The Effect of Asthma and Acute Respiratory Infections in Childhood on Educational Attainment in Indonesia

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Abstract

Asthma and Acute Respiratory Infections (ARI) is one of the most chronic respiratory diseases children suffer. According to the Global Initiative for Asthma (GINA) in 2018, the prevalence rate of asthma is between 1-18 percent of the total population in each country. This study aims to analyze the effect of childhood-asthma and ARI history on educational attainment. We use data from Indonesia Family Life Survey (IFLS) wave 1993 and 2014. The Ordinary Least Square (OLS) regression method was used to assess that effect. The results indicate childhood-asthma and ARI history do not affect a person’s educational attainment in adulthood.

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INTRODUCTION

Childhood is a period full of great opportunities and challenges for individuals to live, learn, grow to achieve their highest potential (WHO, 2019). Poor health during childhood can disrupt the learning process so that individuals prevent achieving this potential. According to the World Health Organization (2007), chronic respiratory diseases among children, including asthma and acute respiratory infections (ARI), have increased in almost all countries globally, and more than 50 percent of sufferers live in a middle-income country.

Referring to the Global Initiative for Asthma (GINA, 2018), asthma is a heterogeneous disease usually characterized by chronic airway inflammation. Furthermore, asthma is also defined by a history of respiratory symptoms such as wheezing, shortness of breath, chest tightness, and coughing that vary from time to time and in intensity, along with restrictions on expiratory airflow. Meanwhile, according to the Ministry of Health 2018 (Kementerian Kesehatan Republik Indonesia, 2018), Acute Respiratory Infection (ARI) is a disease that attacks the respiratory tract that can be transmitted through the air. Based on the 2018 Global Initiative for Asthma report, the asthma prevalence rate is between 1-18 percent of the total population in each country (GINA, 2018). In Indonesia, asthma and acute respiratory infections (ARI) are still relatively high. Based on the 2018 Basic Health Research (Kementerian Kesehatan Republik Indonesia, 2018), the prevalence of asthma in residents of all ages is 4.5 percent, while the prevalence of ARI is 4.4 percent.

In developing countries, childhood asthma and ARI have a significant adverse effect on the child’s daily activities, schooling, family life, and finances (Bousquet et al., 2005). Previous studies suggest that chronic illnesses suffered by individuals have consequences for the education and participation of individuals in the labor market so that they can affect future income (Feldrnan et al., 1980; Gold et al., 2014; Mazurek et al., 2012; Champaloux et al., 2015; Hamilton et al., 2004). The results of a recent study conducted in Finland found that one-fifth of school dropout cases are caused by poor health conditions in childhood (Msocsc et al., 2018). The Ministry of Health of the Republic of Indonesia (2013) states that asthma is a chronic disease that often arises during childhood and young age to interfere with daily activities both at school and in the social environment. The disease also can disrupt the growth and development of children.

The studies on the effect of asthma on individual education show different results. By using a measure of the level of completed education, Champaloux et al. (2015) found that adolescents suffering from chronic illnesses, one of whom was asthma, tended not to finish schools, so they had lower educational attainment than those without a history of chronic illness. In America, children with asthma have a lower education by looking at reading skills because the average children with asthma do not go to school for 26 days per year, so they have difficulty reading (Feldrnan et al., 1980). Feldrnan’s findings in America were confirmed by the study of Gold et al. (2014) conducted in Asia-Pacific. The study found that asthma individuals reported asthma resulting in their absence from school, work, and reduced productivity.
In line with previous studies, Ridder et al. (2013) conducted a study to analyze the high dropout level in Norway. Ridder et al. (2013) used several indicators that influence the level of dropout. Somatic diseases (such as asthma, diabetes, migraine, and epilepsy), somatic symptoms, psychological distress, insomnia, difficulty concentrating, self-health assessment, and weight index. The results show that low levels of health impact educational participation. In the long term, the absence of individuals at school can reduce individual achievement.

Although most studies found negative associations between asthma and individual educational outcomes, Mazurek et al. (2011) and Sturdy et al. (2012) found the opposite results. Mazurek found that individuals who had a history of asthma in childhood tended to have higher levels of education and worked in jobs with higher socioeconomic status, such as managers, teachers, and technicians, than those who did not have a history of asthma. The same thing was found by Sturdy et al. (2012) that asthma is not associated with low educational attainment in the UK. Educational attainment in the UK is caused by social inequality and ethnic issues. These findings indicate that there is some addition to internal factors from within individuals.

