

## **Analysis of determining factors for stunting events in Petang District, Badung Regency**

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### **ARTICLE HISTORY**

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### **ABSTRACT**

The objective of this research is to analyze both the simultaneous and partial effects of family income, the double burden of mothers, age at first marriage, and mother's education level on the incidence of stunting in Petang District, Badung Regency. Additionally, the study aims to examine the moderating role of the mother's education level on the influence of age at first marriage on the incidence of stunting in Petang District, Badung Regency. The research sample was determined using the Simple Random Sampling method with the RNG (Random Number Generator) application, comprising 60 respondents. Data collection methods included observation, structured interviews, and in-depth interviews. Data analysis was conducted using moderation regression analysis. The results of the analysis concluded that family income, the double burden of mothers, age at first marriage, and the mother's education level have a significant simultaneous effect on the incidence of stunting in Petang District. Family income, age at first marriage, and the mother's education level have a negative and significant effect on the incidence of stunting in Petang District. The double burden of mothers has a positive and significant effect on the incidence of stunting in Petang District. The mother's education level serves as a quasi-moderating variable that strengthens the influence of age at first marriage on the incidence of stunting in Petang District.

### **KEYWORDS**

Stunting; Family Income; Double Burden of Mothers; Age at First Marriage; Mother's Education Level

## **1. Introduction**

Toddlers are children aged 0-59 months. During this period, growth and development occur rapidly, requiring high-quality nutritional intake (Aris Amirullah, 2020). Malnutrition is a common issue among toddlers, one of which is stunting, as noted by Kania (Mugianti & Mulyadi, 2018). Stunting is a chronic malnutrition problem caused by prolonged insufficient nutrient intake, which impedes growth and development, resulting in a height that is significantly shorter than the standard for their age (Ministry of Health, 2018). A child is classified as stunted if their height-for-age measurement is less than -2 standard deviations (SD) and is considered severely stunted if it is less than -3 SD (Panhardyka, Amalia, & Herlina, 2022). To address stunting in Indonesia, the government has established a medium-term program called the National Strategy to Accelerate Stunting Prevention 2018-2024. This program aims to reduce the

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high stunting rates in Indonesia, prioritizing pregnant women, breastfeeding mothers, children aged 24-59 months, women of childbearing age, and adolescent girls (Yuda, Septina, Maharani, & Nurdiantami, 2022).

Bali Province is among the provinces with a relatively low national stunting rate in 2022. However, stunting prevalence varies significantly across its districts. Some districts still experience considerable stunting rates, necessitating serious attention. Table 1 presents the prevalence of stunting among toddlers in the districts/cities of Bali Province. The highest stunting prevalence is in Karangasem District, at 10.4 percent, followed by Bangli and Badung Districts at 6.3 percent and 6 percent, respectively, while Denpasar City has the lowest prevalence at 0.4 percent. Overall, the stunting rate among toddlers in Bali Province reached 4.5 percent in 2022.

**Table 1.** Prevalence of Stunting among Toddlers in Bali Province Districts/Cities in 2022

No.	District/City	Number of Toddlers	Short	Severely Short	Prevalence (%)
1	Jembrana	15,632	162	71	1.5
2	Tabanan	10,648	422	153	5.4
3	Badung	13,762	668	163	6.0
4	Gianyar	25,601	710	214	3.6
5	Klungkung	11,846	519	134	5.5
6	Bangli	12,714	637	162	6.3
7	Karangasem	18,041	1,510	375	10.4
8	Buleleng	27,997	819	183	3.6
9	Denpasar City	20,590	56	25	0.4
<b>TOTAL</b>	<b>156,831</b>	<b>5,503</b>	<b>1,480</b>	<b>4.5</b>	

Source: Directorate General of Regional Development - Ministry of Home Affairs, 2022 (processed data)

Also shows the distribution of stunted toddlers by sub-district in Badung District in 2022, where Petang Sub-district has the highest number of stunted toddlers, with 70 recorded cases, while Kuta Sub-district has the lowest, with only 3 cases.

