

## POLICY TO REDUCE UNDER TWO STUNTING IN EAST JAVA REGION, INDONESIA: WHO IS THE RIGHT TARGET?

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### ABSTRACT

**Introduction:** Currently, 22% of children worldwide are stunted, and more than half live in Asia. Stunting in East Java is still high in several areas, which should have been prevented, given the relatively good resources. **Aims:** The study analyzes the policy targets for reducing stunting children in East Java. **Methods:** The study examined 4,541 children. The study analyzed nutritional status, residence, maternal (age, marriage, education, employment, socioeconomic, prenatal class), and child characteristics (age, gender, and early breastfeeding initiation (EIBF)). **Results:** Children in urban regions were likelier than those in rural regions to experience stunting. Stunted children were more prevalent among mothers of all ages compared to those <20. Lower education correlated with a greater likelihood of having stunted children. Stunted children were 2.410 times more prevalent among married mothers than divorced/widowed mothers (95%CI 2.292-2.534). Stunted infants were 1.062 times more prevalent among unemployed mothers compared to employed mothers (95%CI 1.050-1.075). All socioeconomic levels have a higher probability than the wealthiest to experience stunting. Mothers with prenatal classes were 1.088 times more likely than those without to have stunted kids (95%CI 1.073-1.103). Children aged 12-23 had a greater likelihood of developing stunting than those younger than <12. Boys were 1.286 times more likely than girls to experience stunting (95%CI 1.272-1.300). Children with EIBF had a 1.081 times higher likelihood of experiencing stunting than those without (95%CI 1.069-1.093). **Conclusion:** The appropriate policy targets for reducing the stunting prevalence were mothers in urban areas, young age, married, poor educated, unemployed, and poor.

**Keywords:** health policy, stunting, growth disorders, nutritional status.

### INTRODUCTION

Stunting is a critical nutritional problem that is particularly prevalent in lower-middle-income nations across the globe. According to WHO data, it is known that 22% of children worldwide are stunted, and more than half live in Asia (UNICEF, WHO and World Bank, 2021). The occurrence of stunting is an increasingly prevalent issue that is primarily attributed to one thousand days of chronic malnutrition during the first thousand days of existence. Following the child's development and growth standard, the stunting criteria are calculated using the height-for-age index. A child is included in the stunting criteria if the z-score exceeds two deviations from normal below the median following WHO Child

Growth Guidelines (World Health Organization, 2015; 2019).

Stunting has become a prominent issue due to the heightened mortality and morbidity risks that have been linked to it. The morbidity risk is closely related to the problem of child brain development. Barriers to brain development will affect slower cognitive and physical growth, higher vulnerability to noncommunicable diseases, a greater chance of developing degenerative conditions, and metabolic disorders (Kusrini and Laksono, 2020). When stunted children reach their teenage years, they will have worse emotions and behaviors, show higher anxiety levels, experience depressive symptoms, and have lower self-confidence than teenagers who are not stunted. Stunting, therefore, exerts a sustained influence on the substandard caliber of human capital, thereby affecting

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the prospects and economic expansion of a nation (Alam *et al.*, 2020).

A number of variables, including socioeconomic status, sanitation and access to pure water, and the nutritional condition of mothers and children, contribute to stunting (Budiartha *et al.*, 2021; Wulandari, Laksono, Kusriani, *et al.*, 2022). Poor nutrition during pregnancy and early childhood, including insufficient protein, vitamins, and minerals, can cause stunting. Child factors include low birth weight, poor nutrition, frequent infections such as diarrhea, pneumonia, and malaria, and inadequate breastfeeding (Laksono *et al.*, 2021).

In addition, environmental and living conditions, such as exposure to air pollution and poor hygiene practices, may influence the improvement and development of a child (Mutasa *et al.*, 2022; Raj *et al.*, 2022). In order to mitigate the incidence of stunting and foster optimal growth as well as development among children, cultural and behavioral factors including food taboos, nutrition practices, and beliefs regarding child development and environmental conditions are crucial (Kusriani, Ipa and Laksono, 2019; Januarti and Hidayathillah, 2020).

