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Research Paper

# Reaping The Whirlwind: The Impact of Parental Smoking Habits on Children's Education

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**Abstract**

While parental smoking is widely linked to negative health and developmental consequences for children, its long-term influence on educational outcomes has received relatively little attention. This study investigates how parents' smoking behaviors affect the number of years children spend in school, providing important evidence for policymaking in Indonesia to support human capital development. Using panel data from Waves 3 and 5 of the Indonesian Family Life Survey (IFLS) and a fixed-effects model, results show a persistent negative association between parental smoking and children's educational outcomes. Maternal smoking exhibits a similar direction and magnitude of effect as paternal smoking, but is not statistically significant, possibly due to compensatory parental attitudes toward education. These findings highlight the need for comprehensive policies, including higher tobacco taxes, stricter household smoking regulations, stronger enforcement of school attendance, and equitable access to educational infrastructure.

**Keywords**: parental smoking; children's education; IFLS; fixed effect; Indonesia.

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## 1. Introduction

Smoking has long been recognized for its harmful consequences. Its adverse effects on smokers' health are well-established, contributing to a wide array of serious conditions, including oral diseases, respiratory disorders, and life-threatening cancers (Harrandah et al., 2024; Dai et al., 2022b; Jain et al., 2021; Singh & Kathiresan, 2015; Chan et al., 2022). Globally, smoking remains a leading cause of mortality, with 1.18 billion regular smokers associated with approximately 7 million deaths in 2020 alone (Dai et al., 2022a). In addition, smoking creates negative externalities because secondhand smoke exposes non-smokers, particularly spouses and children, to harmful effects. For example, nonsmoking wives married to smokers face double the risk of ischemic heart disease, and children of smoking fathers are more likely to experience thinness and stunting (Kobayashi et al., 2022; Bella et al., 2023).

Beyond health outcomes, parental smoking can also adversely affect children's educational performance. Previous studies have found that parental smoking is associated with lower academic performance among younger students and increased school absenteeism (Srivastava and Trinh, 2021; Ellis-Suriani et al., 2021; Perelman et al., 2019). Maternal smoking in particular has been shown to have a stronger negative impact on children's school outcomes (Yamada et al., 2019; Ayano et al., 2021). Adolescents living with smoking parents are also more likely to adopt smoking habits themselves, which can further reduce school attendance and academic achievement (Legleye et al., 2023). These effects may stem from reduced parental care, prenatal and early-life exposure to harmful substances, or household behavioral patterns that impede cognitive and non-cognitive development.

These findings raise an important question: if parental smoking can adversely affect children's education in the short term, what are the long-term consequences? Currently, little is known about its persistent effects. In Indonesia, Faqih et al. (2022) attempted to fill this gap using data from the Indonesian Family Life Survey (IFLS) and applying the Propensity Score Matching (PSM) method. However, their analysis was mis-specified, as they used cigarette consumption as the dependent variable and children's years of schooling as the independent variable. Another study by Dartanto et al. (2021) found negative effects of living with a smoking household member, but only among younger members, as the analysis was based solely on cross-sectional data. Moreover, these studies have not distinguished between maternal and paternal smoking, leaving an important gap in understanding how different parental roles in smoking behavior affect children's long-term cognitive and non-cognitive outcomes.

This study addresses these gaps by using panel data from Waves 3 and 5 of the IFLS and applying a fixed-effects model to analyze the persistent effects of parental smoking on children's educational attainment. The analysis also distinguishes between maternal and paternal influences. In addition, the study contributes to SDG 4 on Quality Education by examining factors that influence educational attainment and long-term human capital development. The objectives are to (1) examine the impact of parental smoking habits on children's educational attainment and (2) analyze the differential effects of maternal versus paternal smoking on children's schooling outcomes. The results are expected to inform policy interventions to mitigate the adverse educational impacts of parental smoking in Indonesia.

## 2. Methods

This research draws on panel data from Waves 3 (2000) and 5 (2014) of the Indonesian Family Life Survey (IFLS), where a "wave" refers to a round of data collection involving the same households and individuals over time. IFLS Wave 3 was conducted through a partnership between RAND and the Center for Population and Policy Studies (CPPS) at Gadjah Mada University, with financial support from the National Institute on Aging (NIA) and the National Institute for Child Health and Human Development (NICHD). In contrast, IFLS Wave 5 was a collaborative initiative between RAND and Survey Meter, supported by funding from the NIA, NICHD, the Australian Department of Foreign Affairs and Trade (DFAT), as well as contributions from the World Bank, the Indonesian government, and GRM International.

Wave 3 took place from late June to October 2000, with extended tracking continuing until December 2000. This wave includes baseline data on parental smoking habits and children's years of schooling. Wave 5 was administered between September 2014 and March 2015, followed by tracking

activities from March to August 2015, and offers updated information on children's educational attainment.