**Table 2.** Number of Stunted Toddlers in Badung District in 2022

No.	Sub-district	Severely Short Toddlers	Short Toddlers	TOTAL
1	South Kuta	2	12	14
2	Kuta	0	3	3
3	North Kuta	0	16	16
4	Mengwi	17	37	54
5	Abiansemal	11	43	54
6	Petang	7	63	70

Source: Badung District Health Office, 2022 (processed data).

Nutritional status in children can be influenced by direct and indirect factors. Direct factors related to stunting include child characteristics such as gender, low birth weight, and food consumption (Zouine et al., 2024). Indirect factors include family characteristics such as family income, age at first marriage, the double burden of mothers, and parental education (Gladys & Sandra, 2018). Indirectly, family factors are the most common causes of stunting. Socioeconomic factors like low family income are strongly associated with stunting (Fahlevi et al., 2023). Toddlers in low-income households are at a higher risk of stunting compared to those in households with stable family income. The double burden of mothers is also a contributing factor. If child-rearing responsibilities are solely placed on mothers while fathers only provide for the family without participating in childcare, it limits the mother's ability to focus on child nutrition, as her duties extend to household and spousal care, disrupting proper nutritional provision (Illahi, 2017).

Another indicator of stunting is the age at first marriage. In Indonesia, early mar-

riage prevalence is quite high, leading to early pregnancies (Prasetyo et al., 2023). The age at which a mother first becomes pregnant significantly affects pregnancy, increasing the risk of complications, including chronic malnutrition or stunting (Larasati, Nindya, & Arief, 2018). The age at first marriage is closely related to the mother's education level, which significantly impacts the decision and attitude towards marriage. Lower education levels are associated with younger ages at first marriage. Women with higher education tend to prioritize education over early marriage (Prayogi & Sudibia, 2022).

This study aims to analyze the simultaneous effect of family income, the double burden of mothers, age at first marriage, and the mother's education level on the incidence of stunting in Petang District, Badung Regency. Additionally, it seeks to examine the partial effect of family income, the double burden of mothers, age at first marriage, and the mother's education level on the incidence of stunting in the same area. Furthermore, the study investigates the role of the mother's education level in moderating the influence of age at first marriage on the incidence of stunting in Petang District, Badung Regency.

## **2. Research Methodology**

This research employs a quantitative approach with an associative form (Jain et al., 2024). The study was conducted in Petang District, Badung Regency, due to its high stunting prevalence. The research focuses on stunting among toddlers as the dependent variable, with family income, the double burden of mothers, and age at first marriage as independent variables, and the mother's education level as the moderating variable. The population consists of families with stunted toddlers in Petang District, totaling 70 cases. The sample size was calculated using the Slovin formula, resulting in 60 stunted toddlers, selected using the RNG (Random Number Generator) application on an Android smartphone (Marhaeni & Yuliarmi, 2019). Data collection methods included observation, structured interviews, and in-depth interviews. Data analysis was conducted using Interaction Testing or Moderated Regression Analysis (MRA).

## **3. Results and Discussion**

### ***3.1. Distribution of Respondents Based on Family Income***

The family income obtained by respondents is the total income of both the husband and wife generated within one month. The study results reveal the distribution of family income among respondents in Petang District, as shown in Figure 1.

Figure 1 indicates the percentage of respondents based on the monthly family income, ranging between Rp3,000,000 - Rp4,000,000. The magnitude of the family income significantly influences the ability to meet the nutritional needs of toddlers and the family. The average family income of respondents with stunted toddlers in Petang District is Rp3,665,000. When compared to the Minimum Wage Level (UMK) of Badung Regency in 2024, which is Rp3,318,628.06, it is evident that the family income of families with stunted toddlers in Petang District is above the average UMK of Badung Regency.