The dichotomy between stunting and balanced nutrition continues to be evident in East Java. A prosperous region that encourages an entrepreneurial culture and demonstrates leadership in industrial and financial development with the highest achievement of local own-source revenue in Indonesia, it is still hard to read these figures (Nafiah and Wardhani, 2022). The 2021 Indonesian Nutrition Status Survey findings in East Java show that the average prevalence of stunting is 19.2%. Despite experiencing a significant downward trend compared to other provinces in Indonesia, the survey recorded that, from 26.86% in 2019, it declined to 25.64% in 2020 and then to 23.5% in 2021, finally succeeding in reducing poverty in 2022 stunting rate of 4.3 points. On the other hand, there are still 20 out of 38 regencies/cities with a

stunting prevalence above the average rate for the East Java region (The Ministry of Health of The Republic of Indonesia, 2023).

Despite the disparities in East Java Province, a review of the burden, trends, and prevalence reveals the same progress in reducing stunting rates in each region, even in very diverse contexts. Examples include improving the nutritional status of mothers and children, better dietary practices, literacy rates, women's empowerment, and household conditions, as well as the availability of health facilities and workers (Antika *et al.*, 2022; Ghaffar *et al.*, 2022; Hakimah *et al.*, 2022; Kurniasari, Susanti and Surya, 2022).

However, a number of scholarly investigations have established that child health and nutrition outcomes in East Java can be impacted by factors such as the extent of public service provision, the bargaining power of communities, the quality of governance, the strength of institutions tasked with implementing public policies, and the suitability of the macroeconomic environment (Laksono, Megatsari and Yoto, 2019; Yoto *et al.*, 2020; Andayani *et al.*, 2022; Yunifar, Kusbandrijo and Puspaningtyas, 2023). Careful convergence is needed when designing programs that have the potential to impact stunting causes to ensure program coverage is on target so that interventions or services can reach targets in a coordinated manner. In accordance with the narration of the context, the study's purpose was to identify suitable policy targets for reducing the stunting prevalence among children in East Java.

## **METHODS**

### **Research Design and Data Sources**

This research utilized information from the 2022 National Nutrition Status Survey of Indonesia. The cross-sectional study was conducted nationally by the Indonesia Ministry of Health.

With a population of babies and toddlers throughout Indonesia, the survey

collected a sample of 334,848 babies and toddlers. Data were collected by employing a two-stage stratified procedure of group random sampling in 486 regencies/cities in 33 provinces in Indonesia with a response rate of 91.4%.

This study population is limited to all children aged 0-23 months in the East Java Province. We used children as the unit of analysis, with mothers as respondents. A weighty sample of 4,541 children was examined.

### Dependent Variable

In this investigation, stunting is utilized as the dependent variable. Stunting, an indicator of nutritional status, is quantified by the child's height at a particular age or height-for-age. Z-score, or height deviation relative to the mean, is an indicator of height calculated using WHO growth criteria. We classify stunting into two types: standard and stunting. The upper limit of the height/age index for the nutritional status group is Stunting ( $<-2.0$  standard deviation) and Normal ( $\geq-2.0$  standard deviation) (Wulandari, Laksono, Kusriani, *et al.*, 2022).

### Independent Variable

We used ten independent factors: residence type, mother's age (in years), education, marital, maternal employment status, socioeconomic status, participation in the prenatal classes, children's age (in months), gender, and EIBF. Types of residence consist of urban and rural. The study refers to Indonesian statistics to categorize the residence type. Meanwhile, we divided the mother's age into  $<20$ , 20-24, 25-29, 30-34, 35-39, 40-44, and  $>44$ .

The maternal educational background consists of no school, primary, secondary, or higher education. This study divides marital status into divorced/widowed and married. Furthermore, employment status is divided into employed and unemployed.

This study uses the wealth quintile of household goods to assess socioeconomic status. These factors include the number and variety of objects a household owns when providing value to the family. In addition, the survey uses a variety of goods, such as televisions, vehicles or bicycles, and house features to measure socioeconomic status. The assessment considers the source of toilet facilities, drinking water, and building materials for the main floor. Principal component analysis is employed in this investigation to compute the scores. The national socioeconomic quintile is calculated using the family's score for every individual within the household. This quintile is divided into five categories, representing 20% of the population. The survey divides socioeconomic status into poorest, poor, middle, richer, and richest (Wulandari, Laksono, Prasetyo, *et al.*, 2022).