Through the integration of data from Waves 3 and 5, this study explores how earlier parental smoking behavior influences children's educational outcomes in later years. Although the IFLS data may be considered somewhat outdated, it remains a vital source due to its status as the only longitudinal dataset offering comprehensive information on household and individual dynamics in Indonesia.

The analysis focuses on individuals who were between 21 and 32 years old during Wave 5, indicating they were between 7 and 18 years old during Wave 3. This age span captures a formative stage in life when parental smoking could have a substantial effect on educational development. Children aged seven during Wave 3 were likely in the early years of primary school, while those aged 18 were nearing the end of secondary school. By Wave 5, most would have completed their formal education, making them ideal subjects for assessing the long-term educational impacts of parental smoking.

To determine parental smoking status, this research uses responses to two IFLS questions: "Have you ever had a tobacco habit?" and "Do you still have the habit or have you totally quit?" Respondents who still smoke are categorized as smokers. This approach minimizes potential measurement error. Meanwhile, children's years of schooling are derived from the last degree or grade level they attended.

In the data cleaning process, this study goes beyond removing missing values and duplicate entries by also performing consistency checks. These checks include verifying the child's gender, birth records, and island of domicile. If any of these variables change across waves, the observation is excluded from the analysis. Inconsistencies between a child's age and reported years of schooling are also addressed. For example, since the minimum school enrollment age in Indonesia is seven, any child younger than seven who is reported to have more than zero years of schooling is excluded. In short, this filtering process ensures that each age corresponds to a plausible maximum number of years of schooling, thereby reducing potential respondent error.

Although IFLS maintains high re-contact rates, attrition bias remains a concern if individuals lost to follow-up differ systematically in both parental smoking status and educational outcomes. To mitigate this, the analysis is restricted to children observed in both Waves 3 and 5.

To estimate the effects of parental smoking on children's school attainment, this study employs a Fixed Effects (FE) model. This method is suitable for controlling unobserved, time-invariant individual characteristics. The model estimates both the direct and differential effects of parental smoking. The baseline estimation equation is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 S_{it} + a_i + V'\tau + \varepsilon_{it} \text{ ..... (1)}$$

Where $i$ indexes individuals and $t$ denotes the survey wave. The dependent variable is $Y_{it}$ Measures the number of years of schooling completed by the child, calculated based on the highest level of education and grade achieved. For instance, a child who completed or was in the third year of high school would be assigned 12 years of schooling. $S_{it}$ is a binary indicator that captures whether the child has a smoking parent—this includes cases where the father, mother, or both are smokers. Recognizing that parental smoking status is not exogenous, a set of control variables is included in the model, represented by the vector $V'\tau$ to account for observable confounders. Additionally, to control for all unobserved, time-invariant individual characteristics that may influence educational attainment, individual fixed effects ($a_i$) are incorporated into the model.

To explore potential differences in impact, this study also examines the role of parental gender in smoking behavior. Specifically, it tests the hypothesis that maternal smoking exerts a more detrimental effect on children's educational attainment than paternal smoking. To assess this, the original model specified in Equation (1) is adjusted to include a categorical variable, where $i.S_{it}$ captures the smoking status of the parents: a value of 1 indicates only the father smokes, 2 indicates only the mother smokes, 3 indicates both parents smoke, and 0 indicates that neither parent smokes. The revised model is presented as follows:

$$Y_{it} = \beta_0 + \beta_1 i.S_{it} + a_i + V'\tau + \varepsilon_{it} \text{ ..... (2)}$$

Moreover, Table 1 provides a description of the variables used in this research, along with their explanations.

**Table 1:** Description of Variables

| Name of Variables | Description |
|---|---|
| **Dependent Variable** | |
| Child's Years of Schooling | The educational attainment of the children (in years). |
| **Explanatory Variable** | |
| Parent Smoking Habit | Dummy for the smoking habit of the parent (1=one or both parents are smokers; 0=otherwise). |
| **Control Variable** | |
| Child's Age | The child's age (in years old). |
| Child's Age Squared | The square of the child's age. |
| Number of Sibling(s) | The count of brothers and sisters that the child has within the household. |
| Child's Relationship with the Head of the Household | Dummy for the current relationship of the child with the head of the household (1=biological child; 0=otherwise). |
| Father's Years of Schooling | The educational attainment of the child's father (in years). |
| Mother's Years of Schooling | The educational attainment of the child's mother (in years). |
| Mother as Household Head | Dummy for the position held by the mother within a household as the primary decision-maker and provider (1= mother as the household head; 0=otherwise). |
| Annual Household Expenditure Per Capita | The total amount of money spent by a household in a year on various goods and services, divided by number of household members (in natural logarithm). |
| Join the Social Assistance Program | Dummy for beneficiary status of the household (1=beneficiary; 0=otherwise). |
| Leverage Social Assistance Program | Dummy for leveraging the social assistance program, not necessarily as a beneficiary (1=leveraged; 0=otherwise). |
| Number of Cigar Smoked | The number of cigarettes smoked per day by the smoking parent(s). |

**Source:** Author

## 3. Results and Discussions

### 3.1 Results

Using the fixed effects method, the estimation results consistently show a negative relationship between parental smoking habits and children's years of schooling across all model specifications, as expected. Whether the model includes no controls, controls excluding cigar consumption (Model I), or controls including cigar consumption (Model II), the direction of the effect remains unchanged. This consistency reinforces the evidence that parental smoking negatively affects children's educational attainment, indicating that the effect is robust to various control variables.

