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Birth order and intrahousehold allocation of food: Unequal allocation for unwanted children

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ABSTRACT
Background: Food allocation is a fundamental aspect within households, seemingly capable of being distributed evenly among household members, especially among siblings. However, several factors can lead to differences in food allocation among siblings. **Method:** Using data from IFLS 4 and 5, with food variety as a proxy for food allocation, this study examines two influential factors on food allocation: birth order and imperfect fertility control status. Additionally, this study attempts to elucidate the mechanism of the birth order effect using the aforementioned imperfect fertility control status. **FIndings:** The findings of this study reveal a negative effect of birth order on household food allocation. Moreover, children with undesired status or belonging to families with undesired status due to imperfect fertility control tend to have lower food variety. **Conclusion:** However, this study cannot causally explain the mechanism behind the negative effect of birth order through imperfect fertility control status. **Novelty/Originality of this article:** This study analyzes the effects of birth order and fertility control status on household food allocation, finding adverse effects of birth order and unwanted status on food variation. As a novelty, this study proposes the development of a family-based nutrition intervention program that considers intra-household dynamics, aiming to reduce the gap in food allocation between siblings and improve children's overall nutritional status.

KEYWORDS: food allocation; food variation; birth order; imperfect fertility control status; unwanted.

1. Introduction

Since the 21st century, population growth in Indonesia has exceeded what was projected by the government (Jones, 2010). This situation raises concerns about a population explosion as a demographic disaster in the future. However, these concerns have prompted the government to effectively enact policies related to population control (de Silva & Tenreyro, 2018). One implementation of these policies is the implementation of fertility regulation programs or birth control programs. Fertility regulation by creating families with an average of two children who live to adulthood is the best way to maintain a stable population size (Cleland, 2013). This is the approach the government has chosen since 1970 through family planning programs as an implementation of fertility regulation policies (Hidayat, 2015), which focus on reducing the Total Fertility Rate (TFR). However, the TFR in Indonesia has been experiencing stagnation or a slowdown in decline in recent

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years. According to Bongaarts (2005), one of the reasons is a change in preferences regarding the desired number of children. As a result, when discussing fertility regulation, the focus is not only on reducing the TFR but also on ensuring that there is no unmet need, one aspect of which is the total fertility rate reflecting the desired number of births.

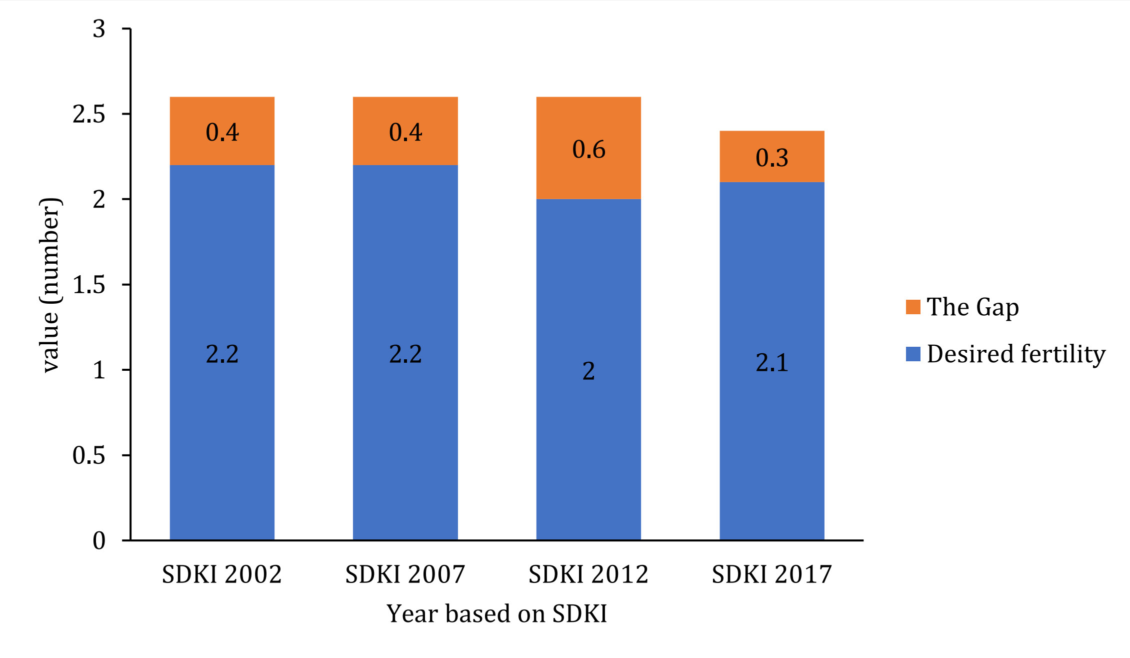

Figure 1: Trend Between Total Fertility Rate and Desired Fertility

Based on Figure 1, it is evident that although the TFR is stagnant at a low level, there is still a gap where some families have imperfect fertility control, leading to the emergence of unwanted children. Imperfect fertility control can also be observed through pregnancy and birth planning status. Parents who have perfect fertility control will plan their pregnancies and births, ensuring that all their children have the status of desired children. Conversely, if a family lacks perfect fertility control, it may result in unplanned or unwanted pregnancies and births, and desired births later or mistimed births (Figure 2).