Difference findings in studies by Champaloux et al., 2015; Feldrnan et al., 1980; Gold et al., 2014; Mazurek et al., 2012; Hamilton et al., 2004; Crump et al., 2013, do not regardless of the different methods of measurements. Crump et al. (2013) measure individual educational attainment by looking at the level of an individual’s reading and arithmetic skills and finding a negative relationship between the two measurements. Champaloux et al. (2015) emphasized the educational attainment of high school graduates who were graduated to measure individual educational attainment. Educational attainment is the highest level of formal education completed by individuals (UNESCO, 2010). Existing studies find various factors affecting individual educational attainment, including individual characteristics, family characteristics, and environmental characteristics (Tansel, 2002; Mendoza, 2018; Yang et al., 2014). Individual characteristics that are thought to influence educational outcomes include a person’s health conditions.

The ability to read and count (Crump et al., 2013) and the level of senior secondary education completed (Champaloux et al., 2015) were used by previous studies to measure individual educational outcomes. Champaloux et al. (2015) only see individuals who can complete senior secondary education and ignore individuals who can complete primary and secondary education. In contrast to Crump and Champaloux et al., this study will refer to the size of the Baroo-Lee school attainment to look at the achievement of individual education levels in detail from primary education levels to tertiary education levels. Based on differences in size, the authors try to complete the study conducted by Champaloux by using different educational achievement measures. We use Baroo-Lee’s educational attainment measurement by looking at the last level of education completed by individuals. According to Baroo-Lee (2019), the level of individual education does not change from ages 25 to 64 years. Baroo-Lee (2019) groups individual education levels into seven groups, including No formal education; Primary education group; Early secondary education group; Further secondary education groups; and tertiary education groups. In Indonesia, the primary education group is equivalent to SD/MI, the initial secondary education group is equivalent
to SMP/MTs, and the secondary education group is equivalent to SMA/SMK/MA. In contrast, the tertiary education group is equivalent to DI/DII/DIII/DIV, S1, S2, and S3. We consider that individuals can generally complete education up to the S3 level. In this study, we assume that individual education has not changed from age 21-64 years.

Various findings by previous researchers clearly state two different associations between asthma and acute respiratory infections on childhoods on their educational attainment. Champaloux & Young (2015); Feldman et al. (1980); Gold et al. (2014); Hamilton et al. (2004) find a negative effect of childhoods illness and individual educational attainment. Meanwhile, Mazurek et al. (2012) and Sturdy et al. (2012) find the positive effect. We tried to fit our study with Champaloux et al. (2015) by using different measures of educational attainment. We use Baroo-Lee’s educational achievement measurements by looking at the level of last education completed by individuals. We analyze this issue using the Indonesia Family Life Survey (IFLS), a multi-topic longitudinal survey in Indonesia. The primary question we consider is how individuals who have asthma and Acute Respiratory Infection (ARI) in childhood affect their educational attainment.

METHODS

We use six variables to find out our research purpose. The dependent variable is educational attainment proxied by the length of formal education individuals can complete. Based on the purpose of the study, we wanted to see the effect of the individual early health status of asthma and ARI on the current educational achievements. Thus, our crucial variable in this study is the individual’s early health status (suffers Asthma/ARI) ages 0-15 years.

In addition to health, other factors are thought to affect individual educational outcomes. Parental education has a vital role in individual education because parents who have a higher level of education will want their children to pursue higher education, too (Takeda & Lamichhane, 2018). Another factor that is thought to influence the achievement of one’s education is the family’s economic condition where the individual lives. Income received by the household is a supporting capacity for individuals to study (Yang et al., 2014). However, to reduce the level of measurement errors in household income, the authors use household expenditure for one year to represent the family’s economic condition. To minimize the results of biased estimates, we include several control variables, including parental education, household expenditure, and gender of the individual.

Our quantitative research study uses primary data from the Indonesia Family Life Survey (IFLS). IFLS is a longitudinal survey in Indonesia from 1993 to 2014, representing 83 percent of Indonesia’s population in 1993. IFLS covers various aspects of socioeconomic and health life at Indonesia’s individual, household, and group levels (Strauss et al., 2016). This study used IFLS data in 2014 (IFLS5) and IFLS data in 1993 (IFLS1). Assuming that the level of individual education has not changed from age 21-64 years, the sample in this study is limited to individuals in the 2014 IFLS survey data aged 21-64 years. The 2014 IFLS survey data was used to determine the sample in our study, which refers to book 3b in the EH (Early Health) section by looking at the answers to the question
“How was your health in childhood?”. At the same time, data on parental education and economic conditions of the households where individuals lived as a child were obtained from the 1993 IFLS survey data (IFLS1).