**Table 2:** Fixed Effect Regression Estimates

| Independent Variables | Dependent Variable: Child's Years of Schooling | | |
|---|---|---|---|
| | Fixed Effect | | |
| | Baseline | Model I | Model II |
| **Parent Smoking Habit** | -0.2975 | -0.5778*** | -0.5827*** |
| | (0.1905) | (0.1415) | (0.1415) |
| Child's Age | | 1.3774*** | 1.3780*** |
| | | (0.9942) | (0.0992) |
| Child's Age Squared | | -0.0310*** | -0.0309*** |
| | | (0.0006) | (0.0006) |
| Number of Sibling(s) | | -0.3916*** | -0.3891*** |
| | | (0.1036) | (0.1039) |
| Child's relationship with Household Head | | 0.1753 | 0.1760 |
| | | (0.1319) | (0.1318) |
| Father's education year(s) | | 0.0627* | 0.0618* |
| | | (0.0332) | (0.0331) |
| Mother's education year(s) | | 0.1519*** | 0.1527*** |
| | | (0.0338) | (0.0338) |
| Mother as Household Head | | -0.8037** | -0.8111** |
| | | (0.3163) | (0.3173) |
| Ln Household Income per capita | | 0.3116*** | 0.3106*** |
| | | (0.0996) | (0.0995) |
| Join the social assistance program | | 0.2853*** | 0.2842*** |
| | | (0.0902) | (0.0902) |
| Leverage the social assistance program | | 0.1906 | 0.1902 |

| Independent Variables | Dependent Variable: Child's Years of Schooling | | |
|---|---|---|---|
| | Fixed Effect | | |
| | Baseline | Model I | Model II |
| | | (0.1330) | (0.1329) |
| Number of Cigar Smoked in a Day (total both parents) | | | 0.0079 |
| | | | (0.0064) |
| Year=2014 | 5.3260*** | 3.1622** | 3.1325** |
| | (0.0780) | (1.3590) | (1.3543) |
| Constant | 5.6803*** | -7.4480*** | -7.5355*** |
| | (0.1476) | (1.2986) | (1.2963) |
| No. Observations/Groups | 7611/4496 | 7294/4426 | 7294/4426 |
| R-squared Within | 0.6188 | 0.8109 | 0.8109 |
| R-squared Between | 0.2886 | 0.5257 | 0.5277 |
| R-squared Overall | 0.4013 | 0.6237 | 0.6251 |

**Source:** Author
**Note:** Robust standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2 presents the results of the fixed effects regression estimating the impact of parental smoking on children's years of schooling. In the baseline specification without controls, the coefficient for parental smoking is negative (-0.2975) but statistically insignificant, indicating a weak association. However, once control variables are added in Models I and II, the effect becomes both statistically significant and economically meaningful. Specifically, parental smoking is associated with a reduction of approximately 0.58 years in children's schooling, significant at the 1% level. This result is robust across both models.

Control variables reveal several important insights. Child's age has a positive and significant effect on years of schooling, while the squared term is negative and significant, suggesting a non-linear relationship where the educational benefit of age diminishes over time. The number of siblings is negatively associated with schooling. Parental education, especially the mother's, shows a strong and positive correlation with the child's educational attainment. One additional year of mother's education is associated with an increase of about 0.15 years in schooling. Notably, children from female-headed households tend to experience significantly fewer years of schooling.

Household income per capita (in log form) also has a positive and statistically significant effect on schooling outcomes, with a similar magnitude across models. Participation in social assistance programs also positively influences schooling outcomes, although the leverage of such programs does not show a significant effect. Interestingly, the inclusion of the number of cigars smoked per day by parents in Model II does not exhibit a significant relationship with children's education, suggesting that it is parental smoking status rather than intensity that drives the observed effect.

Table 3 presents the differential effects of parental smoking. Compared to children of non-smoking parents, paternal smoking is associated with a statistically significant reduction in children's years of schooling, while maternal smoking alone is not statistically significant. However, when both parents smoke, the negative effect is stronger, resulting in a reduction of over nine months in schooling compared to children of non-smoking parents.

