

Understanding stunting risk factors in Kampar Regency: Insights from mothers with stunted children (qualitative study)

SAGE Open Medicine
Volume 12: 1–12
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DOI: 10.1177/20503121241244662
journals.sagepub.com/home/smo



Suyanto Suyanto¹, Sri Wahyuni¹, Zulharman Zulharman¹,
Ridha Restila¹, Raffhy Irfansya², Erfa Natasya Aprillianty²,
and Natasha Widya Adraf²

Abstract

Objective: To assess the perceptions of mothers with stunted children regarding the factors contributing to stunting in Kampar Regency, Riau Province, Indonesia.

Introduction: Stunting is intricately linked to underlying risk factors, and understanding these factors is crucial for preventing its recurrence, particularly for mothers who play a central role in caring for stunted children.

Methods: The research sample consisted of mothers referred by the Perhentian Raja Community Health Center with stunted children. Purposive sampling was employed to select informants and thematic analysis was used for data analysis.

Results: A total of 15 informants were interviewed, leading to the identification of five themes related to stunting risks: (1) before pregnancy, (2) during pregnancy, (3) postnatal, (4) infectious disease factors, and (5) socio-demographic factors.

Conclusion: The study indicates that mothers hold diverse opinions about factors contributing to stunting, with their views being shaped by health programs and personal experiences, specifically focusing on aspects like breastfeeding and weaning foods. Additionally, it underscores that education and economic challenges introduce complexity to understanding how mothers perceive the risk factors associated with stunting.

Keywords

Stunting, risk factors, mother's perception, qualitative study

Date received: 1 November 2023; accepted: 15 March 2024

Introduction

Stunting, a chronic nutritional ailment leading to inadequate height growth in children, is a significant concern in developing nations due to its potential impact on the quality of a country's human resources.¹ Data from the World Health Organization (WHO) in 2021 shows that approximately 22%, or roughly 149.2 million toddlers worldwide, have experienced stunting.² The 2021 Indonesian Nutrition Status Survey by the Ministry of Health indicates that the prevalence of stunting in Indonesia is 25.2% in 2022, exceeding the WHO benchmark of 20%, and the government aims to reduce it to 14% by 2024.³

The prevalence of stunting is closely associated with various underlying risk factors, which fall into distinct domains.⁴ Environmental risk factors involve family food security, access to clean water, and sanitation.^{1,4–6} Concurrently,

child-related factors include prematurity, young gestational age, and the occurrence of diseases like diarrhea and acute respiratory infections. Maternal factors, as outlined by Wardani et al.,⁷ include the mother's height, nutritional and health status during pregnancy, and her knowledge and perception of parenting practices, including the quantity and quality of food.⁷

¹Lecturer in Faculty of Medicine, Universitas Riau, Pekanbaru, Riau, Indonesia

²Medical Student in Faculty of Medicine, Universitas Riau, Pekanbaru, Riau, Indonesia

Corresponding author:

Suyanto Suyanto, Faculty of Medicine, Universitas Riau, No 1 Diponegoro Road, Pekanbaru, Riau, 28133, Indonesia.

Email: suyantounri@gmail.com



Perception is crucial among risk factors for families, especially for mothers, shaping behavior and influencing caregiving. Misunderstandings about stunting can impact caregiving, leading parents to accept conditions and potential consequences for stunted children.^{6–8} Mothers play a crucial role in children's growth, and their understanding of stunting is vital for prevention. Some mothers have misconceptions, linking stunting to hereditary factors or thinking it's not severe unless the child is visibly unwell.⁹ Other studies stress that heredity isn't the main cause, emphasizing the importance of various factors.⁸

Kampar Regency, Indonesia, had a high stunting rate of 25.7% in 2021, exceeding provincial and national rates. However, the prevalence significantly decreased to 14.5% in 2022,¹⁰ prompting researchers to explore if this improvement is linked to a better understanding of stunting risk factors, especially among mothers with stunted children. We aim to understand better the perspectives of mothers with stunted children on the factors causing stunting in Kampar Regency, Riau Province, as there is limited qualitative research focusing on this aspect.

Method

Study setting and design

The study was conducted at Puskesmas Perhentian Raja, a community health center located in Kampar Regency, specifically chosen for its significant role in addressing the heightened prevalence of stunting within the region. Despite the expansion of healthcare infrastructure, challenges persist in accessing high-quality maternal and child healthcare services due to a shortage of skilled medical personnel, particularly in rural areas. Data from the Health Profile of Riau Province for the year 2021 indicate a concerning increase in maternal mortality rates within the Kampar Regency. Furthermore, while antenatal care services in Kampar Regency boast commendable coverage rates at 89.4% for the first antenatal visit (K1) and 84.8% for the fourth antenatal visit (K4), accessibility to these services has notably declined in the Perhentian Raja District, with rates dropping to 94.4% (K1) and 77.5% (K4). Additionally, the prevalence of low-birth-weight babies in Kampar Regency is recorded at 1.3%, with a significantly higher rate of 3.6% observed in the Perhentian Raja District.

The demographic makeup of Kampar Regency is characterized by a diverse blend of cultural and ethnic backgrounds, leading to varied societal influences. Notably, the average educational attainment level is 9.39 years, equivalent to junior high school education, prompting an investigation into how maternal perceptions align with this educational context. The study employed qualitative methodologies to investigate maternal perspectives on stunting risk factors, with a research duration spanning 7 months from inception to completion, notably covering the period from March to October 2023.