We divided the children's age into  $<12$  and 12-23. Then, the study splits the children's' gender into girls and boys. Furthermore, we define EIBF as breastfeeding the baby after the first hour of labor to ensure that the newborn receives colostrum (UNICEF and WHO, 2018). EIBF includes No and Yes.

### Data Analysis

We began by utilizing the Chi-Square test. Then, to ensure that there was no significant relationship between each of the independent variables, a collinearity test was conducted. In the concluding stage, a binary logistic regression test was implemented. For every examination, the IBM SPSS Statistics 26 application was utilized. Furthermore, we used ArcGIS 10.3 (ESRI Inc., Redlands, CA, USA) to create a map of the stunted distribution of children in the East Java region.

### Ethical Approval

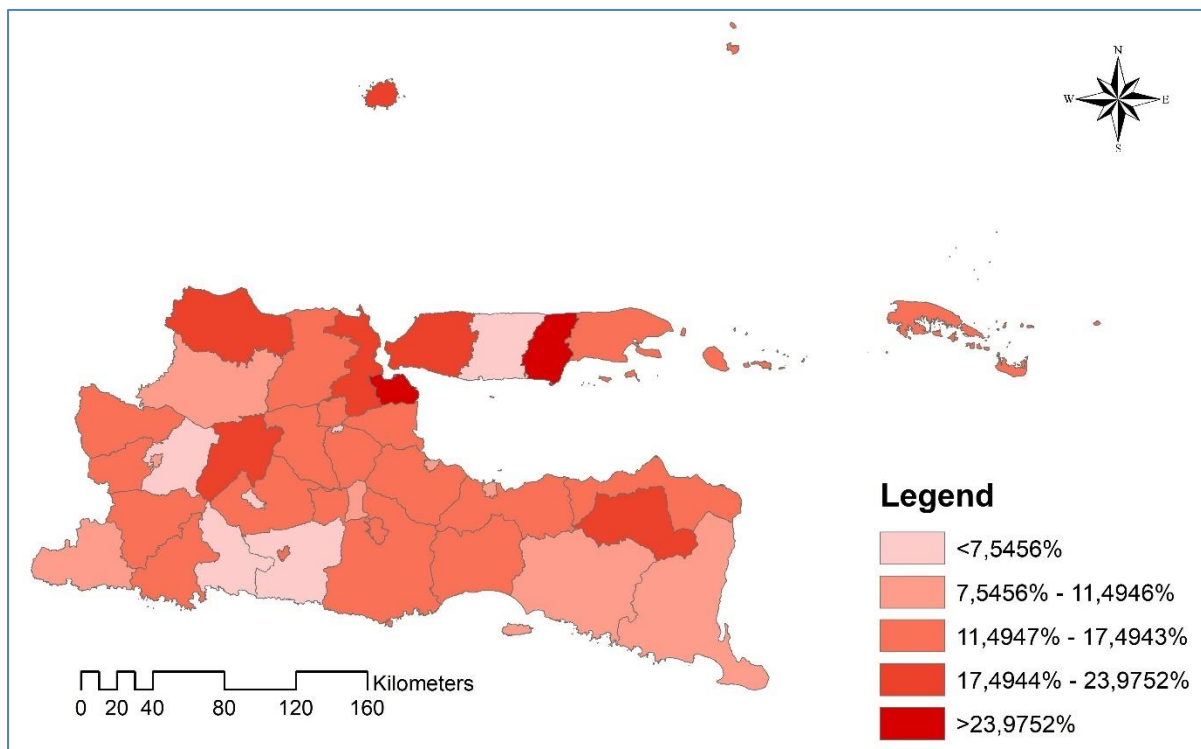
The national ethics committee approved the 2021 Indonesian National

Nutrition Status Survey's ethical license for 2021 with the number LB.02.01/2/KE.248/2021. Signed informed consent was obtained from every respondent in the survey.

## RESULTS

The study's results found that the ratio of under two stunting in East Java

was 15.5%. The lowest ratio of children stunting was found in Kediri City (2.5%), while the highest was in Pamekasan Regency (30.9%). Furthermore, Figure 1 provides a distribution map of children stunting by district/city in the East Java region. Spatially, several districts in the northern part of East Java have an average prevalence of under two stunting, which is higher than the southern part.



