IMPACT OF PARENTAL TOBACCO USE ON ACUTE RESPIRATORY INFECTIONS AND INITIATION AMONG CHILDREN IN PAKISTAN

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CERTIFICATE

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Author's Declaration

I **Zeeshan Ahmad** hereby state that my MPhil thesis titled **"Impact of parental tobacco use on Acute Respiratory Infections and initiation among children in Pakistan"** is my own work and has not been submitted previously by me for taking any degree from this University Pakistan Institute of Development Economics or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my MPhil degree.

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Dedication

This thesis is dedicated to:

Allah, my creator, my master, who always bless me beyond expectations.

My Beloved prophet, Muhammad, who taught us the purpose of life.

My homeland Pakistan, The Paradise on Earth.

My father who struggles hard to fulfil my needs.

My Mom who always support me with prayers and love.

My teachers without whom I could not be, what I am today.

My friends, the sign of love and support.

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"Sometimes our light goes out but is blown into flame by another human being. Each of us owes deepest thanks to those who have rekindled this light."

Foremost I want to offer this endeavor to our Almighty Allah on whom we ultimately depend for sustenance and guidance. I am sure this work would have never become truth without His guidance.

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ABSTRACT

The detrimental impact of parental tobacco use on the child health is documented since 90's for the developed countries but limited literature is available for the developing countries. The study aims to explore the impact of parental tobacco use on Acute respiratory infection (ARI), Mortality, and child smoking initiation. The study employed the nationally representative data of Pakistan Demographic Health Survey (PDHS) 2017-18. Data on Children and household members are employed for multivariate logistics regression. ARI, Mortality and child smoking initiation are taken as dependent variable. While the demographic characters, tobacco use, household and environmental characters are analyzed as independent variables. Among the recognized risk factors, passive smoking, residence type, and poor housing conditions play a fundamental role in children mortality, ARI, and child smoking initiation. Parental tobacco use increases the risk of ARI and mortality among the children. Household income negatively affect the ARI, mortality, and child smoking initiation. The ARI is reduced 9% with each level rise in income but in case of child mortality and child smoking initiation the decline is 17%, and 13%, respectively. With each level rise of mother education, the probability of mortality reduces by 9%. Our empirical findings reveal that child smoking initiation reduces by 2% with each level of mother education. Children having mothers with smoking habits are facing 28% more likely episodes of ARI than the children with nonsmoking mothers. Mother smoking habits also increases the child mortality by 68% compared to the nonsmoking mothers.

Keywords: Parental Tobacco Use, Child Mortality, ARI, Child smoking Initiation, Passive Smoking, tobacco health consequences

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LIST OF ABBREVIATIONS

ARI	Acute Respiratory Infection
SLT	Smokeless Tobacco Use
ETS	Environmental Tobacco Smoke
COPD	Chronic Obstructive Pulmonary Disease
SIDS	Sudden Infant Death Syndrome
SHS	Secondhand Smoking
DALY'S	Disability-adjusted life year
FATA	Federal Administration Tribal Area
KPK	Khyber Pakhtunkhwa
ICT	Islamabad Capital Territory
LPG	Liquid Pan Gas
FCTC	Framework Convention of Tobacco Control
HHID	Household Id
HVIDX	Household Number

1 CHAPTER 1

INTRODUCTION

Tobacco is the only legal consumer product which kills people (The Oxford Medical Companion, 1994)

Tobacco kills more than the combined deaths from Malaria, HIVs, and tuberculosis. Tobacco kills half of its users. Smoking lead to premature deaths. Every year, around 8 million individuals die as a result of tobacco use. Whereas 7 million people die directly from tobacco use, 1.2 million people die as a result of secondhand smoking or Environmental Tobacco Smoke (ETS), including 150,000 children. And these deaths are particularly prevalent in developing countries, where almost 80% of tobacco users live in low- and middle-income countries (WHO, 2019). According to DALYs, after diarrhea, air pollution, and nutrition the risk factors that drive most deaths is tobacco. In 2017 about 4.3% of deaths occur globally due to tobacco related diseases (CDC, Smoking and Cancer, 2020).

Tobacco use is hazardous for the health. It effects about every organ of human body. Pakistan is among top 15 countries having high burden on tobacco related health problems. There is total 23.9 million (19.1%) tobacco users in Pakistan, where the smokers are 15.6 million and 9.6 million (13.9%) are the smokeless tobacco users (TCC, 2020). Each year about 163,360 people dies due to tobacco use, and 5000 admitted to hospitals due to tobacco every day (Pakistan Health Education Survey, 1999).