**Table 3:** Model I Differential Effects

| Independent Variables | Dependent Variable: Child's Years of Schooling |
|---|---|
| **Parent Smoking Habit** | |
| Only Father smokes | -0.5758*** |
| | (0.1415) |
| Only Mother smokes | -0.5759 |
| | (1.0736) |
| Both smokers | -0.7714* |
| | (0.4664) |
| Child's Age | 1.3758*** |
| | (0.0997) |
| Child's Age Squared | -0.0310*** |
| | (0.0006) |
| Number of Sibling(s) | -0.3894*** |
| | (0.1036) |
| Child's relationship with Household Head | 0.1771 |
| | (0.1322) |
| Father's education year(s) | 0.0624* |

| Independent Variables | Dependent Variable: Child's Years of Schooling |
|---|---|
| | (0.0332) |
| Mother's education year(s) | 0.1509*** |
| | (0.0337) |
| Mother as Household Head | -0.8011** |
| | (0.3158) |
| Ln Household Income per capita | 0.3140*** |
| | (0.0996) |
| Join the social assistance program | 0.2866*** |
| | (0.0890) |
| Leverage the social assistance program | 0.1893 |
| | (0.1331) |
| Year=2014 | 3.1823** |
| | (1.3619) |
| Constant | -7.4352*** |
| | (1.3007) |
| No. Observations/Groups | 7294/4426 |
| R-squared Within | 0.8109 |
| R-squared Between | 0.5254 |
| R-squared Overall | 0.6235 |

Source: Author
Note: Robust standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

### 3.2 Discussions

The main finding supports the hypothesis that parental smoking habits are associated with lower educational attainment among their children. Additionally, it extends previous evidence by showing that the negative impact of smoking behaviors is not limited to younger children, as noted by Dartanto et al. (2021), but also affects adolescents. This result further suggests that the consequences of parental smoking extend beyond immediate cognitive effects observed in school-aged children (Ellis-Suriani et al., 2021; Yamada et al., 2019; Ayano et al., 2021), potentially leading to long-term educational disadvantages, including reduced access to formal education.

The estimated reduction of approximately 0.58 years of schooling is economically significant, particularly when compared to the baseline average of 8.21 years of schooling in Indonesia. This represents a 7.1 percent decline attributable to parental smoking behavior. Given that the return to education in Indonesia is around 5 percent (Dumauli, 2015), a loss of 0.58 years in schooling corresponds to an estimated 2.9 percent reduction in future earnings, highlighting the economic importance of this issue.

Smokers are known to have a shorter time horizon (Pope et al., 2019), a behavioral trait often observed among low-income individuals as well (Laajaj, 2017). This similarity may explain why both groups often undervalue the long-term benefits of education. Vadivel et al. (2023) show that children from low-income families tend to have poor school performance, which leads to lower educational attainment and an earlier entry into the labor force. Consequently, smoking behavior in such households can compound educational disadvantages for children.

Given this context, parental smoking may influence children's educational attainment through three channels. The first is a budget constraint channel. When parents smoke, a portion of household income is diverted to tobacco expenditures, thereby limiting the resources available for essential needs such as education. Even when household income remains unchanged, smoking parents face a trade-off between short-term consumption and long-term investment. Due to a preference for immediate gratification and a shorter time horizon, allocating funds to smoking may seem more rational than investing in education, whose returns are realized only in the future.

Second, smoke exposure plays a critical role. Early-life exposure to secondhand smoke has been associated with negative impacts on neurological development, contributing to cognitive impairments (Banderali et al., 2015; Holbrook, 2016; Rovio et al., 2020). Consequently, children from households with smokers often demonstrate lower academic performance, which can diminish their educational

aspirations and motivation, ultimately increasing their likelihood of disengaging from school (French et al., 2015; Srivastava & Trinh, 2021; Yamada et al., 2019; Guio et al., 2018).

Third, there is the concern of intergenerational transmission of smoking behavior. Children raised by smoking parents are more likely to initiate smoking during adolescence (Alves et al., 2017; Joung et al., 2016; Kandel et al., 2015). Once they begin smoking, they not only experience the harmful effects of secondhand smoke but also suffer from direct cognitive and motivational impairments caused by nicotine consumption (Hall et al., 2016). Early dependence on nicotine increases the likelihood of continued smoking into adulthood (Azagba et al., 2015; Kandel et al., 2015), thereby perpetuating a cycle that puts future generations at continued risk of lower educational attainment.

Furthermore, the number of siblings exerts a significantly negative influence on children's educational attainment. Each additional sibling is linked to a reduction of roughly 4.8 months in schooling. This result aligns with the quantity–quality trade-off theory proposed by Becker and Lewis (1973), which suggests that as family size increases, the resources available for each child diminish. More recent empirical studies by Lin (2018) and Xiong et al. (2020) further support this relationship.

Although the Indonesian government has provided tuition-free education for public elementary and junior high schools since 2005, the negative association between sibling number and educational attainment persists. This suggests that free tuition alone is insufficient to address educational disparities or promote broader human development fully. Other structural barriers, such as limited school accessibility and increased transportation costs due to distance, continue to play a role.

