **8**, 586957 (2021). https://doi.org/10.3389/fped.2020.586957.

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50. Rutayisire E., Wu X., Huang K., Tao S., Chen Y., Tao F. Childhood emotional and behavior problems and their associations with cesarean delivery. *Revista Brasileira de Psiquiatria São Paulo.* **40**, 145–153 (2018). https://doi.org/10.1590/1516-4446-2016-2152.

51. Curran E.A., O'Neill S.M., Cryan J.F., et al. Research review: birth by caesarean section and development of autism spectrum disorder and attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. *Journal of Child Psychology and Psychiatry*. **56**, 500–508 (2015). https://doi.org/10.1111/jcpp.12351.

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