Smoking related illness costs about US$300 billion per years in USA. Smokers cause more in developing heart diseases, lung cancer and stroke than nonsmoker. Smoking

increases the risk of coronary heart diseases for 2 to 4 times, lung cancer in men and women by 25% and 25.7%, respectively and for stroke it is 2 to 4%. Smoking causes death due to heart disease, lung cancer and emphysema. Smoking even the secondhand smoking leads to the diseases and disabilities. Secondhand smoke contains 7000 chemicals, where 65 of them are related to cancer. Nearly 9 out of 10 cancers are caused by smoking or secondhand smoking exposure (CDC, 2020). Smoking causes 90 % of lung cancer and the remaining of the other types of cancers (CDC, 2020). It creates the following disorders Asthma, cancer, chronic obstructive pulmonary diseases, HIV, vison loss and blindness, diabetes, pregnancy, mental health condition and gum disease (periodontal) and tooth loss. People are aware that cancer is due to smoking but have little knowledge that it badly effects the pregnant women and the child like early childbirth, or sudden death infant syndrome (CDC, 2020).

Tobacco use causes severe health consequences to the individuals and societies. The health problems of tobacco use are not limited only to the users, but it also affects the health of others. According to national health survey (1998), 34% of men are using tobacco. Cigarette's smoking is the preferred source among male population of Pakistan. According to the report of state bank of Pakistan (2014), the consumption of cigarettes was 64.48 billion over the financial year 2014. Smokeless tobacco (SLT) which consists in different types where the tobacco is used not by firing and their consumption differs in the countries according to its types. Smokeless tobacco also associated with different health risks, but it is very less risky for the passive users. The lip, oral cavity, pharynx, and esophagus common problems due to smokeless tobacco use. The tobacco use influences the health risk in the children. Children are more vulnerable than anyone else due to the exposure of tobacco smoke. Children

who are exposed have episodes of ARI and other respiratory risks which cause the death of infants and child less than 5 years of age.

1.1 Acute Respiratory Infection

The serious infection that prevents normal breathing is the infection of upper respiratory system or lower respiratory system. It damages lungs which is very dangerous for the children and adults with low immune system (Health line, 2020). This infection is mainly due to the exposure of toxic environment. Children are more exposed to passive smoking around the world than any other ages. The literature reveals that tobacco smoke contains about 40 types of known toxic compounds which cause differed infections including ARI. After diarrheal diseases and malnutrition ARI are responsible for high mortality in the children specifically in the developing countries (Williams, et al;2002). According to WHO (2010), Globally 8 million children under age 5 dies with ARI. In Pakistan, the annual deaths of over 250,000 children are attributed to ARI (Khan, 1990). According to UNICEF 84.2% of children under age 5 having acute respiratory infection (ARI). Parental smoking specifically maternal smoking causes the asthma and other respiratory infections in the children. Infants whose mother use tobacco has significantly more hospital visit for the Bronchitis and other respiratory disease than any diseases (Thapa, et al., 2016). The developing nations have high rate of morbidity and mortality than developed and the tobacco use is also high in those countries where the economic demographic situations are worse and have no proper measure to reduce the tobacco use (DiFranza, et al., 1996).

1.2 Child Mortality

Smoking leads to premature deaths and economic burden on the health system of the families of smokers (WHO, 2010). Child mortality is a great challenge for the developing countries. Exposure to 2nd hand smoking and parental tobacco use is one the most important risk factor for the deaths of children. Out of 130 million children born, 9 million under the age of 5 dies each year specifically in the developing countries. The child mortality in Pakistan reduces from 90's but high than the developed nations.

Child mortality rate under 5 years age for Pakistan is 69.3 per 1000 live birth while the mortality rate from 5-14 years of age is 10. Deaths of children under 5 years of age in 2018 is 408,589 (IGME, 2019). Mortality of children under the age of 5 reported over Punjab is 85% then Baluchistan 78%, Sindh 77%, GB 76%, KPK 64%, AJK 53%, ICT 49%, and FATA 33% (NIPS & ICF, 2019) which are shown in the fig 7.1. The household conditions are the primary factor that affect the children health. The household tobacco uses may affect the ability of the childcare which reduces their health status (Bonu, et al.. 2004). The use of tobacco by parents are not only affecting their health, but also the health of other family members and their children. Tobacco use indirectly effects the malnutrition of children and increases the health risk like acute respiratory infection (ARI) which than lead to the child mortality (Bonu, et al.. 2004).