Eligibility and sampling criteria

Mothers living in the Perhentian Raja Community Health Center working area with stunted children, were chosen as participants for this study. The selection process followed purposive sampling, guided by recommendations from the Perhentian Raja Community Health Center, considering the place of residence and age group to ensure community representation. Those ineligible for the study are individuals who are pregnant or afflicted with severe illnesses that, according to the research team's judgment, could potentially impact the study results. Following their consent, informants were furnished with written information about the study, allowing them to assess and reflect on their involvement and encouraging them to pose any questions they might have had. The sample size is determined by appropriateness and sufficiency principles. The interviews began with two key informants and proceeded until a saturation point was reached, indicating that ample information had been gathered.

Data collection

A single interviewer utilized the in-depth interview guide (attached) to pose questions directly to all informants, including key and supporting informants. In particular, in-depth interviews were conducted with key informants. Written consent was reconfirmed before starting the interview, and pseudonyms were used to safeguard informant anonymity. These face-to-face interviews occurred individually at the homes of each main informant, ensuring privacy without the presence of others. However, the process of conducting in-depth interviews with key informants encountered occasional disruptions due to the attention demands of fussy, restless, and crying children, as many informants had children under five. Key informants offered spontaneous responses during the interviews, guided by their thoughts.

Additionally, in-depth interviews were conducted with supporting informants, including the Head of the Village, Posyandu Cadre, the village midwife, and the Person in Charge of the Perhentian Raja Community Health Center Nutrition Program. Interviews with the village midwife and health cadre heads took place at the Village Health Post in Hang Tuah Village, following the routine monthly measurements of children under five. Meanwhile, interviews with the Person in Charge of the Perhentian Raja Community Health Center Nutrition Program occurred in the Nutrition Room of the center. Each interview lasted approximately 60 min, involving the use of a cellphone for recording and the taking of field notes. No repeated interviews were conducted with the same informants.

Apart from in-depth interviews, the data collection process included focus group discussions (FGDs) with key informants who did not undergo individual interviews. These FGDs played a crucial role in triangulating data sources to

Table 1. Characteristics of the key informant.

No	Informant code	Age	Education level	Occupation	Methods
1	U1	40	Junior high school	Housewife	In-depth interview
2	U2	20	Senior high school	Housewife	In-depth interview
3	U3	40	Senior high school	Housewife	In-depth interview
4	U4	40	Junior high school	Housewife	In-depth Interview
5	U6	33	Elementary school	Housewife	In-depth interview
6	U5	30	Senior high school	Housewife	In-depth interview
7	U7	22	Junior high school	Housewife	In-depth interview
8	F1	24	Senior high school	Housewife	Focus group discussion
9	F2	28	Senior high school	Housewife	Focus group discussion
10	F3	36	Senior high school	Housewife	Focus group discussion
11	F4	26	Senior high school	Housewife	Focus group discussion

validate responses from main informants who participated in in-depth interviews. The FGD, lasting 150 min, occurred at one of the informants' houses, with one researcher guiding the discussion and another serving as a note-taker. A cell phone was utilized to record the discussion. While all informants actively participated in the FGD, some encountered disruptions in attention and focus due to bringing their children, generally under 2 years old.

During the interviews and group discussions, we carefully observed different aspects like behavior, environment, documents, and the overall atmosphere, helping us collect qualitative data. This observation method was crucial for confirming and verifying the information provided by key informants, ensuring accuracy through data triangulation. Our observations went beyond individual homes, giving us a broader perspective on village activities and contributing to a better overall understanding of the research context and factors influencing the topic.

Data analysis

We used descriptive statistics for summarizing demographic information, and interview data underwent thematic analysis, involving the identification of recurring patterns. All researchers collaborated to create an initial coding scheme after reviewing the first 15 transcripts. Thematic analysis, using inductive reasoning, led to the development of five main categories: perception of risk factors before pregnancy, during pregnancy, after birth, infectious diseases, and socio-economic and environmental factors. It's important to note that the analysis was done manually, without employing any software.

Ethical statement

The study received ethical approval from the institutional research ethics board at the Faculty of Medicine, Universitas Riau (Approval Number: B/086/UN19.5.1.8/UEPPK/2023).

Results

Seven key informants underwent in-depth interviews, while four joined FGDs. The details of the informants are in Table 1. From the in-depth interview and FGD informants, it was noticed that over half of them (63.64%) completed education up to senior high school. All informants identified themselves as housewives, with the majority (63.64%) having an education level up to senior high school.

In-depth interview was also conducted with four supporting informants as part of the data triangulation process. These supporting informants were selected for their knowledge and experience with stunting conditions in the village. The detailed characteristics are provided in Table 2 below.

The findings of this study, illustrating the perceptions of mothers with stunted children regarding the risk factors for stunting, are summarized in Table 3 below.

Theme 1: Perceptions of risk factors associated with stunting prior to pregnancy. The research findings concerning the perception of risk factors for stunting before pregnancy reveal various viewpoints among the primary informants. A substantial number held the belief that the maternal lineage could influence a child's short stature, suggesting that hereditary or genetic factors might play a role in making a child shorter and potentially increasing the risk of stunting.

For instance, when informants were asked, "Do you think short stature in the family can increase the risk of stunting? Please tell me the reason" on in-depth interview, they commented:

Yes, it influences it, yes, to a small extent, this gene influences it (U2).

Yes, it's possible, Maybe because the mother's offspring may be small, the father is small too. (U4)

There is an influence, because it can cause small children and yes, it's possible, right? (U7)

Table 2. Characteristics of the supporting informant.