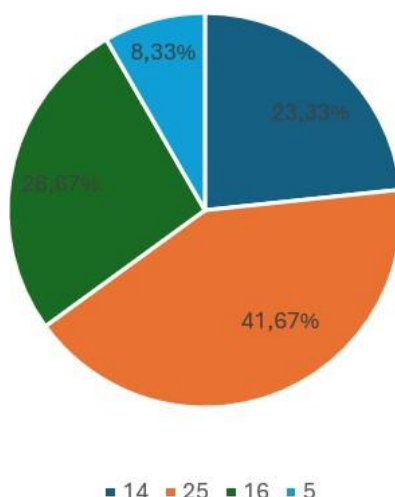


Figure 1. Percentage Distribution of Respondents According to Family Income

### 3.2. Distribution of Respondents Based on the Double Burden of Mothers

The double burden of mothers was analyzed using factor analysis to yield a single data point representing three statements. Table 3 explains respondents' perceptions of the double burden experienced by mothers, with most respondents agreeing with the statements (Ramadhani et al., 2022). This indicates that the perception of the double burden experienced by mothers remains very strong. This is reflected in the high percentage of agreement with the three statements, suggesting that the double burden faced by mothers in caring for children and working is still a significant issue in the community, especially in Petang District.

Table 3. Distribution of Respondents According to the Double Burden of Mothers

No	Question	STS	TS	CS	S	SS	Total
	Person (%)	Per-son (%)	Per-son (%)	Per-son (%)	Per-son (%)	Per-son (%)	
1	Mothers find it difficult to care for children while working	15 (25.0)	11 (18.3)	9 (15.0)	16 (26.7)	9 (15.0)	60 (100.0)
2	Mothers feel guilty because their children are not directly cared for while they work	12 (20.0)	13 (21.7)	16 (26.7)	15 (25.0)	4 (6.6)	60 (100.0)
3	There is no gender reconciliation (work division) in the household with the husband	13 (21.7)	12 (20.0)	11 (18.3)	14 (23.3)	10 (16.7)	60 (100.0)

Source: Primary Data Processed, 2024

### 3.3. Distribution of Respondents Based on Age at First Marriage

The distribution of respondents based on the age at first marriage in Petang District is classified into two categories: non-productive age (< 21 years) and productive age (20 – 29 years). The frequency distribution of the age at first marriage can be seen in Figure 2.

Figure 2 shows that the largest sample of respondents based on the age at first

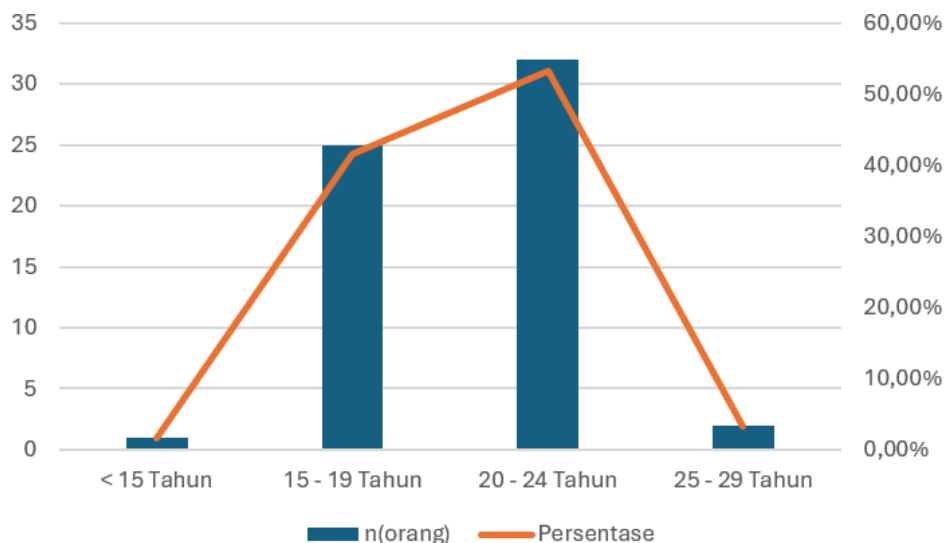


Figure 2. Percentage Distribution of Respondents According to Age at First Marriage