Notably, the impact of parental smoking on children's education is greater than that of sibling number. This suggests that smoking behavior imposes a more severe constraint on educational outcomes. In the absence of tobacco-related expenditures, households might have more financial capacity to invest in their children's education, potentially offsetting the adverse effects associated with having more siblings.

Table 2 and Table 3 also reveal that parents' education significantly positively impacts their children's educational attainment, with the number of years of maternal education having a stronger effect than that of paternal education. The greater influence of a mother's education on children's schooling is well-documented in the literature (Crede et al., 2015; Minello & Blossfeld, 2017; Mahadevan & Fan, 2021). Educated mothers are generally more engaged in their children's education, as they are better equipped to navigate and utilize educational opportunities. For instance, Cui et al. (2019) found that maternal education increases the likelihood of school enrollment for adolescent children.

Moreover, both tables also show that participation in social assistance programs significantly increases years of schooling. This result is expected, as the aim of social assistance is to enhance educational outcomes. However, this positive effect could be even greater if parents did not smoke, since the negative impact of parental smoking may limit the benefits of social assistance.

In Indonesia, households headed by women are more likely to experience poverty compared to those led by men (Pukuh & Widyasthika, 2018; Pujiwati et al., 2024). This feminization of poverty may explain why female-headed households tend to have lower educational outcomes for children. However, this contrasts with the findings of Asiedu et al. (2024), who observed that children in female-headed households in Africa tend to receive more educational benefits than those in male-headed households. This inconsistency may suggest that other factors are at play in determining educational outcomes in female-headed households.

This study focuses on intact families where both parents are present. In cases where the mother is the head of the household, she is typically the sole income earner, whereas in male-headed households, both parents or other relatives may contribute financially. This difference in household income dynamics may help explain why maternal headship is linked to a more substantial negative effect on education compared to parental smoking.

In the differential effect analysis, although previous studies suggest that maternal smoking may have a more detrimental impact on children's academic performance than paternal smoking (Yamada et al., 2019), this effect does not appear to extend to long-term educational outcomes. Table 3 indicates that, compared to children of non-smoking parents, maternal smoking does not have a statistically significant impact on children's years of schooling, despite a similar direction and magnitude of the effect as paternal

smoking. This may suggest that while maternal smoking negatively influences child development, leading to cognitive challenges and poorer school performance, a mother's positive attitudes toward education may still motivate her children to remain in school.

The effect of maternal education on children's schooling consistently outweighs that of paternal education, implying that mothers generally take a more supportive role in their children's education. Additionally, smoking women—particularly mothers—tend to exhibit distinct smoking behaviors compared to men. As noted by Gallego et al. (2021) and Awawda et al. (2022), women are more responsive to price increases, often reducing cigarette consumption when prices rise, unlike men. This behavioral difference may also apply when women are faced with the decision between smoking and investing in their children's education, leading them to reduce smoking to prioritize their children's schooling. This could help explain why maternal smoking alone does not significantly affect children's educational outcomes.

However, this interpretation should be considered with caution. The negative effect is more pronounced when both parents smoke, with children from such households experiencing a reduction of over nine months in their years of schooling compared to children of non-smoking parents. This suggests that the detrimental impact of maternal smoking may persist, especially when combined with paternal smoking.

Furthermore, the relatively small proportion of female smokers in Indonesia may influence the results. In this study, among 5,279 smoking parents, only 1.87 percent are mothers who smoke, and just 0.34 percent are mothers who smoke without the father also smoking. Although this low prevalence is well-documented, it varies by country (Bauer et al., 2007). Consequently, further research using data from different countries or alternative sources is necessary to more accurately assess the differential effects of parental smoking on children's educational attainment.

Overall, these findings have several broader implications. Theoretically, they support models linking parental behavior, household resources, and child human capital accumulation. Practically, they highlight the importance of integrating tobacco control measures with educational policies, particularly for low-income households. For future research, investigating intergenerational effects across different contexts, exploring mechanisms such as parental time allocation, and assessing policy interventions that mitigate the negative impact of smoking on children's education could further enrich our understanding.

## Conclusion

The results indicate a significant negative effect of parental smoking habits on children's years of schooling, as expected. However, the impact of maternal smoking shows a negative trend but remains statistically insignificant. This harmful effect could arise through several mechanisms: budget constraints due to cigarette expenses, smoke exposure that harms cognitive development, and the transmission of smoking behaviors across generations, leading to sustained educational disadvantages.

Based on these findings, several policy recommendations can be made. First, the government should consider increasing tobacco taxes to decrease consumption. Raising the price of tobacco would likely encourage parents to reduce smoking, allowing them to reallocate those resources towards their children's education. Additionally, the revenue generated from these taxes could be used to enhance the quality of educational facilities.

However, raising tobacco prices may have unintended consequences. Due to nicotine dependence, some parents may irrationally prioritize smoking over their children's education. To address this, the government could implement smoking cessation campaigns that provide free consultations through phone or mobile applications. Such programs would encourage parents to avoid smoking at home and, over time, assist them in quitting entirely. This approach would foster a healthier household environment while helping to disrupt the intergenerational transmission of smoking behavior.