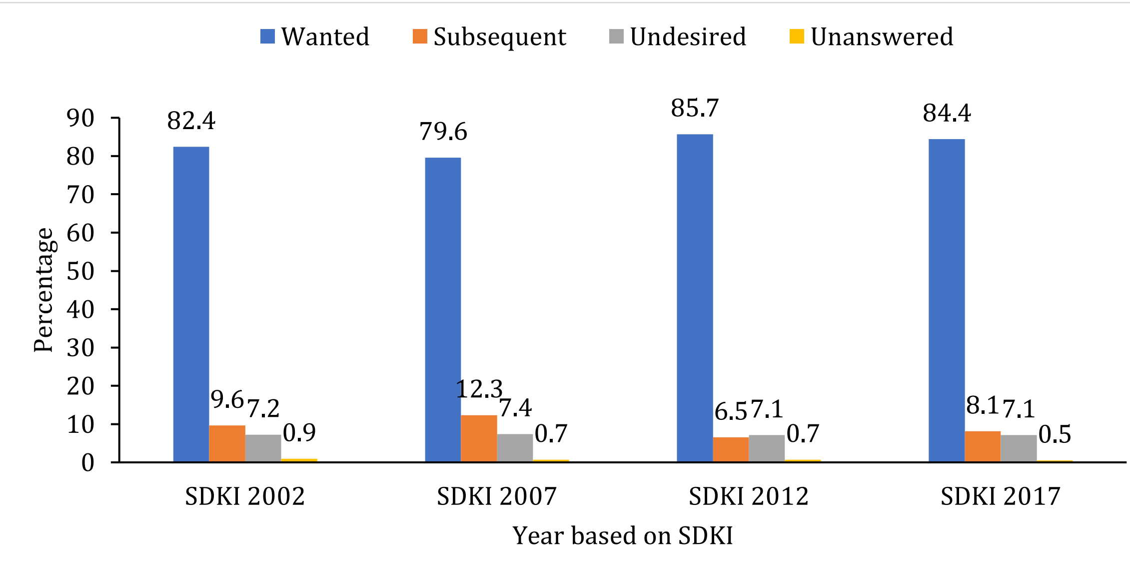

Figure 2 Child Birth Status Based on Birth Planning
Source: SDKI 2002, 2007, 2012, 2017

Lin & Pantano (2014), in their study, found that children with undesired status have a higher likelihood of experiencing negative outcomes throughout their lives, such as lower levels of education and future wages, as well as a greater likelihood of involvement in criminal activities compared to desired children. This condition suggests that undesired children could become a significant socio-economic issue in the future if their numbers are not controlled. Nevertheless, these impacts are only indirect. They occur because the presence of undesired children directly affects the household level, resulting in lost welfare (Deadweight Loss) and additional costs to cover the lost welfare (Easterlin, 1975), leading to differences in allocation among siblings.

Children with higher birth orders and unwanted status have a negative effect on birth order in a family attempting to equalize resource allocation for each child. Lin et al. (2019) provide an example of a family planning to have only two children, which would consistently distribute resources equally between the first two children. However, when a third child is born into the family and is unwanted, it disrupts the previously decided allocation plan, causing suboptimal outcomes. Parents may attempt to readjust by slightly reducing the allocation to the first two children and reallocating it to the third child. However, this may not achieve optimal allocation because of parents' reluctance to withdraw and reallocate resources among siblings (Lin et al., 2019). Consequently, parents who have committed to equalizing allocation or investment for a certain number of children will find it challenging to readjust when an unwanted child is born. This condition can also affect food allocation. Although food allocation is fundamental, Patel and Surkan (2016) state that some families may experience food insecurity for 9-24 months after the birth of an unwanted child. This issue results in the unwanted child, automatically being the eldest, receiving relatively lower food allocation compared to their older siblings (negative birth order effect). Therefore, using IFLS data, this study aims to demonstrate the influence of imperfect fertility control on differences in food allocation among siblings. Imperfect fertility control will be indicated by the presence of unwanted children based on the ideal number of children and pregnancy intentions or planning. Based on the overall background, this research aims to address a question, namely does fertility control influence food allocation?