**Figure 1.** Distribution Map of Under Two Stunting Based on Regencies/Cities in East Java in 2021 (Source: Visualized by the author based on SSGI 2021 results)

Table 1 displays descriptive statistics on the nutritional status of under two in East Java in 2021. The findings revealed that the proportion of stunted children was marginally more significant in urban regions compared to rural areas. Regarding the maternal age group, the

oldest age (> 44 years) has the highest ratio of stunted kids. Furthermore, according to maternal education, the highest prevalence is for mothers who do not attend school.

**Table 1.** Descriptive Statistics on the Children's Nutritional Status in East Java Region, Indonesia (n=4,541)

Variables	Nutritional Condition		<i>p-value</i>
	Normal (n=3,887)	Stunting (n=654)	
Residence			<0.001
Urban	83.9%	16.1%	

Variables	Nutritional Condition		p-value
	Normal (n=3,887)	Stunting (n=654)	
Rural	85.2%	14.8%	
Maternal age (in years)			<0.001
<20	81.2%	18.8%	
20-24	81.6%	18.4%	
25-29	85.7%	14.3%	
30-34	85.9%	14.1%	
35-39	85.4%	14.6%	
40-44	83.4%	16.6%	
>44	78.9%	21.1%	
Maternal Education			<0.001
No education	79.5%	20.5%	
Primary	83.2%	16.8%	
Secondary	83.8%	16.2%	
Higher	92.7%	7.3%	
Maternal Marital Status			<0.001
Married	84.4%	15.6%	
Divorced/Widowed	90.3%	9.7%	
Maternal Employment Status			<0.001
Unemployed	83.7%	16.3%	
Employed	85.9%	14.1%	
Socioeconomic status			<0.001
Poorest	79.8%	20.2%	
Poorer	85.3%	14.7%	
Middle	84.8%	15.2%	
Richer	82.3%	17.7%	
Richest	88.6%	11.4%	
Prenatal Classes			<0.001
No	85.0%	15.0%	
Yes	82.3%	17.7%	
Children Age (in months)			<0.001
<12	92.9%	7.1%	
12-23	77.7%	22.3%	
Children Gender			<0.001
Boy	82.8%	17.2%	
Girl	86.4%	13.6%	
EIBF			<0.001
No	83.8%	16.2%	
Yes	85.1%	14.9%	

Based on the maternal marital status, Table 1 shows that mothers with married status have a much higher prevalence of under two stunting than divorced/widowed ones. Slightly more children of unemployed mothers are stunted than those of employed mothers. Based on socioeconomic status, the

highest ratio of under two stunting is in the poorest families. Furthermore, the majority of under two stunting mothers who took part in the class for pregnant women was slightly higher than those who did not take part.

Table 1 informs that the prevalence of under two stunting at 12-23 months is

three times more than at the age of less than 12 years. Meanwhile, most stunting under two males is higher than that of females. Furthermore, the prevalence of under two stunting without EIBF was higher than that of EIBF.

The outcomes of the collinearity test for children's nutritional status in East Java demonstrate that the relationship between each independent factor is not statistically significant. Simultaneously, the variance inflation factor result is greater than 0.10 for all variables and falls below 10.00 for all variables. Based on the results, we conclude that the regression model is devoid of multicollinearity symptoms.

Table 2 provides the binary logistic regression test outcomes for children's nutritional status in East Java in 2021. Children residing in urban regions are 1.277 times more prone to stunting than those under two in rural areas, as determined by their residential category (AOR 1.277; 95% CI 1.263- 1.292). Children with all maternal age groups have

a reduced likelihood of being afflicted with stunting compared to those whose mothers are < 20. In contrast, the results indicate that the likelihood of stunted children increases with the level of education attained by the mother.

Table 2 demonstrates that children whose mothers are married are 2.410 times more likely to be stunted than those whose divorced mothers (AOR 2.410; 95% CI 2.292-2.534). The incidence of stunted children born to unemployed moms is 1.062 times greater than that of children born to employed mothers (AOR 1.062; 95% CI 1.050-1.075).

Table 2 shows that children with all socioeconomic levels have a higher probability than those under two in the wealthiest families to experience stunting. Meanwhile, based on participation in the prenatal class, women who took prenatal classes are 1.088 times more likely than those who took classes to have under two stunting (AOR 1.088; 95% CI 1.073-1.103).