Third, the government should strengthen school attendance regulations by introducing penalties for non-compliance. Although Indonesia has provided 12 years of tuition-free education in public elementary and some high schools since 2015, the lack of enforcement reduces pressure on parents to ensure regular attendance. Implementing penalties would create stronger incentives for parents, including those who

smoke, to prioritize their children's education. To make this effective, the government must first ensure equitable access to education across all regions by maintaining a sufficient number of public schools according to local population and educational needs.

**Limitations**

While this study provides valuable insights, it has several limitations. The primary aim is to assess the impact of parental smoking habits on children's educational attainment, including the differential effect of maternal smoking. However, it does not take into account children's educational aspirations, which could potentially influence the results. Additionally, the analysis is limited to families with both parents present, meaning the findings may not be applicable to single-parent or incomplete households. Furthermore, the data used may be considered outdated and may not accurately reflect current conditions, especially considering the changes brought about by the COVID-19 pandemic. As such, future research that utilizes more recent and comprehensive data would be highly beneficial.

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**References**

Alves, J., Perelman, J., Soto-Rojas, V., Richter, M., Rimpelä, A., Loureiro, I., Federico, B., Kuipers, M. A. G., Kunst, A. E., & Lorant, V. (2017). The role of parental smoking on adolescent smoking and its social patterning: A cross-sectional survey in six European cities. *Journal of Public Health, 39*(2), 339–346. https://doi.org/10.1093/pubmed/fdw040

Asiedu, E., Karimu, A., & Iddrisu, A. G. (2024). Structural changes in African households: Female-headed households and children's educational investments in an imperfect credit market in Africa. *Structural Change and Economic Dynamics, 68*, 30–42. https://doi.org/10.1016/j.strueco.2023.09.008

Awawda, S., Chalak, A., Khader, Y., Mostafa, A., Abla, R., Nakkash, R., Jawad, M., Salloum, R. G., & Abu-Rmeileh, N. M. E. (2022). Gender differences in the price elasticity of demand for waterpipe and cigarette smoking in Lebanon, Jordan and Palestine: A volumetric choice experiment. *BMJ Open, 12*(7). https://doi.org/10.1136/bmjopen-2021-058495

Ayano, G., Betts, K., Dachew, B. A., & Alati, R. (2021). Maternal smoking during pregnancy and poor academic performance in adolescent offspring: A registry data-based cohort study. *Addictive Behaviors, 123,* 107072. https://doi.org/10.1016/j.addbeh.2021.107072

Azagba, S., Baskerville, N. B., & Minaker, L. (2015). A comparison of adolescent smoking initiation measures on predicting future smoking behavior. *Preventive Medicine Reports, 2*, 174–177. https://doi.org/10.1016/j.pmedr.2015.02.015

Banderali, G., Martelli, A., Landi, M., Moretti, F., Betti, F., Radaelli, G., Lassandro, C., & Verduci, E. (2015). Short and long term health effects of parental tobacco smoking during pregnancy and lactation: A descriptive review. *Journal of Translational Medicine, 13*(1), 327. https://doi.org/10.1186/s12967-015-0690-y

Bauer, T., Göhlmann, S., & Sinning, M. (2007). Gender differences in smoking behavior. *Health Economics*, *16*(9), 895–909. https://doi.org/10.1002/hec.1259

Becker, G. S., & Lewis, H. G. (1973). On the interaction between the quantity and quality of children. *Journal of Political Economy, 81*(2), S279–S288. http://www.jstor.org/stable/1840425 [JSTOR]

Bella, A., Dartanto, T., Nurshadrina, D. S., Kusnadi, G., Moeis, F. R., Nurhasana, R., Satrya, A., & Thabrany, H. (2023). Do parental smoking behaviors affect children's thinness, stunting, and overweight status

in Indonesia? Evidence from a large-scale longitudinal survey. *Journal of Family and Economic Issues, 44*(3), 714–726. https://doi.org/10.1007/s10834-022-09864-x

Chan, K. H., Wright, N., Xiao, D., Guo, Y., Chen, Y., Du, H., Yang, L., Millwood, I. Y., Pei, P., Wang, J., Turnbull, I., Gilbert, S., Avery, D., Kartsonaki, C., Yu, C., Chen, J., Lv, J., Clarke, R., Collins, R., Zhang, X. (2022). Tobacco smoking and risks of more than 470 diseases in China: A prospective cohort study. *The Lancet Public Health, 7*(12), e1014–e1026. https://doi.org/10.1016/s2468-2667(22)00227-4

Crede, J., Wirthwein, L., McElvany, N., & Steinmayr, R. (2015). Adolescents' academic achievement and life satisfaction: The role of parents' education. *Frontiers in Psychology, 6, 52*. https://doi.org/10.3389/fpsyg.2015.00052