1.1 Theoretical background

This study adopts several theories, including the intra-household allocation model, the fertility decision model, individual food diversity, and food allocation determinants. The intra-household allocation model implicitly represents an optimization model aimed at maximizing household utility. The early models of household utility optimization identify various mechanisms influencing household socio-economic choices and decision-making processes (Borga, 2016). These mechanisms are necessary because households face resource constraints. One decision households make to maximize satisfaction is to invest in children through the distribution or allocation of household resources, based on each child's endowment.

Behrman et al. (1982) developed the Separable Earnings Transfer (SET) Model, incorporating the impact of inequality aversion into the allocation of resources for each child. The SET model assumes that parental preferences can be separated, where preferences in income distribution are independent of transfer distribution, and preferences in transfer distribution are independent of income distribution (Behrman, 1997). The separation of preferences is based on the level of inequality aversion, allowing parents to make neutral, compensatory, or reinforcing investments for each child, depending on the need. For example, if the return on investment is higher for a child with a higher endowment, parents may make investments or transfers that are reinforcing or compensatory.

The household allocation model indeed focuses more on child endowment, but efforts have been made to develop a new model that integrates household allocation with fertility models (Behrman, 1997). This effort is primarily aimed at analyzing the relationship between household allocation and birth order. This is because birth order is the realization of parental fertility decisions, which are part of the fertility model (Ejrnaes et al., 2004). In several periods, the model developed by Becker and Lewis (1973) became the standard formulation in microeconomic fertility theory, where the demand for children was the primary factor influencing parental fertility behaviour. However, in subsequent periods, Becker's framework was further developed by Easterlin (1975) to explain fertility behaviour with more complex mechanisms. In this model, Easterlin introduced a new component, Surviving Children, defined as desired children, to demonstrate parental fertility behaviour and decision-making.

Furthermore, individual food diversity refers to the number of food groups consumed by an individual over a certain period (Swindale & Billinsky, 2006). Food diversity is a crucial indicator in assessing food quality, particularly in terms of individual nutritional intake. The greater the diversity of food groups consumed, the better the individual's nutritional intake. It is also expected that each food group complements the others in meeting nutritional needs. Conversely, low food diversity indicates poor nutritional intake, which can affect an individual's nutritional status. Insufficient nutrient intake can lead to decreased body weight, growth failure, weakened immunity, and tissue damage (Tomkins & Watson, 1989). Therefore, guidelines are needed regarding the food groups that individuals should consume to meet their nutritional needs. One such guideline is the Dietary Diversity Score (DDS).

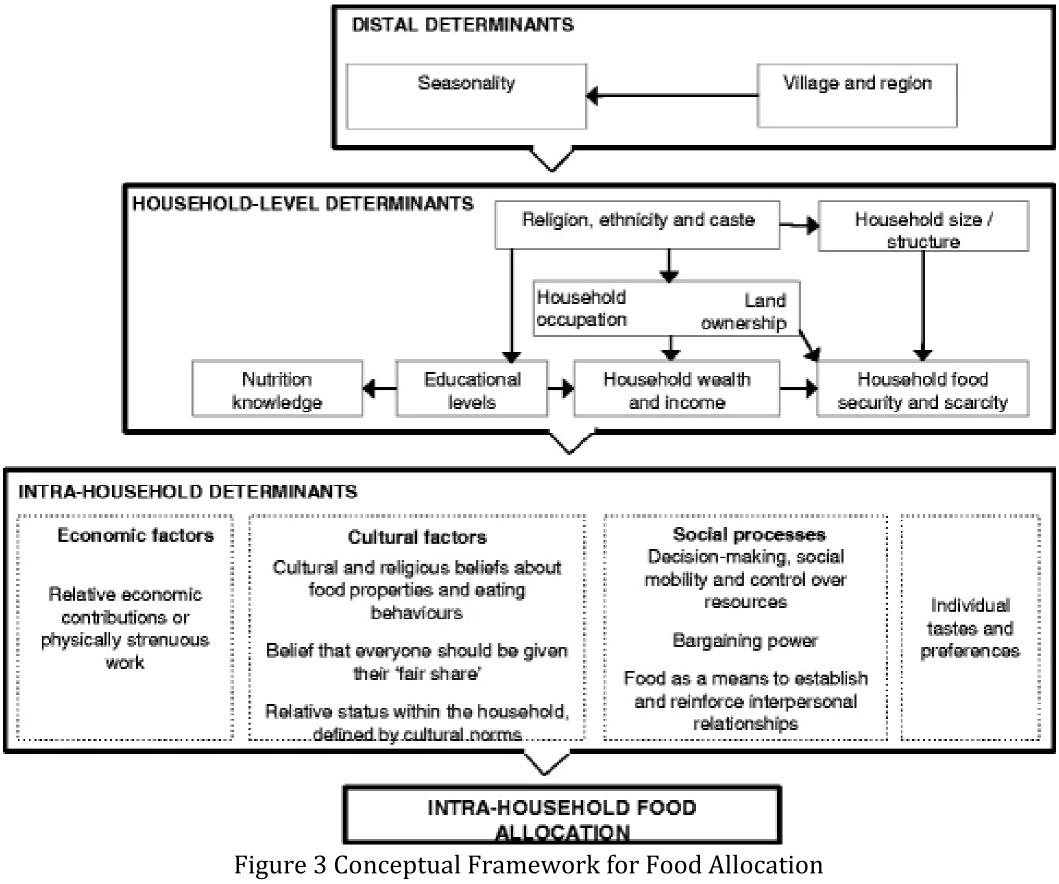

Figure 3 Conceptual Framework for Food Allocation
(Harris-Fry et al., 2017)