**Table 2.** The outcomes of Binary Logistic Regression (n=4,541)

Predictor	Stunting			
	<i>p-value</i>	AOR	95% Confidence Interval	
			Lower Bound	Upper Bound
Residence: Urban	*<0.001	1.277	1.263	1.292
Residence: Rural (ref.)	-	-	-	-
Maternal age: <20 (ref.)	-	-	-	-
Maternal Age: 20-24	*<0.001	0.922	0.893	0.953
Maternal Age: 25-29	*<0.001	0.713	0.690	0.736
Maternal Age: 30-34	*<0.001	0.648	0.627	0.670
Maternal Age: 35-39	*<0.001	0.656	0.634	0.678
Maternal Age: 40-44	*<0.001	0.766	0.738	0.795
Maternal age: >44	**0.026	0.943	0.896	0.993
Maternal Education: No education	*<0.001	2.759	2.627	2.898
Maternal Education: Primary	*<0.001	2.389	2.332	2.448
Maternal Education: Secondary	*<0.001	2.187	2.137	2.239
Maternal Education: Higher (ref.)	-	-	-	-
Maternal Marital: Married	*<0.001	2.410	2.292	2.534
Maternal Marital: Divorced/Widowed (ref.)	-	-	-	-

Predictor	Stunting			
	p-value	AOR	95% Confidence Interval	
			Lower Bound	Upper Bound
Employment: Unemployed	*<0.001	1.062	1.050	1.075
Employment: Employed (ref.)	-	-	-	-
Socioeconomic: Poorest	*<0.001	1.554	1.520	1.589
Socioeconomic: Poorer	*<0.001	1.147	1.124	1.170
Socioeconomic: Middle	*<0.001	1.138	1.117	1.160
Socioeconomic: Richer	*<0.001	1.478	1.452	1.505
Socioeconomic: Richest (ref.)	-	-	-	-
Prenatal Classes: No (ref.)	-	-	-	-
Prenatal Classes: Yes	*<0.001	1.088	1.073	1.103
Children Age: <12 (ref.)	-	-	-	-
Children Age: 12-23	*<0.001	3.867	3.819	3.916
Children Gender: Boy	*<0.001	1.286	1.272	1.300
Children Gender: Girl (ref.)	-	-	-	-
EIBF: No	*<0.001	1.081	1.069	1.093
EIBF: Yes (ref.)	-	-	-	-

AOR: Adjusted Odds Ratio; \*p < 0.001; \*\*p < 0.050.

Stunted children between the ages of 12 and 23 months had a 3.867-fold greater likelihood of being stunted than those under two months (AOR 3.867; 95% CI 3.819-3.916). Stunted children are 1.286 times more likely to be males than girls, according to the gender of the child (AOR 1.286; 95% CI 1.272-1.300). Moreover, children with a documented history of EIBF had a 1.081-fold increased probability of developing stunting compared to children without such a history (AOR 1.081; 95% CI 1.069-1.093).

## DISCUSSION

The incidence of child malnutrition is significantly higher among children living in urban regions as opposed to their rural counterparts, according to the outcome. This finding is consistent with findings from spatial studies indicating that regional proximity influences the prevalence of stunting in relation to ethnic similarity or parental style similarity (Kusrini and Laksono, 2020; Laksono and Megatsari, 2020; Paramita *et al.*, 2022).

In contrast to offspring whose mothers are below 20, the likelihood of stunting in children is diminished across all maternal age categories. Concurrently, the analysis results indicate that the possibility that a child will suffer from stunting increases with the level of education attained by the mother. Globally, 12 million girls under 18 are married yearly, which impacts their educational attainment and can even jeopardize the future health of their families (Laksono, Wulandari, *et al.*, 2022; Tamir *et al.*, 2022; Kusumawardani *et al.*, 2023). According to research, new moms are susceptible to delivering infants that have low birth weights, and the babies are at risk of stunting in their future offspring (Lubna Naz, 2020; Rohmah *et al.*, 2022; Rohmah and Laksono, 2023). Stunted children were more likely to be born to low-education mothers (Tamir *et al.*, 2022; Ipa *et al.*, 2023). In addition, women with low incomes and little education may find it more challenging to obtain enough food to feed their children a balanced diet (Laksono and Kusrini, 2020; Laksono,

Sukoco, *et al.*, 2022; Supadmi *et al.*, 2024).