No	Informant code	Age	Education level	Occupation	Methods
1	P1	32	Diploma degree	Village midwife	In-depth interview
2	P2	53	Senior high school	Health cadre	In-Depth interview
3	P3	53	Senior high school	Health cadre	In-depth interview
4	P4	40	Bachelor degree	Community Health Center nutrition coordinator	In-depth interview

During the FGD, all informants considered that genetic factors can increase the risk of stunting based on the informants' statements below.

Yes, I think you can, bro, because if the parents are not tall enough, it automatically doesn't rule out the possibility of their child becoming stunted, but it can still be corrected. (F1)

There is a possibility, but it seems small, because genetics can have a slight influence, bro. (F2)

Yes, maybe it could be like that, like my children, for example, when they are all breastfed, they are all small, their father is small, so the children are small. But if they are breastfed like their mother, they will all be big. (F3)

I think so, there will be an influence, because it doesn't rule out the possibility that the mother and father are small, the child could be like that. (F4)

Conversely, some informants held incorrect perceptions. One informant asserted that the mother's height had no bearing on the likelihood of stunting, aligning with the notion that experiences from the informant's perspective. The informant explained,

Not really, because I'm short and my husband is not very tall and thank God my first child is tall (U5).

Don't know, it's not that descendants are also rich hehe. (U1)

The study findings regarding mothers' perceptions concerning nutritional issues and anemia during adolescence as contributors to an elevated risk of stunting revealed that a majority of informants possessed a fairly good understanding of how nutritional problems and anemia during adolescence could heighten the risk of stunting. They argued that nutritional imbalances and incidents of anemia in the mother could have repercussions for both the mother's future health and that of her child. Informants emphasized this by stating,

I think maybe because it is possible, sometimes as much as we can, what we buy is what we eat and give to our children. It's possible. Because when you're a teenager before you get pregnant you can be less focused on doing activities or whatever. For example, if the mother also has anemia, of course the child will too. Yes, we can, so we try not to do that. There must be enough calcium and calories. Yes, it started with his mother first. (U3)

Might have an impact (U4)

When I was a teenager I was also skinny, my weight was only 40 kg, so that had an influence on the incidence of stunting. Yes, because if the mother's health is disturbed, it can also have consequences for the child. (U5)

The influence of what enters our bodies can determine who we will be in the future. (U6)

It seems that if you are a teenager, it doesn't have much of an influence, there is a slight influence, as you explained earlier, stunting can be corrected from pregnancy to delivery. The slight influence is because maybe the mother was thin, it could have an impact on the child becoming thin too, I'm anemic too. And it turns out after I searched again on Google, it could also cause stunting in children. (F2)

Yes, it also has an effect, because even the mother or the seeds are malnourished, let alone the children. Yes, I think it is represented by the mother's previous answer. (F3)

In my opinion, it has an influence, because when we are teenagers, we also menstruate, right? From our future mothers to our future children, it's like, how about that, it's like that because before we were pregnant, we weren't healthy? It does matter, bro, yes, this is my child. Since before I was pregnant, my hemoglobin has always been low, I often get dizzy, even though I don't take enough medicine. Previously, I didn't take enough medicine either, and I think this is what caused my child to be like this. So maybe this child is mine. I used to do checks like that when I was a teenager. (F4)

However, a minority of informants held erroneous perceptions regarding this matter. They argued that health conditions during adolescence could not elevate the risk of stunting, contending that good pregnancy and parenting practices would not lead to stunting in children. They were saying on in-depth interview and FGD:

That's still right when she's a teenager, who knows, when she gets pregnant, her nutritional intake will be good. So, it won't have any effect. (U2)

No, uncle, not really because it doesn't affect the child's intake. (U7)

Not really, it depends on us and our parenting style, so if our parenting style is more child-oriented, Insha Allah, children can avoid stunting. Yes, together too, because of the influence and I

Table 3. Perceptions of mothers with stunted children on stunting's risk factors themes in Perhentian Raja Community Health Center Working Area, Kampar Regency.