The Dietary Diversity Score is a measure of the simple count of food groups consumed over the past 24 hours (FAO, 2010), or it can also be measured by the frequency of consuming specific food groups or types within a reference period ranging from 1 to 15 weeks (Ruel, 2003). The respondents' levels observed are at the household level (HDDS) and individual level (IDHS). The Household Dietary Diversity Score (HDDS) is intended to reflect, in snapshot form, the household's economic ability to access various foods, while the

Individual Dietary Diversity Score (IDHS) aims to reflect the nutritional adequacy of each individual (FAO, 2010).

The food constraints within a household lead to almost daily decisions on how to allocate or distribute food evenly among household members. Harris-Fry et al. (2017) developed a conceptual framework on food allocation based on various quantitative and qualitative research findings on food allocation and nutritional intake in South Asia households. In this conceptual framework, the factors influencing decision-making in food allocation are broadly divided into three levels: intrahousehold, household, and distal. This can be observed in Figure 3.

3. Methodology

This study utilizes secondary data from the Indonesian Family Life Survey (IFLS), also known as SAKERTI (Survei Aspects of Household Life). IFLS is a panel household survey conducted in five waves: initially in 1993, followed by subsequent waves in 1997/1998, 2000, 2007, and the latest in 2014. The selection of IFLS data for this study is due to its provision of longitudinal data on pregnancy intentions and childbearing status. Additionally, the richness of available information in IFLS facilitates the exploration of various relevant aspects related to the study's topic.

In demonstrating the influence of birth order effects and fertility regulation on children's food variation, this study collected various necessary information from IFLS 3 (2000) to IFLS 5 (2014). The sample used in this study was constrained by three main factors: (1) children aged 6-14 years, (2) women aged 15-49 years who were married or ever married in IFLS 3, still tracked until IFLS 5, and had children aged 6-14 years in IFLS 4 and 5, and (3) women at point B who responded in book 5 in IFLS.

The analysis method used is descriptive to explain the general overview of the variables used. Analysis will be conducted both univariately and bivariately, where univariate analysis will use tabulation or statistical description related to sample characteristics for each dependent and independent variable, presented in the form of means, standard deviations, and percentages. Meanwhile, the bivariate analysis will use cross-tabulation to determine the relationship or correlation between the independent and dependent variables selected. This study also employs an econometric model used by Calimeris & Peters (2017) to examine the effect of birth order on food allocation. Using the mother-fixed effect model, Calimeris & Peters (2017) constructed the Food Allocation Index function, consisting of absolute birth order as the variable of interest and main control variables such as age groups. Hence, the basic model equation will be as follows in Equation 1. In analyzing child outcomes, the following variables are considered FA (food allocation), BO (birth order), Age (age group), and X (control variables related to child, mother, and household characteristics). The notation η represents the mother's fixed effect, while i denotes the individual child, m indicates the mother, and t signifies the year of observation.

$$FA_{imt} = \alpha + \beta_1 BO_i + \beta_2 age_{it} + \beta_3 BO_i * age_{it} + \delta X_{it} + \eta_m + \mu_{imt} \quad \text{(Eq. 1)}$$

However, in this study, age group is not the main control variable as in the model above. The age group will be included in the usual control variables related to child characteristics, thus there are changes or modifications in the model specification used. This study also modifies or changes the method used. With unbalanced panel data at the individual level, the method used is Pooled OLS with the following specifications. Furthermore, this study adds the main independent variable of fertility regulation, namely the unwanted status, which represents whether a child is unwanted within the family. The addition of this fertility regulation variable aims to eliminate bias or explain the birth order effect within the model. Due to the reasons mentioned above, in this study, the fertility regulation variable will be interacted with the birth order variable (Equation 2).

$$FA_{imt} = \alpha + \beta_1 BO_i + \beta_2 Unwanted_{it} + \beta_3 BO_i * Unwanted_{it} + \delta X_{imt} + \mu_{imt} \quad \text{(Eq. 2)}$$