Regarding the marital status of mothers, the study showed that children with married mothers have a higher probability than those under two with divorced/widowed mothers. These results contradict other studies in Indonesia, which report a higher risk of child stunting from divorced or widowed mothers compared to married mothers (Laksono, Sukoco, *et al.*, 2022; Wulandari, Laksono, Kusri, *et al.*, 2022). This situation may be related to the wrong parenting style by the mother due to her limited understanding of infant nutrition (Kusri, Ipa and Laksono, 2019; Maghfiroh and Laksono, 2020; Pratita and Laksono, 2020).

On the contrary, the offspring of employed mothers had a lower risk of malnutrition than those without employed mothers. This condition aligns with previous research where stunting was higher in children with mothers who did not work than working mothers (Ahmed *et al.*, 2022).

The result indicated that children under two with all socioeconomic levels have a higher probability than under two in the wealthiest families to experience stunting. The results prove that poverty determines the under-two fall into stunting. These results align with previous research, which stated that socioeconomic decline (wealth index) tends to be a greater risk of stunting (Budiarto *et al.*, 2021; Ashar *et al.*, 2024). Furthermore, earlier studies in Bangladesh identified children from low-income households experiencing at least one form of malnutrition (stunting, underweight, or wasting) (Jones *et al.*, 2018).

Based on participation in the prenatal class, women who took prenatal classes had a higher likelihood than those who took classes to have under two stunting. This situation may be related to the content or material of the course for pregnant women, which is intended more

for preparing for childbirth (Harahap and Afianti, 2019). The government should start adding materials related to child nutrition in studies for pregnant women to prevent low nutritional status in children.

Based on the children's age, under two aged 12-23 months had a higher probability than under two aged less than 12 months to experience stunting. The study explains that stunting in under twos in East Java is more caused by wrong upbringing and intake patterns than by congenital factors from the mother (Apriluana and Fikawati, 2018). Serious attention needs to be paid to increasing mothers' knowledge about parenting and ways to intake food for their children. Meanwhile, based on the sex of the child, stunted boys are more prevalent than stunted girls. The condition aligns with previous research in Indonesia, which reported that girls are less likely to be stunted than boys (Ridwanah *et al.*, 2021; Suratri *et al.*, 2023; Wulandari and Laksono, 2023). In addition, a meta-analysis study on determining the sex of children under five to malnutrition was also reported to have a higher tendency for boys than girls (Thurstans *et al.*, 2020).

Furthermore, based on the history of EIBF, there was an increased probability of stunting among children with EIBF in comparison to children without EIBF. EIBF ensures that the infant is supplied with colostrum, thereby boosting the infant's resistance to infection. Babies who receive colostrum minimize the risk of infection. Conversely, infection is an essential factor in determining neonates' nutritional status and can affect the amount of food they eat and contribute to their poorer nutritional quality (Aryastami *et al.*, 2017).

### **Strengths and Limitations**

Strength of the study: using secondary data with an adequate sample size to achieve province-level representation in East Java. Conversely, due to the utilization of secondary data,



analysis can only be carried out on the variables available in the survey. The results of this study cannot include several other variables related to stunting in under-fives that have been found in previous studies, for example, maternal body mass index, antenatal care, maternal height, diarrhea, anemia, and availability of agricultural food production (Amaha and Woldeamanuel, 2021; Castro-Bedriñana, Chirinos-Peinado and De La Cruz-Calderón, 2021). On the other hand, this research uses quantitative methods, so it cannot explain the aspects of cultural surrounding problems related to nutritional status found in previous studies, for example, children's values, food taboos, parenting styles, and maternal dietary patterns (Kusrini, Ipa and Laksono, 2019; Pratita and Laksono, 2020).

## CONCLUSION

Based on the outcomes obtained, it can be inferred that the optimal policy objectives to decrease the ratio of stunting in East Java are as follows: mothers who are urban residents, are young, married, have little education, do not work, and are poor. Furthermore, it is imperative that the government promote increased focus on class material for pregnant women, especially regarding stunting prevention, parenting, and EIBF. Moreover, we need further qualitative studies to explore why this superficial phenomenon can occur.

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