marriage is mothers who married for the first time between 20 - 24 years, accounting for more than 50 percent. According to the National Population and Family Planning Agency (BKKBN), the ideal age for women to marry is 21 years, indicating that a substantial portion of families with stunted toddlers married below the ideal age according to BKKBN standards.

### 3.4. Distribution of Respondents Based on Mother’s Education Level

In this study, education refers to the formal education completed by the mothers of toddlers, measured in years. The education level of mothers in Petang District is illustrated in Figure 3.

Figure 3 reveals that the most commonly completed education level among respondents is 10 - 12 years (equivalent to high school/ vocational school) with a percentage of 33.33 percent. The education level of mothers is calculated based on their successful years of schooling. According to the Ministry of Education and Culture (Kemendikbud) in Indonesia, the mandatory education program is 12 years. Therefore, it can be concluded that the education level of mothers meets the government’s 12-year compulsory education program.

### 3.5. Distribution of Respondents Based on the Duration of Stunting in Toddlers

Stunting can occur from the fetal stage and become apparent when the child is two years old, according to the Ministry of Health of the Republic of Indonesia (in Kinanti Rahmaditha, 2020). The distribution of the duration of stunting in toddlers in Petang District per month can be seen in Figure 4.

Figure 4 shows that the majority of toddlers in Petang District have been stunted for 6 - 11 months, accounting for 60 percent, while the least number of toddlers have been stunted for less than 6 months, with a percentage of 3.33 percent.

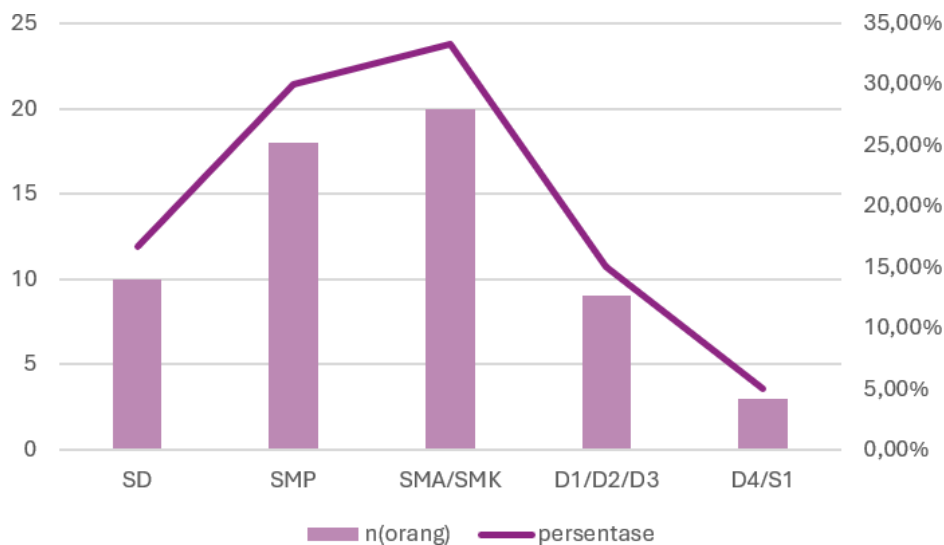


Figure 3. Percentage Distribution of Respondents According to Mother’s Education Level