1.3 Children smoking/tobacco initiation

The presences of children in an environment which is commonly used for tobacco by the parents increases the prevalence of tobacco among the children. Parents are the role model for their children, from the childhood one can learn from

their role model and act as they see around. The use of tobacco by parents may be modeling the value of tobacco. Parental tobacco use in homes in the presence of their children, influences the initiation of tobacco use in adolescent. The parental and close friend's smoking influences the adolescence smoking behavior (Bricker et al.., 2007). In Pakistan about 1,200 children start smoking every day (WHO, 2005). Parental tobacco use plays the key role not only in the initiation of children smoking but escalate the smoking behavior. Some studies indicate that children who have only one smoking parent in home are more likely to begin smoking (Jackson, 1998). The parental smoking cessation reduces the risk of children smoking of about 30% (Bricker et al.., 2007). Most adult smokers start smoking in the early adolescence. Preventing adolescences initiation means to reduce the public health burden which is possible when parents quit and impose strict actions in their home on the offspring.

1.4 Problem statement

The socio economics burden of tobacco and their other forms are still unclear. Tobacco has affected every sector and some direct and indirect halts to health of the users and other surrounding. Women and children are most vulnerable to every environmental disorder. Exposure to tobacco smoke creates very serious disorders among children which are responsible for the mortality. Children health are mostly affected by the parental tobacco use. It creates acute respiratory disease which are the highest factor of mortality in child under 5 years age. The parental tobacco use also increase the initiation of tobacco in children. and face high rate of child mortality. The tobacco use in Pakistan is growing from the last 10 years and the youth and school going adults are affected. The rising prevalence of tobacco is still alarming. The

health risk due to tobacco use are known for the developed countries but the developing countries are unaware. The people are unaware of the risks of tobacco for the users as well as ETS or passive users. According to the world bank report on the tobacco control suggested that demand of the consumption can reduced through "information shocks" like the research and publication on the health risks of the tobacco use. To reduce the use of tobacco, users must be educating and create awareness of the health consequences. The societies need to reduce the unquantifiable suffering of tobacco burden on premature deaths and diseases. Numerous researches have been conducted on the causes and determinants of child mortality and morbidity other than tobacco use. Parental smoking is a risk factor for children's respiratory illnesses and death. There is a dearth of knowledge, and parents' ignorance about the health hazards associated with children being exposed to ambient tobacco smoke in their homes.

1.5 Significance of the study

Children have high risk to non-cancer respiratory disease and having sudden infants' syndrome. The study will investigate the ETS specifically the impact of parental smoking habits on children's health and the study will also attempt to quantity its impact on the risk of acute respiratory infection and mortality. The study will also explore the correlation that how parents use of tobacco increases the risk of smoking initiation among children. The study is important as this is the evidence base study throughout country. Passive smoking is related with an increased risk of respiratory illnesses, which has been well documented in numerous study (Gergen , 2001) but the empirical evidence is limited for Pakistan. The study will find the

association between the household passive smoking and ARI among children under 5, child mortality and child smoking initiation. This study will provide the evidence of harmful effects and health consequences using the Pakistan demographic health survey and recommend the policy of restrictions across the country either for public places, working environment and at home. The study will discuss the public health issues regarding the ETS and child health. Increasing awareness of the risks of health due to tobacco use will introduce the legislation and policies in restricting and prohibiting smoking in public places and to clean the environment of home for your children and to reduce the passive smoking deaths. The study will provide empirical evidence of different variables affecting the respiratory diseases among children and child mortality. Based on empirical findings study will propose the intervention to minimize the burden of ETS on respiratory diseases among children and child mortality.

1.6 Research question

How the parental tobacco use effect the initiation of smoking/tobacco among children?

How parental tobacco use increases the risk of mortality and acute respiratory infection among their children?

1.7 Objectives

In the light of above discussion, the study will focus to achieve the following objectives.

- To compare the prevalence of tobacco, use among parents in urban and rural areas
- To explore the impact of parental tobacco, use on children initiation
- To investigate the impact of parental tobacco, use on child mortality and acute respiratory infection among children.