Themes	Subthemes
Perception of risk factors before pregnancy risk factors	<ul style="list-style-type: none"> ✓ Maternal genetics Genetic inheritance, affecting a child's height, is seen by most as a major factor in stunting risk. However, a minority disagrees, citing personal experiences that suggest it doesn't increase the risk of stunting. ✓ Nutritional problems and anemia in adolescence Expectant mothers' nutritional and health conditions, along with current food intake, are viewed by the majority as determining future stunting risk. In contrast, a minority believes stunting doesn't result from conditions during adolescence, pregnancy, breastfeeding, or good parenting. ✓ Low level of maternal education A low level of education is seen by the majority as linked to less experience and inappropriate parenting patterns, influencing the incidence of stunting. In contrast, a minority believes that low education has no effect on stunting, as information can be obtained through counseling about stunting and reading Child Health Monitoring books
Perception of risk factors during pregnancy risk factors	<ul style="list-style-type: none"> ✓ Inadequate nutritional intake Most informants think that not eating enough during pregnancy affects the likelihood of stunting by impacting the baby's nutrition and development, while a few believe it has no effect, attributing it to the mother's insufficient food intake ✓ Mother's nutritional status during pregnancy The majority believes that the inadequate nutrition of pregnant women affects stunting by decreasing fetal weight, while a minority argues that it has no impact, citing instances of families with low nutritional status during pregnancy but have tall children ✓ The age of the pregnant woman is too young The majority believes that too young a pregnant mother's age is linked to insufficient experience, knowledge, and parenting, increasing the risk of stunting. In contrast, a minority argues that being young during pregnancy doesn't increase the risk, citing instances where friends who married young had healthy children ✓ Pregnancy too close The majority holds that insufficient breast milk due to pregnancy can impact the child's intake, increasing the risk of stunting. However, a minority believes that even with close spacing, good nutrition prevents any effect on the incidence of stunting ✓ Low ANC visits The majority believes that infrequent ANC (antenatal care) checks can increase the risk of stunting by affecting the growth and development of the fetus in the womb ✓ Hypertension and anemia in pregnancy The majority agrees that hypertension and anemia during pregnancy can cause problems in the unborn child ✓ Increased underweight during pregnancy A majority believes that insufficient weight gain during pregnancy affects fetal growth, while a minority argues it's only a concern if the child's post-birth food intake is inadequate to cause stunting
Perception of risk factors after birth risk factors	<ul style="list-style-type: none"> ✓ Low birth weight The majority contends that Low Birth Weight negatively impacts children's growth and height, while the minority argues that premature babies can catch up in growth with proper nutrition ✓ Inappropriate exclusive breastfeeding The majority believes that exclusive breastfeeding is crucial for a child's growth, while the minority, based on personal experience, argues that limited breast milk production during the first 6 months did not lead to stunting ✓ Inadequate quality and quantity of complementary foods The majority agrees that insufficient balanced nutrition significantly impacts children's growth and development, leading to stunting ✓ Infectious diseases The majority believes that diseases can weaken children's immunity, making it challenging for them to eat, resulting in thinness and an increased risk of stunting ✓ Low family income The majority believes that low family income impacts adequate nutrition for children, increasing the risk of stunting. However, a minority opinion suggests that certain food purchases, such as eggs, may not cause stunting despite financial constraints ✓ Environmental cleanliness and sanitation An increased risk of bad sanitation is linked to children getting sick easily, potentially raising the incidence of stunting, according to the majority opinion
Perception of infectious disease risk factors	
Perception socioeconomic and environmental risk factors	

also experienced it when I was in high school, so I don't have enough blood. (F1)

Maternal education levels emerged as another factor influencing the risk of stunting. Several informants asserted that a lower level of education correlates with less experience and potentially less knowledge of effective parenting. Maternal education was closely associated with access to knowledge and the perceptions underpinning a mother's parenting style. The study identified several informants with lower educational backgrounds. Informants emphasized this by stating,

They have less experience and they know more or less how to raise children (U4).

I also only graduated from elementary school so I don't really know what the future holds and I don't understand yet, that's why I need to go to the posyandu to gain knowledge and experience because it's been said that children with stunting are afraid, so that's an influence. (U5)

There's the problem, if we ourselves have to give lessons to children or what is this name, we will definitely be the ones teaching it, so I'm afraid that if we don't know, he won't know either. (U7)

Another commented on Focuss Group discussion:

Yes, we have to know that, don't we, especially now that children are at this age, it's not enough time before they are already pregnant, so we need that knowledge for their parenting patterns (FGD F4).

It's influential. That's why it's also an influence. As parents, you have to know that there's that too. That's why we have to look for lots of knowledge, bro. (F1)

The research revealed that even informants with lower educational backgrounds tended to seek information through various means, such as consulting health education books, attending counseling sessions, and actively searching for accurate information. As one informant succinctly expressed,

Because I also didn't come from a high education so low education doesn't matter, depending on whether we want to expand our knowledge. I want to learn (U6).

Theme 2: Maternal perceptions of stunting risk factors during pregnancy in children with stunted growth. The majority of respondents demonstrated a well-founded belief that insufficient nutritional intake during pregnancy could heighten the risk of stunting, except for one informant who held a differing view.

Respondent articulated this belief by stating,

Despite not being directly visible, the impact becomes apparent in the baby's development; you can observe it in their growth and overall development, (U6).

I don't know, it could be like that, hehe, the cause might be that, it's not enough. Yes, maybe that's what happens, it's stunting. Because the nutritional intake is lacking, perhaps vitamins (U1)

Yes, it affects you, bro, the mother isn't enough, let alone the baby she's carrying. (U2)

Yes, definitely, The child also lacks nutritional intake in it (U3)

It has an impact, bro, because we don't eat enough, and the child can have problems, bro. (U5)

It has an effect because the intake of the fetus is not sufficient, so its growth and development is reduced. (U6)

It has an influence, even though it is not directly visible, it will definitely be visible from the baby's development and growth and development can also be seen. (U7)

Another respondent concurred, asserting on FGD,

Indeed, it has consequences because it essentially constitutes nourishment for the baby; when the mother lacks adequate nutrition, the child inevitably receives less nourishment as well, (F2).

Yes, right from the start of pregnancy, because we didn't get enough food, it was like we were really weak, so the lack of nutritional intake, because there was not enough fruit, might have had an impact on my womb. (F1)

Yes, that's right, it has an effect because it becomes nutritional intake for the baby. The mother doesn't get enough food, so the child automatically gets less food too, (F2)

Agree, yes it has an effect too, so it has a more or less influence on the incidence of stunting in children. (F4)

Informants held the conviction that inadequate nutritional intake during pregnancy could adversely affect the nutrition and growth of the unborn child. These perceptions were shaped by situational factors stemming from the experiences of mothers with stunted children, who were consistently exposed to information provided by Posyandu's cadres. The overwhelming consensus among informants was that poor maternal nutritional status could elevate the risk of stunting. They maintained that poor nutritional status indicated inadequate nutrient intake, leading to disruptions in children's nutritional intake.