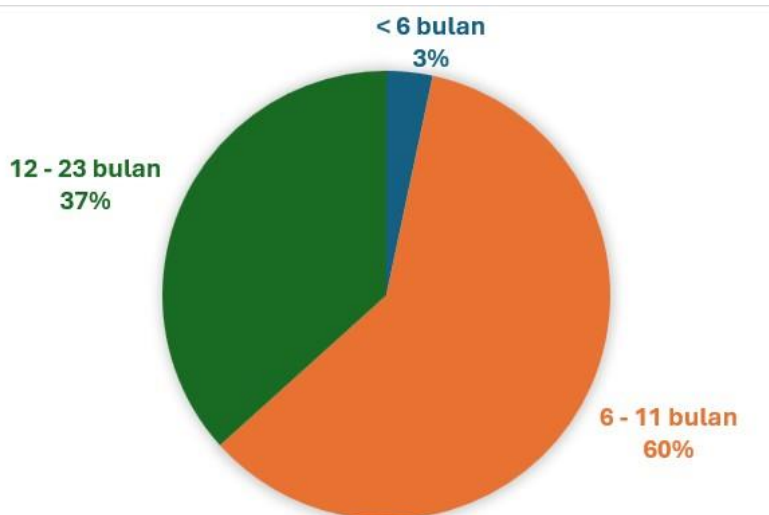


Figure 4. Percentage Distribution of Respondents According to the Duration of Stunting in Toddlers

### 3.6. Validity Test

Validity is the degree of accuracy between the actual data occurring in the research object and the data reported by the researcher. Valid data is "unbiased" data between what the researcher obtained and what actually happened in the research object. In the SPSS output, if the Pearson Correlation value is greater than 0.3, the instrument is considered valid and can be used in the study (Marhaeni & Yuliarmi, 2019).

Source: Primary Data Processed, 2024

**Table 4.** Validity Test Results

No	Double Burden of Mothers	Pearson Correlation	Conclusion
1	Mothers find it difficult to care for children while working	0.956	Valid
2	Mothers feel guilty because their children are not directly cared for while they work	0.956	Valid
3	There is no gender reconciliation (work division) in the household with the husband	0.962	Valid

### 3.7. Reliability Test

The reliability test determines the consistency of measurement results when repeated multiple times on the same symptom using the same measurement tool. If the Cronbach's Alpha value is greater than 0.6, the variable is considered reliable (Marhaeni & Yuliarmi, 2019).

**Table 5.** Reliability Test Results

No	Variable	Cronbach's Alpha	Conclusion
1	Double Burden of Mothers	0.953	Reliable

*Source: Primary Data Processed, 2024*

shows that the Cronbach's Alpha value for the Double Burden of Mothers variable is greater than 0.6, indicating that this variable is reliable.

### 3.8. Classical Assumption Test

#### 3.8.1. Normality Test

The normality test aims to determine whether the residuals of the regression model are normally distributed. A good regression model has normally distributed or nearly normally distributed residuals (Utama, 2016).

**Table 6.** Normality Test Results

Statistic	Unstandardized Residual
Test Statistic	0.067
Asymp. Sig. (2-tailed)	0.200

*Source: Primary Data Processed, 2024*

Based on Table 6, the Test Statistic value of the regression model is 0.067, with an Asymp. Sig (2-tailed) value of 0.200. This value is greater than  $\alpha = 5$  percent (0.05), indicating that the data are normally distributed or pass the normality test, and the regression model is suitable for further analysis.

#### 3.8.2. Multicollinearity Test

The multicollinearity test aims to determine whether there is a correlation among the independent variables in the regression model. A good regression model should not have multicollinearity, meaning there is no correlation among the independent variables (Utama, 2016).

*Source: Primary Data Processed, 2024*

Based on Table 7, it can be seen that none of the variables exhibit multicollinearity. Each variable has a tolerance value greater than 0.1 and a VIF value less than 10.

**Table 7.** Multicollinearity Test Results

Variable	Collinearity Statistics
	Tolerance
Family Income (X1)	0.834
Double Burden of Mothers (X2)	0.929
Age at First Marriage (X3)	0.769
Mother's Education Level (M)	0.802

### 3.8.3. Heteroscedasticity Test

The heteroscedasticity test aims to determine whether there is a variance inequality of residuals from one observation to another in the regression model. A good regression model should not have heteroscedasticity or should have homogeneous variances (Utama, 2016).