Cui, Y., Liu, H., & Zhao, L. (2019). Mother's education and child development: Evidence from the compulsory school reform in China. *Journal of Comparative Economics, 47*(3), 669–692. https://doi.org/10.1016/j.jce.2019.04.001

Dai, X., Gakidou, E., & Lopez, A. D. (2022a). Evolution of the global smoking epidemic over the past half century: Strengthening the evidence base for policy action. *Tobacco Control, 31*(2), 129–137. https://doi.org/10.1136/tobaccocontrol-2021-056535

Dai, X., Gil, G. F., Reitsma, M. B., Ahmad, N. S., Anderson, J. A., Bisignano, C., Carr, S., Feldman, R., Hay, S. I., He, J., Iannucci, V., Lawlor, H. R., Malloy, M. J., Marczak, L. B., McLaughlin, S. A., Morikawa, L., Mullany, E. C., Nicholson, S. I., O'Connell, E. M., Gakidou, E. (2022b). Health effects associated with smoking: A burden of proof study. *Nature Medicine, 28*(10), 2045–2055. https://doi.org/10.1038/s41591-022-01978-x

Dartanto, T., Moeis, F. R., Can, C. K., Ratih, S. P., Nurhasana, R., Satrya, A., & Thabrany, H. (2021). Good intentions, unintended outcomes: Impact of social assistance on tobacco consumption in Indonesia. *Tobacco Induced Diseases, 19*. https://doi.org/10.18332/tid/132966

Dumauli, M. T. (2015). Estimate of the private return on education in Indonesia: Evidence from sibling data. *International Journal of Educational Development, 42*, 14–24. https://doi.org/10.1016/j.ijedudev.2015.02.012

Ellis-Suriani, Z., Norsa'adah, B., Othman, A., & Siti-Azrin, A. H. (2021). Association between secondhand smoke exposure at home and cognitive performance among rural primary school children in Malaysia. *Tobacco Induced Diseases, 19*. https://doi.org/10.18332/tid/133638

Faqih, M. A., Rudiana, M. N., & Sugiarti, M. (2022). Pengaruh konsumsi rokok orang tua terhadap capaian pendidikan anak (The impact of parent's cigar consumption on children's education attainment). Prosiding HERO 2022, 61–70.

French, M. T., Homer, J. F., Popovici, I., & Robins, P. K. (2015). What you do in high school matters: High school GPA, educational attainment, and labor market earnings as a young adult. *Eastern Economic Journal, 41*(3), 370–386. https://doi.org/10.1057/eej.2014.22

Gallego, J. M., Otálvaro-Ramirez, S., & Rodriguez-Lesmes, P. A. (2021). Price smoking participation elasticity in Colombia: Estimates by age and socioeconomic level. *Tobacco Control, 30*(1), 36–41. https://doi.org/10.1136/tobaccocontrol-2019-055186

Guio, J., Choi, Á., & Escardíbul, J.-O. (2018). Labor markets, academic performance and school dropout risk: Evidence for Spain. *International Journal of Manpower, 39*(2), 301–318. https://doi.org/10.1108/ijm-08-2016-0158

Hall, B. J., Cauley, M., Burke, D. A., Kiany, A., Slotkin, T. A., & Levin, E. D. (2016). Cognitive and behavioral impairments evoked by low-level exposure to tobacco smoke components: Comparison with nicotine alone. *Toxicological Sciences, 151*(2), 236–244. https://doi.org/10.1093/toxsci/kfw042

Harrandah, A., Bahatheq, J., Mandourah, M., Kaki, W., Alandonisi, A., Subahi, M., Hanafi, R., Sembawa, S., & Bamaga, I. (2024). Effect of different types of smoking on oral health and on cellular changes in oral mucosa. *The Saudi Dental Journal*. https://doi.org/10.1016/j.sdentj.2024.03.018

Holbrook, B. D. (2016). The effects of nicotine on human fetal development. *Birth Defects Research Part*

*C: Embryo Today: Reviews, 108*(2), 181–192. https://doi.org/10.1002/bdrc.21128

Jain, D., Chaudhary, P., Varshney, N., Bin Razzak, K. S., Verma, D., Khan Zahra, T. R., Janmeda, P., Sharifi-Rad, J., Daştan, S. D., Mahmud, S., Docea, A. O., & Calina, D. (2021). Tobacco smoking and liver cancer risk: Potential avenues for carcinogenesis. *Journal of Oncology, 2021*(1), 5905357. https://doi.org/10.1155/2021/5905357

Joung, M. J., Han, M. A., Park, J., & Ryu, S. Y. (2016). Association between family and friend smoking status and adolescent smoking behavior and e-cigarette use in Korea. *International Journal of Environmental Research and Public Health, 13*(12). https://doi.org/10.3390/ijerph13121183

Kandel, D. B., Griesler, P. C., & Hu, M.-C. (2015). Intergenerational patterns of smoking and nicotine dependence among US adolescents. *American Journal of Public Health, 105*(11), e63–e72. https://doi.org/10.2105/ajph.2015.302775