In the model of the Pooled OLS method above, there are control variables such as child, mother, and household characteristics used to minimize bias, both time-variant and time-invariant. Although some observed characteristics of mothers and households can be controlled, there is always a possibility that there are additional unobserved characteristics that may confound the main independent variables, especially birth order variables. Moreover, this study assumes that mothers play a significant role in food allocation to children. Therefore, to address this issue, this study specifies the model using the mother's fixed effect method with the following specifications (Equation 3).

$$FA_{imt} = \alpha + \beta_1 BO_i + \beta_2 Unwanted_{it} + \beta_3 BO_i * Unwanted_{it} + \delta X_{it} + \eta_m + \mu_{it} \quad \text{(Eq. 3)}$$

4. Results and Discussion

4.1 Food variations according to unwanted child status

In this study, the status of unwanted children is divided into two categories. First, the unwanted child status is defined as a child being non-ideal. A non-ideal child is one whose birth order exceeds the ideal number of children according to the mother's preference. The ideal number of children in this study changes as the number of non-ideal families changes. Figure 4 illustrates the changes in family status based on the ideal number of children from 2007 to 2014. In 2007, 14% of families with ideal status (having the ideal number of children according to the mother) transitioned to non-ideal status by 2014 due to the birth of a child between 2007 and 2014. Meanwhile, there were 0.03% of non-ideal families in 2007 that transitioned to ideal status by 2014 due to the death of one child within the family between 2007 and 2014. These transitions resulted in changes in the number of ideal and non-ideal families from 2007 to 2014. Among the 548 families in this study, the percentage of ideal families decreased from 64.29% to 56.96%, while the percentage of non-ideal families increased from 35.08% to 43.04%, causing the number of children with non-ideal status to increase in 2014.

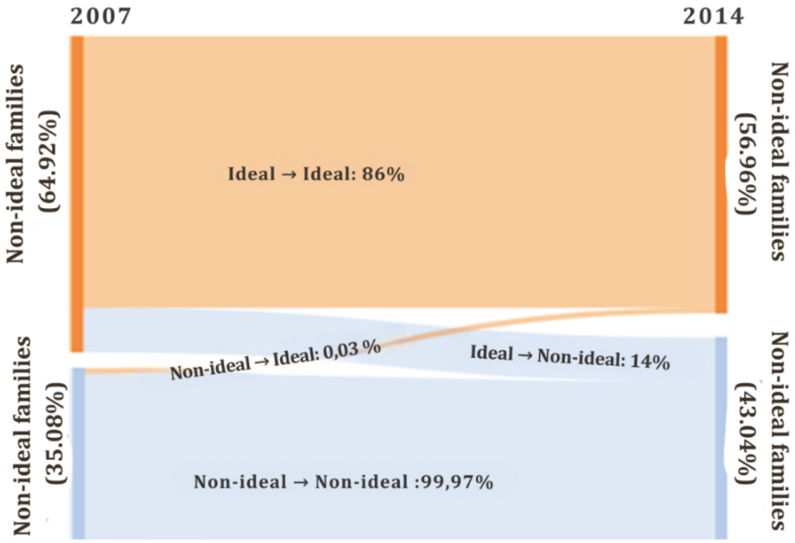

Figure 4 Ideal and Non-Ideal Family Status Transitions

The desired child status is also defined as an unplanned child. A child is categorized as unplanned if their birth was not planned in the previous wave of IFLS. Similar to unwanted children, the number of unplanned children changes due to changes in the number of unplanned families or families with unplanned children. Figure 5 shows that

19% of planned families in 2007 transitioned to unplanned status by 2014 due to the birth of previously unplanned children. However, there were no unplanned families in 2007 that transitioned to planned status by 2014. Consequently, the percentage of planned families decreased from 60.49% to 49.91%, while the percentage of unplanned families increased from 39.06% to 50.09%. This condition resulted in an increase in the number of children with undesired status in this study from 2007 to 2014.