1.8 Organization of the Study:

The rest of the study is organized as follows: second chapter of the thesis provides a brief literature review on child mortality, ARI, and child smoking initiation due parental smoking and tobacco use. Third chapter includes research methodology which include explanation of model and variables. Analysis of the empirical results are present in the fourth chapter. Finally, the fifth chapter concludes the results and outcomes of this study and give policy recommendations for tobacco control and children health.

2 CHAPTER 2

LITERATURE REVIEW

This chapter reviews the available literature and divides it into four themes. The first theme is the prevalence of tobacco usage. The second is about the ARI, specifically how tobacco usage affects children's health and who is responsible for the ARI. The third is about child mortality, which demonstrates the link between environmental tobacco smoke exposure and child fatality. While the fourth is the effect of parental tobacco use on child tobacco initiation, which demonstrates that parental tobacco use is a significant factor that contributes to children initiating tobacco use and demonstrates how to minimize health risks for both parents and children.

2.1 Prevalence of tobacco

Tobacco possesses risks to the children’s mortality and morbidity. It creates disorder and factor of economic loss (WHO, 2021). The prevalence of the tobacco used is growing over the globe. The alternates for the smoking which is water pipes and chewing tobacco also alter the health. According to (VM, 2007) Cigarette smoking was formerly considered a luxury by the elite, but it is now substantially overrepresented in lower socioeconomic and disadvantaged minority groups, who have the fewest resources to cope with the health consequences or advocate on their own behalf. Tobacco marketing has specifically targeted these demographics. The inequality in exposure and health consequences extends to the international and global stage. Tobacco firms, like many other industries, have taken advantage of the world's rising and developing markets, including China (the world's largest tobacco-growing nation), India, Africa, and South America. Tobacco has been promoted as a quick

cash crop for peasant farmers, who become reliant on the fertilizer industry and frequently go into debt as a result of tobacco's soil depletion.

Khan, et al., (2015) analyses the prevalence of tobacco and their products in the Pakistani women. From the Pakistan Demographic Health Survey (PDHS) of the 2012-13 where the women questionnaires were investigated and the data extracted of ever married 15–49-year-old women, and the dependent variable chewing tobacco user and smoking tobacco user with all its form like snuff, hukkah, pan and pipe etc. The multivariate logistic regression was examined of that covariate which are significant on the univariate logistic regression which include, age, area, education, wealth quantiles, access to media and visit to health facility and employment status. Which concludes how tobacco, and their other products has affected the reproductive age of the women. The older women which having lower socioeconomic profile and low education level have high prevalence rate of water pipe and chewing tobacco use, which is 4% and 2% respectively. The multivariate logistic result stated that women who are ever married, above 35 years age, with no education and are poor have more likely to be the water pipe users and ever married above 35 years age which having no education and poor also visited medical care in recent year were using chewing tobacco.

Basit et al. (2020) perform a prevalence study in rural and urban areas of tobacco users, ex-tobacco users, and non-tobacco users. To evaluate the prevalence of tobacco usage, primary data were collected and multinomial logistic regression was employed. According to the findings, urban areas have double the tobacco prevalence than rural areas, and males have seven times more prevalence of tobacco than females.

Frieden TR, (2007) stated in his study how to prevent 100 million deaths from tobacco that tobacco use is a global source of injustice and environmental concern, and it is more than just a personal health issue. Signatory nations were obliged by the WHO Framework Convention on Tobacco Control (2003) to satisfy essential fundamental principles and objectives by February 2005. (26). Increased taxation, the prohibition of sales to minors, the prohibition of smoking in workplaces, restaurants, bars, and casinos, the removal of vending machines and tobacco point-of-sale displays, the requirement of package health warnings, and media campaigns have all been effective in lowering smoking rates in many countries to levels below 20%. Frieden and Bloomberg projected in 2007 that reducing smoking prevalence from 25% to 20% globally would save 73 million adult lives, 50 million children's lives, and 50 million prenatal lives by 2030.

Shariful Islam, et al…, (2016) perform study on the prevalence of tobacco use and their contributing factors among adolesecent in bangladesh. For this they use global youth tobacco survey of bangladesh. The data presented in this survey revealed that boys have a greater prevalence of tobacco use than girls, with over 97% of children stating that they were not denied while purchasing smokes due of their age. Accordingly, enforcement of tobacco control regulations, a common challenge in developing countries, is strongly advised.