The experiences of others, specifically within the informant's family, were identified as situational factors tied to social conditions that could impact the informant's perception. One informant expressed this by noting,

It doesn't matter either way. Because my older brother had slender arms, you know, but now his son is big and tall, (U2)

Moreover, the majority of informants held the perception that pregnancies in very young women increased the risk of

stunting. They contended that young pregnancies were associated with a lack of experience, knowledge, and parenting capabilities that were essential for a child's growth and development. Additionally, concerns were raised about the immaturity of the uterus in young pregnancies, which could negatively affect the developing fetus.

It has consequences because they are not sufficiently mature and therefore not adequately prepared to care for their child, (U4)

Yes, because of my experience, when I was pregnant I was also thin and lacked nutritional intake during pregnancy. (U5)

Yes, it also has an influence on the child, because the mother is like that, the child's automatic behavior is also like that. (F1)

It's akin to their reproductive organs not being fully developed, so if they become pregnant too quickly, it could have subsequent effects, and their knowledge may still be insufficient, (F2)

It has an impact, because even the mother is already malnourished, so it affects the unborn baby? (F3)

This perception stemmed from an incident involving the informant's friend and aligns with the idea that proximity to certain individuals or objects can influence one's perceptions.

One informant expressed this perspective by saying,

I've observed experiences among friends who were too young, and their children appeared small and underweight. So, what if fate follows the same path, Sister? (FGD; F4).

Additionally, there was a consensus among informants that closely spaced pregnancies posed a risk for stunting. Informants argued that pregnancies in quick succession could lead to insufficient breast milk supply during pregnancy, potentially disrupting the nutritional intake of the previous child. This, in turn, could impact parenting patterns negatively.

The impact is due to inadequate breast milk supply, explained one informant. (U4)

I don't know, it seems like it has an effect. Yeah, because I'm too close, the pain hasn't gone away, hehe. That's why I'm so far away from my brother. (U1)

Yes, because it's too close. For example, if you're pregnant again in 6 months, you're still breastfed. So in my opinion you can't get pregnant again while we're giving breast milk. (U3)

In my opinion there is a connection, because when he came (meaning the baby came again) we were still in the recovery period and the process of stopping breastfeeding was not done naturally like we stop a child having finished breastfeeding but through medication because the child was not there (experience

of miscarriage) the breast milk continued to flood, finally they were given medicine to stop the breast milk. (U6)

Another concurred, stating on FGD:

It's the same as breast milk, so if you get pregnant first, your first child's breast milk intake will be less. (F1)

It's highly impactful; when we're breastfeeding and become pregnant again, it automatically exerts a significant influence on our parenting patterns. It receives insufficient attention. (FGD F4)

Nonetheless, some informants believed that closely spaced pregnancies did not necessarily increase the risk of stunting. They contended that pregnancy spacing would not affect stunting rates as long as nutritional intake remained sufficient.

It's also not good if the wealth is good. I don't think it matters. Even though the distance is close, the nutrition is good until the child is born. (U2)

Not really, uncle, because it depends on us how we divide our time and how we look after it. (U7)

All informants exhibited a strong understanding of the importance of antenatal care (ANC) in promoting the growth and development of fetuses. They acknowledged that ANC visits played a crucial role in monitoring fetal conditions and maternal health during pregnancy, highlighting the potential consequences of neglecting such check-ups. Below statements were informants' answers when the interviewer asked, "Do you think if a pregnant woman who rarely or never checks her pregnancy with a doctor or midwife can increase the risk of stunting? Please tell me the reason."

In my opinion, it's not good if you don't get checked when you're pregnant, what will happen to your child, you won't know about your pregnancy. If you check, you'll know how your child is developing. (U1)

Yes, it has an impact because we don't know what the condition of the fetus and mother are during pregnancy and we also don't know the development of the fetus in the womb if we don't check it. (U5)

It could be, because if we meet with a doctor we can increase our knowledge and the doctor can also provide advice on pregnancy. The baby can also be monitored better, if we don't see a doctor how will we know the condition of the baby. (U6)

Another informant answered when FGD:

Yes, it's risky, yes, because he doesn't want to check himself for his child, right? That means he automatically lacks knowledge, he doesn't know his child's condition, including how much he is,

including his weight. Even when the child's position is approaching birth, we don't know. there is a breech position so we have to know and if it is discovered that the pressure is low, at least the doctor can give us directions to correct it. (F4)

It's risky because if a person doesn't undergo ANC for their child, it means they lack knowledge and are uninformed about their child's condition, including their weight. (FGD F4)

Informants viewed infrequent ANC visits as a potential risk factor for stunting since ANC could provide insights into fetal growth and development. The study's findings indicated that some informants had infrequent ANC check-ups at healthcare facilities. These perceptions were shaped by the informants' own experiences, which were considered internal factors influencing their perceptions.

Furthermore, mothers with stunted children held unfavorable perceptions regarding the link between hypertension and anemia during pregnancy and the increased risk of stunting. Even though most mothers acknowledged that hypertension and anemia during pregnancy could elevate the risk of stunting, a majority of informants demonstrated a lack of awareness about this connection during in-depth interviews.