We use the Ordinary Least Square (OLS) method to determine the effect of individuals with asthma and ARI in childhood on their educational achievements. The OLS method is an estimation method that minimizes errors in predicting population mean values and sample values. To produce a good regression model, the regression model must meet the Best Linear Unbiased Estimator (BLUE) element. The way to find out that the regression model is a BLUE model is to do a classic assumption test. The classic assumption test consists of tests of normality, multicollinearity, autocorrelation, and heteroscedasticity (Gujarati & Porter, 2010).

Regression analysis is used to find out how the dependent variable can be predicted through predictor variables, partially or simultaneously. The equation model in this study refers to the model built by Champaloux et al., (2018) is as follows:

\[
Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \epsilon_i
\] (1)

Where

- \(Y\) = Educational Attainment
- \(X_1\) = Medical History (Asthma and URI)
- \(X_2\) = Gender
- \(X_3\) = Father’s Education Level
- \(X_4\) = Mother’s Education Level
- \(X_5\) = Household Expenditures

**RESULT AND DISCUSSION**

**Descriptive Statistical Analysis**

The number of observations used in this study was 48,219 respondents. Based on Table 1, the average level of education that respondents can complete is 10.34 years or the same level as high school. In contrast, the average education of fathers and mothers is equivalent to the elementary level. Compared to the education of fathers and mothers, the average length of education of respondents is more than twice their parents’ education. This data shows that the average respondent has a higher level of education than his parents’ level of education. The number of individuals with a history of asthma and ARI is only 2.2 percent of the total observations. While the gender of male respondents by 48 percent and female respondents by 52 percent.

The family’s economic conditions when individuals aged 0-15 years can be seen from the variable household expenditure. The household expenditure shows the total expenditure or consumption of all types of goods and services consumed by all household members for one year where the respondent lived when he was 0-15 years old. The average amount of household expenditure for one year is 4,898,962 thousand rupiahs. If converted to expenditure per month, household expenditure is approximately 400 thousand rupiahs.
Table 1. The Descriptive Statistical Analysis

| Variable                                    | Observation | Mean  |
|---------------------------------------------|-------------|-------|
| Educational Attainment (Years)              | 48.219      | 10.34 |
| Early Health Status (1=Have asthma/ARI on childhoods) | 48.219    | 0.022 |
| Gender (1=Male)                             | 48.219      | 0.48  |
| Mother’s Education Levels (Years)           | 48.219      | 4.36  |
| Father’s Education Levels (Years)           | 48.219      | 5.61  |
| Household Expenditure (Years per Rupiah)    | 48.219      | 4.898.962 |

Source: Authors’ data (2019)

Table 2 shows our study results. Individuals who have asthma and ARI in childhood are negatively associated with their educational attainment in the future. This result aligns with studies conducted by Champaloux et al. (2015). The negative association between the two is suspected because individuals with a history of asthma have higher absenteeism in schools than those without a history of asthma and ARI (Feldman et al., 1980; Gold et al., 2014). However, our study results were not statistically significant.

Table 2. Regression Results

|                      | (1)          | (2)          | (3)          | (4)          | (5)          |
|----------------------|--------------|--------------|--------------|--------------|--------------|
| Educational Attainment | 0.353***     | 0.353***     | -0.068       | -0.085       | -0.089       |
| Early Health Status  | (0.11)       | (0.11)       | (0.09)       | (0.09)       | (0.09)       |
| Gender               | -0.05        | -0.023       | -0.061**     | -0.063***    | (0.27)       |
|                      | (0.03)       | (0.02)       | (0.02)       | (0.02)       |              |
| Father’s             | 0.474***     | 0.293***     | 0.293***     | 0.293***     | (0.004)      |
| Education Level      | (0.003)      | (0.004)      | (0.004)      |              |              |
| Mother’s             | 0.276***     | 0.274***     |              |              |              |
| Education Level      | (0.004)      | (0.004)      |              |              |              |
| Household Expenditure|              |              | 5.85***      |              | (6.26)       |
| Constant             | 10.70***     | 10.72***     | 8.03***      | 7.80***      | 7.79***      |
|                      | (0.016)      | (0.023)      | (0.027)      | (0.026)      | (0.02)       |
| Observation          | 48.219       | 48.219       | 48.219       | 48.219       | 48.219       |

t statistics in parentheses

*p < 0.05, **p < 0.01.
In Indonesia, the average level of a person’s education is relatively low. According to the Central Statistics Agency (2019), the average length of schooling of Indonesia’s population in 2018 is 8.9 years for men. In comparison, girls’ average length of school is 8.26, or equivalent to junior high school. Educational problems are multidimensional problems that are not only influenced by one or two things. Even today, there is still debate about the causal relationship between health and education—the debate questions whether health affects one’s education or vice versa. Empirical evidence and existing theories indicate that the higher level of education of a person will have an impact on the quality of health, the better, and conversely, the better the condition of health will result in the higher level of education achieved by individuals (Agupusi, 2019; Eide & Showalter, 2011; Grossman, 2008).