**Table 8.** Heteroscedasticity Test Results

Variable	Sig.
Family Income (X1)	0.448
Double Burden of Mothers (X2)	0.062
Age at First Marriage (X3)	0.114
Mother's Education Level (M)	0.487

Source: Primary Data Processed, 2024

resents the results of the heteroscedasticity test using the Glejser method by regressing the independent variables against the absolute residuals. Table 8 shows that the variables Family Income (X1), Double Burden of Mothers (X2), Age at First Marriage (X3), and Mother's Education Level (M) have significance values greater than the predetermined level of significance (0.05). This indicates no relationship between the independent variables and the absolute residuals, concluding that this study does not exhibit heteroscedasticity.

### 3.9. Simultaneous Influence of Family Income (X1), Double Burden of Mothers (X2), Age at First Marriage (X3), and Mother's Education Level (M) on Stunting Incidence in Petang District (F Test)

The F test is conducted to observe the collective influence of all independent variables on the dependent variable. The significance level used is 5 percent or 0.05. If the significance value  $F < 0.05$ , it implies that the independent variables collectively affect the dependent variable.

**Table 9.** F Test Results (Simultaneous)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	468.800	5	93.760	798.571	.000b
Residual	6.340	54	.117		
Total	475.140	59			

Source: Primary Data Processed, 2024

Based on Table 9, the F test results using SPSS software show that the F calculated value (798.571) is greater than the F table value (2.540) with a significance level of  $0.000 < 0.05$ . Thus,  $H_0$  is rejected, and  $H_1$  is accepted, indicating that Family Income (X1), Double Burden of Mothers (X2), Age at First Marriage (X3), and Mother's Education Level (M) collectively have a significant effect on the incidence of stunting



in Petang District.

### 3.10. Coefficient of Determination (R2 Test)

The coefficient of determination measures the goodness of fit of the regression equation, indicating the variation of the dependent variable explained by the independent variables (Utama, 2016).

**Table 10.** Coefficient of Determination (R2 Test) Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.993a	0.987	0.985	0.343

Source: Primary Data Processed, 2024

Table 10 shows that the R2 value from the moderation regression analysis is 0.987. This indicates that 98.7 percent of the stunting cases among toddlers in Petang District are influenced by Family Income (X1), Double Burden of Mothers (X2), Age at First Marriage (X3), and Mother’s Education Level (M), while the remaining 1.3 percent is influenced by other variables not included in the study.

### 3.11. Partial Influence of Family Income (X1), Double Burden of Mothers (X2), Age at First Marriage (X3), and Mother’s Education Level (M) on Stunting Incidence in Petang District (t Test)

The t-test is conducted to determine whether an individual independent variable (Xi) has a significant effect on the dependent variable (Y).

**Table 11.** t Test Results for Moderation Regression Analysis (MRA)

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	
(Constant)	24.421	1.404		17.391
X1	-0.429	0.060	-0.126	-7.209
X2	0.602	0.049	0.212	12.417
X3	-0.303	0.068	-0.279	-4.468
M	-0.339	0.155	-0.337	-2.186
X3M	-0.015	0.008	-0.378	-2.014

Based on Table 11, the following moderation regression equation is formed:

$$Y = 24.421 - 0.429X1 + 0.602X2 - 0.303X3 - 0.339M - 0.015X3M + \mu$$

Information:

- Y: Stunting Incidence
- X1: Family Income
- X2: Double Burden of Mothers
- X3: Age at First Marriage
- M: Mother’s Education Level
- X3M: Interaction between Age at First Marriage and Mother’s Education Level

Based on the partial regression coefficient test (t-test), the results from SPSS indicate that the Family Income variable has a t calculated value (-7.209) less than the t table value (-1.673), with a significance value of 0.000. Therefore, Ho is rejected, and H1 is accepted, indicating that Family Income has a negative and significant effect on stunting incidence in Petang District, Badung Regency. The negative coefficient of -0.429 with a significance of 0.000 supports this conclusion. This is corroborated by

Tayong Siti (2021), who states that family income is statistically related to stunting levels. Higher family income can meet family needs, particularly diverse food requirements, ensuring adequate food intake.