As far as I know, we need to take care of our condition during pregnancy because in the future it will also be for us. If there is hypertension and anemia, there will also be treatment in terms of diet, etc. (So this mother agrees, can it affect stunting) (U6)

If the mother doesn't increase her nutritional intake, maybe yes. Maybe the impact will be on her child too (U3)

Oh yes, people with high blood pressure are really at risk, that's what you call a risk, what's your name? If we have a low blood pressure, we'll have a low blood pressure, the child will be weak, so if there's too much, wallahualam, that's a risk, right. (F1)

It's possible. Because I don't rule out the possibility that it could happen because of that, that's why it has to be normalized. (F4)

Insufficient weight gain during pregnancy was also considered a risk factor for stunting by most informants. They argued that a lack of weight gain during pregnancy indicated an abnormality in fetal growth and development.

It has an effect because the mother's weight loss is indicative of unhealthiness, an abnormal condition that impedes fetal development, noted one informant. (U5)

Impactful, Impactful bro, because it was difficult for me to gain weight during pregnancy (U4)

Certainly, if there was insufficient intake and the child couldn't gain weight, the child would become thin, and stunting would likely result. (FGD)

Research findings revealed that a mother's weekly weight gain of less than 200 g was a predictor of severe stunting in children. Perceptions on this matter were significantly influenced by the informants' personal experiences. For instance, one informant shared,

No, because during my first pregnancy with Dira, it was said that I wasn't eating enough since my weight was only 44 kg, not even 50 kg. Thankfully, my child, Dira, turned out healthy and quite intelligent, (Informant U6).

Theme 3: Maternal perceptions of risk factors for stunting after childbirth in cases of stunted children. The majority of informants exhibited a well-informed perspective regarding the association between Low Birth Weight (LBW) and heightened risk factors for stunting. They believed that LBW signaled an underlying issue in a child, potentially disrupting their growth and development.

One informant shared their view, stating,

Yes, if a child's weight is less than 2.5 kg, there is something wrong with the child, and there may be disruptions. (U7)

Maybe yes and no. Firstly, there are many factors that children are born with low weight, but later when they are 1 month old, their weight can increase like that. Those who don't want it, maybe they are like my child. (U3)

It has an impact because weight at birth has less influence on the child's height. (U4)

Another emphasized the risk, explaining,

It's highly risky because, from the beginning, the child's weight is already low. So, for instance, if our child tries to gain weight, and as they grow older, their weight increases at the same rate, but compared to a friend who started with sufficient weight, the outcomes differ because the starting point is distinct. (FGD F2)

It doesn't rule out the possibility that even this lady's 3.4 kg child could be stunted, especially if it's less than that, right? (FGD F4)

Besides LBW, early initiation of breastfeeding practices and exclusive breastfeeding were also recognized as postnatal risk factors for stunting by most informants. They understood that improper early initiation of breastfeeding and exclusive breastfeeding practices could heighten the risk of stunting.

Informants explained,

It has an effect because the child doesn't receive initial intake and yes because breast milk isn't provided for the child, leading to insufficient food intake from parents to children (U5). Another informant added,

In my opinion, yes, because nutritional intake may be insufficient, as 6-month-old babies rely primarily on breast milk for nutrition. (FGD F1)

Informants believed that exclusive breast milk contained crucial nutrients and antibodies essential for a child's growth, development, and immune defense.

Providing inadequate weaning foods was also recognized as a risk factor for stunting during infancy. Most informants had a sound understanding of the significance of weaning food and its relation to stunting. Some informants emphasized,

It's influential because a child's nutrition is vital for their future, (U6)

It has an impact, starting from the weight loss, eating a little from the first time he was given food until now the portions don't want to increase, from the first time he was given food from the age of 6 months until less than 2 years old, even snacks are at most 2 pieces of bread already. (U4)

while another concurred, stating on FGD:

Yes, that's why what children eat matters. (F1)

Meanwhile, even good children are like this, especially if they don't eat well. (F4)

The informants argued that providing weaning food correctly was closely tied to balanced nutrition, a pivotal factor influencing a child's growth and development. Additionally, exposure to information from village midwives, health cadres, and community health centers significantly influenced the perceptions of mothers with stunted children. This information pertained to parenting patterns in providing breast milk and weaning food to children. Almost all informants identified these healthcare professionals and programs as their sources of information on breastfeeding, weaning food, and stunting prevention.

Theme 4: Mothers' perspectives on infectious diseases as contributors to stunting in children with stunted growth. All of the informants clearly understood the link between chronic Upper Respiratory Tract Infections (ARI) and recurrent diarrhea, and the heightened risk of stunting. They explained these illnesses could compromise a child's immunity, leading to reduced appetite and diminished nutritional intake.

For instance, one informant stated,

Possibly yes, because of the intake of food because of the intake of food, because it is difficult to eat (U1)

In the past, my child was also rich, like I found out that her lungs were affected when she was more than 2 years old, she was my first child. She was malnourished, right, she was underweight but not tall. My first and second children did indeed eat well, sucks too. (U2)

Yes, because their immunity is lacking. If we are often sick, the intake we eat is not for growth but for healing first. Sick children also rarely want to eat so their intake is also reduced. (U5)

Another informant added on FGD

So, because you're sick, your appetite decreases, you don't want to drink, so if you're sick, the taste on your tongue is bitter or something like that, bro. Not looking for enough, not getting enough food too. (F1)

Interestingly, one informant (U2) shared that their first child had experienced lung issues, resulting in poor nutritional status but not stunted growth. The experience with their first child led this informant to perceive a connection between infectious diseases and stunting risk.