Kobayashi, Y., Yamagishi, K., Muraki, I., Kokubo, Y., Saito, I., Yatsuya, H., Iso, H., Tsugane, S., & Sawada, N. (2022). Secondhand smoke and the risk of incident cardiovascular disease among never-smoking women. *Preventive Medicine, 162*, 107145. https://doi.org/10.1016/j.ypmed.2022.107145

Laajaj, R. (2017). Endogenous time horizon and behavioral poverty trap: Theory and evidence from Mozambique. *Journal of Development Economics, 127*, 187–208. https://doi.org/10.1016/j.jdeveco.2017.01.006

Legleye, S., Bricard, D., & Khlat, M. (2023). Roles of parental smoking and family structure for the explanation of socio-economic inequalities in adolescent smoking. *Addiction, 118*(1), 149–159. https://doi.org/10.1111/add.16026

Lin, H.-H. (2018). Number of siblings and educational attainment: Application of son preference. *Applied Economics Letters, 25*(2), 83–86. https://doi.org/10.1080/13504851.2017.1296543

Mahadevan, R., & Fan, S. (2021). Differential effects of parents' education on adolescent well-being outcomes. *Child Indicators Research, 14*(6), 2495–2516. https://doi.org/10.1007/s12187-021-09856-7

Minello, A., & Blossfeld, H.-P. (2017). From parents to children: The impact of mothers' and fathers' educational attainments on those of their sons and daughters in West Germany. *British Journal of Sociology of Education, 38*(5), 686–704. https://doi.org/10.1080/01425692.2016.1150156

Perelman, J., Leão, T., & Kunst, A. E. (2019). Smoking and school absenteeism among 15- to 16-year-old adolescents: A cross-sectional analysis on 36 European countries. *European Journal of Public Health, 29*(4), 778–784. https://doi.org/10.1093/eurpub/ckz110

Pope, D. A., Poe, L., Stein, J. S., Snider, S. E., Bianco, A. G., & Bickel, W. K. (2019). Past and future preference reversals are predicted by delay discounting in smokers and non-smokers. *Experimental and Clinical Psychopharmacology, 27*(1), 19–28. https://doi.org/10.1037/pha0000224

Pujiwati, L. A., Fatoni, Z., Alabshar, N., Harfina, D., Munawaroh, T., & Widaryoko, N. (2024). Determinants of household extreme poverty among female-headed households in Indonesia: Does disability matter? *Journal of Poverty*, 1–23. https://doi.org/10.1080/10875549.2024.2338156

Pukuh, N., & Widyasthika, H. F. (2018). Women left behind? Findings from female-headed household in Indonesia. *In K. H. Dewi, A. Situmorang, & W. M. Santoso (Eds.), International Conference and Workshop on Gender: Women's Leadership and Democratisation in the 21st Century Asia* (pp. 397–410). Center for Political Studies.

Rovio, S. P., Pihlman, J., Pahkala, K., Juonala, M., Magnussen, C. G., Pitkänen, N., Ahola-Olli, A., Salo, P., Kähönen, M., Hutri-Kähönen, N., Lehtimäki, T., Jokinen, E., Laitinen, T., Taittonen, L., Tossavainen, P., Viikari, J. S. A., & Raitakari, O. T. (2020). Childhood exposure to parental smoking and midlife cognitive function: The Young Finns Study. *American Journal of Epidemiology*, 189(11), 1280–1291. https://doi.org/10.1093/aje/kwaa052

Singh, C. R., & Kathiresan, K. (2015). Effect of cigarette smoking on human health and promising remedy by mangroves. *Asian Pacific Journal of Tropical Biomedicine, 5*(2), 162–167. https://doi.org/10.1016/s2221-1691(15)30337-3

Srivastava, P., & Trinh, T. A. (2021). The effect of parental smoking on children's cognitive and non-cognitive skills. *Economics & Human Biology, 41*, 100978. https://doi.org/10.1016/j.ehb.2021.100978

Vadivel, B., Alam, S., Nikpoo, I., & Ajanil, B. (2023). The impact of low socioeconomic background on a child's educational achievements. *Education Research International, 2023*(1), 6565088. https://doi.org/10.1155/2023/6565088

Xiong, F., Zang, L., Zhou, L., & Liu, F. (2020). The effect of number of siblings and birth order on educational attainment: Empirical evidence from Chinese General Social Survey. *International Journal of Educational Development, 78*, 102270. https://doi.org/10.1016/j.ijedudev.2020.102270

Yamada, M., Sekine, M., Tatsuse, T., & Asaka, Y. (2019). Association between lifestyle, parental smoke, socioeconomic status, and academic performance in Japanese elementary school children: The Super Diet Education Project. *Environmental Health and Preventive Medicine, 24*(1). https://doi.org/10.1186/s12199-019-0776-x