The Double Burden of Mothers variable has a t calculated value (12.417) greater than the t table value (-1.673), with a significance value of 0.000. Therefore,  $H_0$  is rejected, and  $H_1$  is accepted, indicating that the Double Burden of Mothers has a positive and significant effect on stunting incidence in Petang District. The positive coefficient of 0.602 with a significance of 0.000 supports this conclusion. This is supported by J Januarti and Hidayathillah (2020), who found that the role of fathers as family heads and breadwinners significantly influences stunting prevention. Shared childcare responsibilities between mothers and fathers significantly impact stunting prevention in toddlers.

The Age at First Marriage variable has a t calculated value (-4.468) less than the t table value (-1.673), with a significance value of 0.000. Therefore,  $H_0$  is rejected, and  $H_1$  is accepted, indicating that Age at First Marriage has a negative and significant effect on stunting incidence in Petang District. The negative coefficient of -0.303 with a significance of 0.000 supports this conclusion. This aligns with Larasati's (2018) research, which shows that the age at which mothers become pregnant influences stunting. Toddlers born to teenage mothers are 3.86 times more likely to experience stunting compared to those born to mothers who became pregnant at a normal age.

The Mother's Education Level variable has a t calculated value (-2.186) less than the t table value (-1.673), with a significance value of 0.033. Therefore,  $H_0$  is rejected, and  $H_1$  is accepted, indicating that Mother's Education Level has a negative and significant effect on stunting incidence in Petang District. The negative coefficient of -0.015 with a significance of 0.049 supports this conclusion, implying that higher maternal education levels result in lower stunting incidence.

### ***3.12. Role of Mother's Education Level (M) in Moderating the Effect of Age at First Marriage (X<sub>3</sub>) on Stunting Incidence in Petang District, Badung Regency***

The Mother's Education Level (M) variable moderates the relationship between Age at First Marriage (X<sub>3</sub>) and stunting incidence (Y) in Petang District. The significance value of the Mother's Education Level (M) variable is 0.033, and the significance value of the interaction between Age at First Marriage and Mother's Education Level (X<sub>3</sub>M) is 0.049. The interaction coefficient of Age at First Marriage with Mother's Education Level (X<sub>3</sub>M) is -0.015 and significant, while the coefficient of the Age at First Marriage (X<sub>3</sub>) variable is -0.303 and significant. Therefore, the Mother's Education Level (M) variable serves as a moderating variable that strengthens the effect of Age at First Marriage (X<sub>3</sub>) on stunting incidence (Y) in Petang District, Badung Regency.

## **4. Conclusion and Suggestions**

Family Income, Age at First Marriage, and Mother's Education Level have a negative and significant effect on stunting incidence in Petang District, Badung Regency. Conversely, the Double Burden of Mothers has a positive and significant effect on stunting incidence in Petang District, Badung Regency. Additionally, Mother's Education Level serves as a quasi-moderating variable that strengthens the effect of Age at First

Marriage on stunting incidence in Petang District, Badung Regency.

The government must pay attention to and provide opportunities for women to pursue the highest possible education by facilitating scholarship programs to eliminate discrimination in women's education. Furthermore, the government should socialize the PUP (Maturation of Marriage Age) program to increase the age at first marriage, thereby reducing stunting incidence. Finally, the role of the family is also crucial in preventing stunting among toddlers, particularly by supporting the mother's mental health through equal gender reconciliation (division of labor) within the household, so that childcare and work responsibilities are shared between the mother and the father.

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