Theme 5: Mothers' views on social, economic, and environmental factors as risk factors for stunting in children with growth issues. Most informants demonstrated a well-informed perception of how low family income can heighten the risk of stunting. They reasoned that limited family income could hinder access to adequate nutrition for children, consequently increasing the likelihood of stunting.

Informant explanations included statements like,

Yes, if they lack the means and resources, it becomes challenging for them to provide food, and what's crucial is that the child eats, regardless of the variety of dishes. The key is ensuring the child consumes enough. (U3)

Another informant emphasized,

Due to economic constraints, we can't afford it, resulting in malnourished children, ultimately leading to stunting. (FGD F1)

However, some informants held misconceptions, believing that their child's nutritional needs were met as long as they could still afford certain foods like eggs.

Not really, if mother can still buy eggs she can still buy them so that's it (U2)

Furthermore, all informants had a well-formed perception of the role of environmental cleanliness and sanitation in stunting risk. They believed that an unsanitary environment increased the likelihood of illness, making children prone to disease and stunting.

Some informants articulated,

It can indirectly lead to illness, and that's why cleanliness must be maintained. (U2)

Maybe it's not clean enough, managing it before the mother cooks it is not hygienic and she doesn't wash it enough so as a result her child can be stunted. (U3)

Yes, because the midwife once said that stunting in children can occur in terms of food, cleanliness, the environment must also be clean so that children want to play wherever they are and still be safe. (U5)

Another informant concurred, explaining on FGD

It does have an effect because a clean environment promotes a child's health, while a dirty environment might result in diarrhea or infections, right? (FGD F2)

Discussion

The study offers a comprehensive exploration of mothers' perceptions of stunting risk factors at various stages, revealing diverse perspectives among informants. Prior to pregnancy, beliefs range from hereditary factors to misconceptions. During pregnancy, most mothers exhibit good understanding, but some lack clarity, particularly regarding anemia and hypertension. Maternal education's impact on stunting risk, along with economic struggles, is acknowledged, highlighting the role of family socioeconomic status. Post-childbirth, mothers' perceptions vary, shaped by health program information and personal experiences. Infectious diseases' link to stunting is well-understood, emphasizing the need to address chronic infections. Economic struggles pose a risk, limiting access to nutrition, aligning with research on poverty and stunted growth. Environmental cleanliness is recognized as vital, aligning with the water, sanitation and hygiene (WASH) mechanism.

Diverse perspectives among main informants on stunting risk factors before pregnancy were found. While some believed a child's short stature could be influenced by the maternal lineage due to hereditary factors, others had misconceptions. Regarding mothers' perceptions of nutritional issues and anemia during adolescence, the majority understood their role in stunting risk, with some sharing personal experiences. However, a minority held misconceptions, stating that adolescent health conditions and good parenting practices do not affect stunting risk. Maternal education levels were seen as influential, with lower education associated with less parenting knowledge.^{7,9,11} Despite limited education, some informants actively sought information, emphasizing the role of individual factors in shaping perceptions and highlighting the impact of family socioeconomic status on children's health knowledge.

Most mothers with stunted children understand the risk factors for stunting during pregnancy in this study. However, some mothers lack a good understanding, especially regarding factors like anemia and hypertension during pregnancy, which can increase the risk of stunting. Mothers' perceptions are shaped by information from community health centers, villages, and posyandu programs. Pregnant women's actions to prevent stunting should be based on knowledge about stunting definitions, contributing factors, consequences, nutritional needs during pregnancy, and their nutritional status. The

majority of informants' statements align with a study by Darmini et al.,¹² which found a significant relationship between maternal knowledge of balanced nutrition and stunting incidence. Additionally, most informants believe that pregnancies in very young women increase the risk of stunting due to a lack of experience, knowledge, and parenting capabilities. They express concerns about the immature uterus negatively affecting fetal development.¹³ Informants understand the importance of antenatal care (ANC) in promoting fetal growth and view infrequent ANC visits as a potential stunting risk. Insufficient weight gain during pregnancy is also considered a risk factor for stunting, supported by research indicating that a mother's weekly weight gain of less than 200g can predict severe stunting in children.¹⁴ Assessing the nutritional status through weight gain during pregnancy is crucial to detect the risk of stunting. If a mother's weight gain is less than 10kg, it may lead to conditions like low birth weight or premature birth, increasing the risk of stunting.

Most mothers in this study who had stunted children had a good understanding of the risk factors for stunting after childbirth. However, some mothers had incorrect perceptions, especially regarding the risk factors for low birth weight (LBW), proper Early Breastfeeding Initiation and Exclusive Breastfeeding. Their perceptions were shaped by information from community health centers and posyandu, where routine counseling and toddler classes were conducted. Personal experiences, observations, and internet information also influenced their perceptions.¹⁵ Informants generally recognized the link between LBW and a higher risk of stunting, understanding that LBW could indicate an underlying issue affecting a child's growth.¹⁶ However, a few informants believed LBW babies could catch up in growth without an increased risk of stunting, based on their own experiences. Early initiation of breastfeeding and exclusive breastfeeding were acknowledged as postnatal risk factors for stunting,^{1,4,13,17} with informants understanding the importance of proper breastfeeding practices in preventing stunting.¹⁴ Providing inadequate weaning foods during infancy was also recognized as a risk factor for stunting,¹⁸ with informants emphasizing the significance of balanced nutrition in a child's growth and development. Exposure to information from healthcare professionals, such as village midwives and health cadres, significantly influenced the perceptions of mothers with stunted children, particularly regarding breastfeeding, weaning food, and stunting prevention.