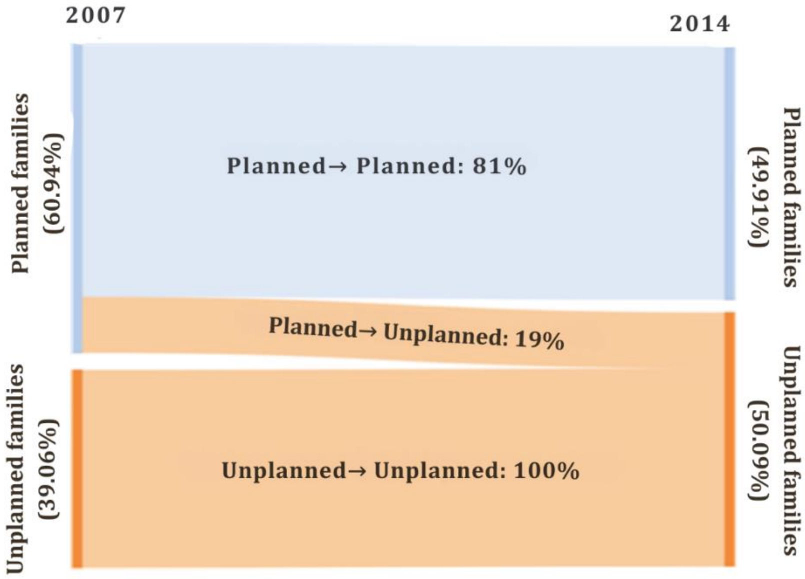

Figure 5 Transition Status of Planned and Unplanned Families

Not only transitions occur, but the unwanted family status based on the ideal number of children and pregnancy intention or planning are interrelated, such as families with unwanted status also potentially being classified as unplanned families, and vice versa. This happens because the ideal number of children can serve as a reference for a family to plan future pregnancies, considering whether the current number of children is below or already exceeds the ideal number.

The birth of an unwanted child within a family incurs additional costs and leads to suboptimal household allocations, resulting in differences in allocation between wanted and unwanted children (Easterlin, 1975). This illustrates the relationship between average food variation and child birth status. It shows that both unwanted children with non-ideal status and unplanned children have lower average food variation compared to wanted children with ideal status or planned children. This condition is consistent with the research conducted by Lin et al. (2019), which states that there are differences in received allocations between wanted and unwanted children.

4.2 The influence of unwanted family children (unideal and unplanned) on food variations

In this subsection, there are five models used, both with OLS and Mother's Fixed Effect methods. Model 1 and 2 are employed to evaluate the impact of being born into an unwanted family on the diversity of food. Model 1 excludes controls, while model 2 includes all relevant controls. Model 3 assesses the birth order effect before considering the unwanted family status. Meanwhile, model 4 and 5 do not focus on the effect of the unwanted family status like the previous two models, but rather on accounting for the differences in this status in estimating the birth order effect. In this study, the unwanted family status is divided into two categories: the non-ideal family, which comprises families with more children than desired by the mother, and the unplanned family, defined as families with unplanned births.

Table 1 Regression Results for the Influence of Children on Non-Ideal Families based on IFLS 4 & 5

Independent	Pooled OLS					FE				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Birth order			-0.123	-0.103				-0.422	-0.393	-0.43
			(0.027)	(0.027)				(0.045)	(0.047)	(0.062)
Children from non-ideal families	-0.162 (0.066)	-0.281 (0.069)		-0.229 (0.070)	0.413 (0.168)	-0.782 (0.182)	-0.783 (0.178)		-0.311 (0.186)	-0.494 (0.265)
Birth order #Non-ideal families					0.062 (0.049)					0.072 (0.077)
Constant	1.967	-2.546	-2.447	-2.581	-2.497	2.235	-1.240	0.040	-0.183	-0.052
	(0.042)	(0.655)	(0.660)	(0.644)	(0.666)	(0.084)	(1.088)	(1.035)	(1.306)	(1.044)
Control characteristics										
Individu	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Mother	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Household	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
N	1507	1507	1507	1507	1507	1507	1507	1507	1507	1507
R-sq	0.004	0.109	0.110	0.116	0.117	0.493	0.567	0.592	0.594	0.594
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 1 presents the processing results concerning children from unwanted families as children in non-ideal families. Based on models 1 and 2, it is shown that children from non-ideal families have lower food diversity than children from ideal families. This condition persists in models 4 and 5, where including birth order, children from non-ideal families still have lower food diversity than children from ideal families. The processing results in model 3 indicate a negative birth order effect on children's food diversity. However, by adding the variable of children from non-ideal families (model 4), there is a decrease in the coefficient of the birth order effect from 0.123 to 0.103 using OLS and from 0.422 to 0.393 using Mother's Fixed Effect. Then, in model 5, the interaction variable between birth order and children from unwanted families shows nonsignificant results in influencing food diversity. This means there is no significant difference between the birth order effect on children in ideal and non-ideal families.

Table 2 Regression Results on the Influence of Unplanned Family Children based on IFLS 4 & 5