Studies on the effects of respiratory ailments and individual education show different results. Hamilton et al. (2004) state that there is no difference in education between individuals who have a history of asthma and those who do not have a history of asthma. However, there are indications that individuals with a history of asthma will experience a loss in employment. However, this finding was broken by a study conducted by Mazurek et al. (2012). Mazurek et al. (2012) found that children who have asthma tend to work in areas with higher social status, such as managers because those who have asthma tend to avoid jobs that can trigger a recurrence of their disease. In the end, they try harder to learn to obtain jobs with higher socioeconomic status.

Based on the estimation results that have been stated previously, we found that the negative association between childhood medical history and later educational attainment was not statistically significant. Several reasons can be pointed out. First, in this study, the number of individuals with asthma and ARI in childhood is minimal, with only 2.2 percent of the total samples studied or 1.060 people from 48,219 people. Secondly, the insignificant results indicate that in this study, other factors are more influential on the educational attainment for an individual than the history of asthma and ARI suffered by an individual in childhood.

These results are in line with Sturdy et al. (2012) findings in the United Kingdom. Sturdy found that other factors besides health influence a person’s educational attainment. Ethnic factors and economic conditions are the dominant factors affecting individual educational outcomes in the UK. In line with Sturdy’s findings, this study found other factors outside of health that significantly affect individual educational attainment. We find that the father’s education, mother’s education, gender, and family economic conditions statistically significantly affect individual educational attainment.

The level of education achieved by individuals cannot be separated from family support. In human capital theory, parents’ higher education level is one of the critical variables affecting individual education levels. Parents with higher education are aware of the importance of education for their children. So that parents will strive to provide better education for their children, even parents tend to want their children to pursue education beyond the level of education they had achieved. In the long run, parents with
a high level of education will influence the third generation of educational attainment in their families (Agupusi, 2019). As a result, individuals with parents with a higher level of education tend to have higher educational attainments.

Almost all aspects of an individual’s life are closely related to the role of their parents or family. Parents who have an important role in the family are also the main source of support for the economy and non-economy for individuals in all aspects of their lives. Low-income family economic conditions also affect individual education achievements (Sturdy et al., 2012). An empirical study in China finds that the level of family income or the better economic conditions of the household will increase the level of education of their children (Lin & Han Lv, 2017).

The economic cost of asthma and ARI is considerably both direct and indirect costs. Direct costs for medical and indirect costs such as time lost for daily activities (Bousquet et al., 2005). Asthma and ARI are diseases closely related to air quality in an individual’s living environment. Information to World’s Air Pollution (2019), three regions in Indonesia, including Pontianak, Sampit, and East Jabung, have poor air quality for groups sensitive to respiratory problems. Even Jakarta is an area with an unhealthy air quality category. With these conditions, it is feared that it could increase the prevalence of asthma and ARI in Indonesia. Other factors that trigger asthma and ARI symptoms are exposure to second-hand tobacco smoke. Poor control of asthma and ARI symptoms is a significant issue that can lead to adverse clinical and economic outcomes (Bousquet et al., 2005).

CONCLUSION

As a statistical, our study found that asthma and ARI suffered by individuals during childhood did not significantly influence individual educational attainment. The relatively small number of individual respondents who suffered from asthma and ARI in childhood presumably causes it. However, we find the negative direction. It shows that early health condition is one of the crucial factors that determine an individual’s educational attainment in the future. We found other factors that significantly affected the educational attainment of individuals, including the level of parental education, family economic conditions, and gender.

Parents and governments should control several causative factors that can cause the increasing prevalence of asthma or ARI in Indonesia to increase an individual’s educational attainment. One of the other ways is by controlling air pollution in their living environments. Further studies are still relevant to be carried out considering that asthma and ARI are closely related and sensitive to changes in environmental conditions. We have limited the number of samples of individuals who have a history of asthma and ARI. For robust results, it requires more samples of sufferers of asthma and ARI in childhood.
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