All informants clearly understood that Acute Respiratory Infections (ARI) and recurrent diarrhea heighten the risk of stunting. They explained that these illnesses can compromise a child's immunity, leading to a reduced appetite and diminished nutritional intake. Informants argued that children with ARI and gastrointestinal infectious diseases experience weakened immunity, and during frequent illness, the food consumed is primarily for healing rather than growth. They highlighted that during illness, children

require more nutrients, but the increased need isn't often matched by adequate food intake. The severity, frequency, and duration of the disease can directly impact a child's linear growth, potentially leading to stunting. This understanding among the informants emphasizes the importance of addressing and preventing chronic infections and diseases in children to mitigate the risk of stunting and ensure optimal growth and development.¹⁴ Interestingly, one informant shared that their first child had experienced lung issues, resulting in poor nutritional status but not stunted growth. This experience led this informant to perceive a connection between infectious diseases and the risk of stunting.

The family's economic situation poses a risk of stunting as it reflects the family's ability to meet nutritional needs. Most informants understand that a low family income can increase the risk of stunting by limiting access to sufficient nutrition for children. They emphasized the link between stunting and poverty, noting that families with limited incomes face challenges in choosing nutritious foods, leading to insufficient nutritional intake for their children. This understanding aligns with existing research, indicating that households dealing with food insecurity are more likely to have children with stunted growth.¹⁹ Additionally, all informants had a well-founded understanding of how environmental cleanliness and sanitation impact the risk of stunting. They believed that an unsanitary environment increases the likelihood of illness, making children susceptible to diseases and stunting. These perceptions align with the WASH mechanism, which connects to stunting through factors such as diarrhea, worm infections, and subclinical conditions in the gastrointestinal tract, directly affecting nutrient absorption, immune function, and growth in children.²⁰

Strength and limitation

Several limitations should be considered when interpreting the findings of this study. Firstly, there is a notable educational bias among informants, with the majority having completed high school education, while the average schooling for residents in the Kampar district is reported to be 9.4 years. The exclusion of individuals with elementary and junior high school education may impact the generalizability of the findings, as the sample may not fully represent the broader population. Secondly, the small number of informants, combined with the dominance of high school-educated individuals, raises concerns about potential bias, making it challenging to accurately reflect the perspectives of mothers with stunted children. Thirdly, conducting only a single interview with each informant may limit the depth and completeness of the information obtained, and repeated interviews could have provided a more nuanced understanding. Lastly, the translation process introduces variability, as translators may not always render responses verbatim, impacting the accuracy and fidelity of interpretation and introducing uncertainty.

Furthermore, the interview guide lacked formal validation or pilot testing, which could compromise the reliability and applicability of our findings. Relying solely on a literature-based approach for interview guide development might have introduced biases or overlooked crucial aspects absent in existing research. Overall, these limitations highlight the importance of exercising caution when generalizing the study's findings, and future research endeavors should aim to address these limitations to bolster the strength and relevance of the results.

Despite these limitations, this study significantly contributes valuable insights into the perceptions of mothers with stunted children regarding the risk factors for stunting. The educational bias among informants, while acknowledged, doesn't negate the rich and diverse perspectives captured in the study. The research team made substantial efforts to ensure inclusivity, and the findings still offer meaningful implications for understanding how maternal perceptions may influence stunting risk. The study's focus on informants with higher education levels does not diminish the importance of the nuanced insights provided, serving as a foundation for further exploration in diverse educational settings. The single-interview approach, though a limitation, provides a snapshot of informants' views, and the detailed thematic analysis adds depth to the understanding of maternal perspectives. Despite translation concerns, the study maintains credibility through meticulous documentation and transparency in the research process.

Conclusions

The study indicates that mothers hold diverse opinions about factors contributing to stunting, with their views being shaped by health programs and personal experiences, specifically focusing on aspects like breastfeeding and weaning foods. Additionally, it underscores that education and economic challenges introduce complexity to understanding how mothers perceive the risk factors associated with stunting.

Acknowledgements

The authors are grateful to anonymous referees for their useful suggestions and reviewing the manuscript. The authors appreciate all the respondents and Perhentian Raja Community Health Center, Kampar Regency staffs for supporting this study.

Author contributions

The authors confirm their contribution to the article as follows: study conception and design: SS; article collection or interviewer/facilitator on FGD and in-depth interviewer: RI; Interview transcripts maker: NWA and ENA; interpretation of results: SS, ZZ, SW, and RR; draft article preparation: SS, ZZ, and RI. All authors contributed to the revision of the article, reviewed the result, and read and approved the final version. All researchers have had qualitative research training and experience.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by the “UNRI LPPM research grant number 8273/UN19.5.1.3/AL.04/2023.” The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.”

Ethics approval

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Faculty of Medicine, Universitas Riau (protocol code no B/086/U.19.5.1.8/UEPKK/2023).

Informed consent

Informants comprehend that they will serve as subjects in the research, and researchers have clarified the research’s objectives through informed consent. This ensures that respondents are confident in their understanding of the research’s purpose. Written informed consent was secured from all subjects prior to commencing the study.

Informed consent statement

Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

Trial registration

Not applicable.

ORCID iD

Suyanto Suyanto  <https://orcid.org/0000-0001-7659-6689>

Supplemental material

Supplemental material for this article is available online.

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