Independent	Pooled OLS					FE				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Birth order			-0.123	-0.108				-0.422	-0.401	-0.382
			(0.027)	(0.029)				(0.045)	(0.049)	(0.058)
Children from planned families	-0.167 (0.065)	-0.193 (0.065)		-0.115 (0.070)	-0.097 (0.052)	-0.764 (0.156)	-0.684 (0.167)		-0.206 (0.173)	-0.088 (0.078)
Birth order #Planned families					-0.006 (0.052)					-0.044 (0.078)
Constant	1.974	-2.417	-2.447	-2.468	-2.477	2.250	-0.537	0.040	0.082	0.031
	(0.044)	(0.663)	(0.660)	(0.662)	(0.672)	(0.079)	(1.100)	(1.035)	(1.039)	(1.041)
Control characteristics										
Individu	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Mother	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Household	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
N	1507	1507	1507	1507	1507	1507	1507	1507	1507	1507
R-sq	0.004	0.104	0.110	0.111	0.112	0.494	0.566	0.592	0.593	0.593
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Next, Table 2 presents the processing results for children in unplanned families. In models 1 and 2, it is shown that there is a negative impact of the unplanned family status on children's food diversity. By including all controls (model 2), children from unplanned families will have lower food diversity compared to children from planned families. Unlike the ideal family status, models 4 and 5 do not show a significant influence from children in unplanned families when including the birth order variable in the model. Only in model 4 in the OLS method, there is a negative impact from children in unplanned families by 0.115 but with a 10% significance level. Although the variable of children in unplanned families does not significantly affect food diversity, the addition of this variable to model 4 shows a decrease in the coefficient of the birth order effect in both models 3 and 4, using both OLS and Mother's Fixed Effect methods. However, the interaction variable shows that the birth order effect on children in unplanned families also does not significantly affect children's food diversity.

4.3 The influence of unwanted child status (not ideal and unplanned) on food variations

In this section, there are 4 different models. Models 1 and 2 are used to observe the influence or impact of unwanted child status on children's food diversity without and with including control variables. Meanwhile, models 3 and 4 present the birth order effect before and after including the unwanted child status in influencing children's food diversity. Model 4 itself focuses more on considering the difference in the child's birth status as an unwanted child in the birth order estimation effect. Additionally, in this subsection, there are estimates of the birth order effect using only the desired child subsample. Similar to family status, unwanted child status is also divided into two categories: unwanted child status as an undesirable child and an unplanned child.

Table 3 Regression Results on the Effect of Non-Ideal Child Status

Independent	Pooled OLS				FE			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Birth order			-0.123	-0.088			-0.422	-0.408
			(0.027)	(0.029)			(0.045)	(0.052)
Children from Non-	-0.227	-0.319		-0.115	-0.508	-0.542		-0.068
ideal families	(0.074)	(0.074)		(0.070)	(0.113)	(0.114)		(0.129)
Constant	1.952	-2.529	-2.534	-2.468	2.020	-0.947	0.040	0.004
	(0.037)	(0.663)	(0.660)	(0.662)	(0.039)	(1.070)	(1.035)	(1.039)
Control characteristics								
Individu	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Mother	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Household	No	Yes	Yes	Yes	No	Yes	Yes	Yes
N	1507	1507	1507	1507	1507	1507	1507	1507
R-sq	0.006	0.109	0.110	0.114	0.494	0.568	0.592	0.592
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 3 presents the processing results for the status of an undesirable child. In models 1 and 2, there is a negative impact of the undesirable child status on food diversity. Children with undesirable child status have lower food diversity compared to those with ideal child status. Meanwhile, in model 4, the negative impact of the ideal child status is only significant on food diversity in the OLS method, which is -0.215, meaning that each increase in birth order causes a decrease of 0.215 in the food diversity of the child.

Similar results are also found in the processing for the unplanned child status. In Table 4, models 1 and 2 show a negative impact of the unplanned child status. Children with unplanned child status have lower food diversity than planned children. This impact is greater than the impact of the undesirable child status. Moreover, this impact remains greater and significant in influencing children's food diversity compared to the undesirable child status in model 4 when adding the birth order variable, both in OLS and mother's fixed effect methods. However, in model 4, there is a similar pattern or condition where the coefficients of the undesirable and unplanned child status are higher in the OLS method compared to the mother's fixed effect method. The mother's fixed effect method has bias in estimating the undesirable child status. This occurs because in this method, the birth or existence of an undesirable child will affect the desired child or there is a spill-over effect from the undesirable child to the desired child due to the mother's efforts to optimize resources to deal with the birth or existence of an undesirable child. As a result of this action, the difference in allocation that desired children will receive compared to undesired children tends to be smaller.

Table 4 Regression Results for the Effect of Unplanned Childhood Status

Independent	Pooled OLS				FE			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Birth order			-0.123	-0.071			-0.422	-0.362
			(0.027)	(0.029)			(0.045)	(0.049)
Children from	-0.355	-0.398		-0.326	-0.637	-0.644		-0.316
Unplanned families	(0.069)	(0.068)		(0.075)	(0.091)	(0.102)		(0.110)
Constant	2.002	-2.388	-2.447	-2.431	2.085	-0.525	0.040	0.064
	(0.039)	(0.657)	(0.660)	(0.659)	(0.039)	(1.077)	(1.035)	(1.034)
Control characteristics								
Individu	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Mother	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Household	No	Yes	Yes	Yes	No	Yes	Yes	Yes
N	1507	1507	1507	1507	1507	1507	1507	1507
R-sq	0.017	0.117	0.110	0.120	0.504	0.575	0.592	0.596
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

In models 3 and 4, which are used to examine the impact of the undesirable child status on the birth order effect, it is shown that including the undesirable child status variables, both undesirable and unplanned, can reduce the value or coefficient of the negative birth order effect in both methods. However, the undesirable child status does not strongly influence the birth order effect when estimating using only the desired child subsample (no interaction is performed as in previous models because there are no first-born children with undesirable status) whether ideal or planned children. Comparing the negative birth order effect values when using all samples or assuming them as desired children (ideal or planned), there is indeed a total decrease in the birth order effect values as described. However, this decrease in values cannot be interpreted causally because it results from differences in sample size. Similarly, the significance cannot causally explain that the undesirable child status can account for the negative birth order effect in food diversity allocation.

4.4 Discussion

Influences occur in the context of fertility arrangements related to intentions or pregnancy planning regarding food variation. Just as the ideal number of children, pregnancy planning also reflects the household's ability, or more precisely, readiness, to meet the needs of the child. This results in unplanned pregnancies often being incongruent with the economic readiness of the family, thus allowing unplanned status families to have suboptimal allocations compared to families with perfect pregnancy planning (Jones, 2020). This also applies in the context of food variation allocation. However, this economic readiness factor not only affects the long term (food variation allocation) but actually has a direct impact in the short term when the child is still in the womb until birth. Many studies indicate that unplanned children tend to receive lower prenatal and postpartum care compared to planned children (Joyce et al., 2000; Institute of Medicine (US) Committee on Unintended Pregnancy et al., 1995). The family's economic unpreparedness to provide prenatal and postpartum care will affect the child's health or nutrition status, which will later affect the child's eating patterns in the future. One of the affected health or nutritional statuses is the issue of Low Birth Weight (LBW), where children from unplanned pregnancies tend to have a higher risk of LBW (Institute of Medicine (US) Committee on Unintended Pregnancy et al., 1995). However, LBW issues not only occur due to the economic unpreparedness of the household but also due to delayed care, especially prenatal care (Sable & Wilkinson, 2000; Institute of Medicine (US) Committee on Unintended Pregnancy et al., 1995).

Mothers who do not plan their pregnancies often delay recognizing pregnancy symptoms, leading to delays in prenatal care in the early stages of pregnancy. Furthermore, the delay in providing prenatal care will be even greater if the mother considers this unplanned pregnancy to be truly unwanted by her compared to unplanned due to mistiming (Kost et al., 1994). In addition, unplanned pregnancies often occur in mothers who are either young or older, placing them at an age that is not ideal for childbirth, thereby increasing the risk of LBW births. Then, the mother's behavior towards unplanned pregnancies also affects the low level of postpartum care. Several studies state that children from unplanned pregnancies tend not to be breastfed or are more likely to be breastfed for shorter durations than children from planned pregnancies (Kost et al., 1998).

An inferential analysis reveals a reduction in the coefficient for the birth order effect when adding the variable of unwanted status. There is also a change in the significance of the birth order effect when using a subsample of only desired (planned) children. This condition indicates that there is indeed an impact of the difference between desired and unwanted status on the birth order effect, though it is very small and not clearly evident. These results contrast with those found by Lin et al. (2019), whose study was able to demonstrate that differences in status, particularly from the perspective of the child, can influence the birth order effect and explain the mechanisms behind the negative effects of birth order. Due to several reasons mentioned above, children from unplanned pregnancies tend to have a tendency towards low health or nutritional status from birth, which affects their future food consumption patterns, including causing a lack of food variation in these children. Inferential analysis indeed indicates that both unwanted family status and child status lead to a decrease in food variation allocation. However, the difference in desired or undesired status based on the ideal number of children or pregnancy planning cannot explain the mechanism of birth order effects.

5. Conclusion

Both descriptive and inferential analyses of this study indicate that birth order negatively affects food allocation. Children with a lower birth order have a more diverse range of foods compared to children with a higher birth order. This was initially suspected to be due to age bias within the birth order, where children with a lower birth order are older and typically have a higher and more varied food consumption compared to younger children. However, this study show that there is no age bias in the negative effects of birth order on food allocation.

Similar to birth order, the influence of imperfect fertility arrangements also occurs. Children with unwanted status and/or in families with imperfect fertility arrangements tend to have lower food variation. These results indicate that imperfect fertility arrangements not only cause allocation and outcome issues for children in the long term, but also in the short term, affecting the most fundamental allocation: food allocation. This condition suggests the importance for every household to conduct fertility arrangements perfectly by determining the desired or ideal number of children and planning pregnancy intentions according to the family's economic condition and readiness at that time. Although affecting food allocation, this study cannot explain the mechanism of the negative effect of birth order through imperfect fertility. This indicates that the differences in food allocation provided by parents are not based on the differing status of the children as wanted or unwanted.

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