Smokeless tobacco had very adverse impact on health. According to National Cancer Institute. Smokeless Tobacco states that pinching tobacco in mouth for 30 minutes delivers same nicotine as 4 cigarettes. Smoking causes health damages which include tuberculosis, respiratory diseases, cardiovascular disorders, chronic obstructive pulmonary disease, and cancer. Smokeless tobacco which includes naswar, kiani, pan and gutkha etc. increases the risk of oral and esophagus cancers.

The use of tobacco products not only effects the health of the user, but it adversely effects the children health and causes the morbidity and mortality. DiFranza, et al (1996) in review article which include all the studies related to tobacco health risks after 1965. Meta-analysis of similar studies of each disease was performed. Measure of risk termed as pooled odd ratio and measure of relative risk termed as pooled relative risk of case control studies and cohort studies relatively was added in the meta-analysis. The relative risks were used for attributes of morbidity and mortality while the risk associated for the attributable of exposure. It also causes many health illnesses like otitis media, tympanostomies, tonsillectomies. the study also evaluated that child have visits physicians for asthma were 529000 and 1.3 to 2 million for cough. children younger than 5 have bronchitis and pneumonia who were exposed to smoking and other tobacco use.

The socioeconomic and demographic characters have also very effective role in the prevalence of tobacco use. In the developing countries the poor have high prevalence rate (Khan, et al., 2015).

2.2 Parental tobacco uses or ETS and their impact on the children

Unborn children exposed to maternal smoking or second-hand smoke have been associated to birth abnormalities, stillbirths, preterm births, and infant fatalities (Tobacco control, 2021). According to the center for disease control and prevention that there is no risk-free level of ETS. Despite the Tobacco use is adverse for its users but it can be very harmful and causing health risks to the non-user who are exposed to ETS. The tobacco user may cost the non-users which is difficult to quantify it effect the health of the others which are never the users and increase the damages of health (Chaloupka, 1999). It affects everyone health, but children are more vulnerable to

ETS and may lead many disorders. The children who are exposed to environmental tobacco smoke in their homes have high risk of respiratory disorder which sometimes may causes death of the children. here is the literature of adverse effects of parental tobacco use for the children which are reported and written in the 3 themes.

2.3 Acute respiratory infection (ARI)

Tobacco uses are responsible to different disorders. It is different in different studies but the more alarming which are highly risky are respiratory diseases, cardiovascular disease. Respiratory diseases are mostly related due to active and passive smoking. There is strong evidence based on different surveys like a study is taken place in the Faisalabad where the all the respiratory diseases were analyzed on the base of survey. Respiratory disease which includes asthma, COPD, infection, TB. The study shows the status and demographic information with addition to the information of smoking and finds that over the 590 male patients the 50.36% o are the active smokers, 12.63% are the passive smokers and the nonsmoker are 31.99%. and the result for the women is quite interesting. Over 414 females' patients 19% and 36% were affected due to smoking and passive smoking while the nonsmokers are 39.3% (Sultana, et al 2017)

ARI is among one accountable for the child mortality. There are several studies published accessed that environmental tobacco smoking causes the cancer of respiratory system and responsible to Increase the risk of noncancer effects, specifically in children. These effects include the risk of Bronchitis, asthma, and symptoms of upper respiratory tract irritation (Jinot & Bayard , 1996). Study at Nepal stated the association between the parental tobacco use and children ARI. Through questionnaire data collected from the hilly areas conducted, where the ARI and mortality were high, so the diseases were categorized into 4 grades on the base of

intensity, as grade 1 is mild while the grade 4 is very high. The results support the objective as the parental tobacco use correlates with the episodes of ARI and children have less infections when only father was smoker as compared to maternal tobacco use (Raj et al., 1991). The effect of parental tobacco uses which is risk factor of ARI for children and infant which is global concern for public health. Greenberg also shows that children under 5 who are exposed to passive smoking have high Nicotine and cotinine level compared to non-exposed.

The socioeconomics and demographic situations matter a lot for the child mortality and other health risks. According to Singh & Singh, (2014) in India children under five who are experiencing ARI and diarrhea out of 6680 child 2880 lived in slums where the environment is polluted, air quality and water sanitation facilities were miserable. The results show that parental education and mother exposure to the mass media has strongly associated with the prevalence of ARI. The educated father or mother or both have less likely odd ratio of ARI and mother's access to mass media have less exposure to ARI. According to (Prietsch, et al., 2002) respiratory infections are the main source of mortality and morbidity. Keskinoglu... et al, (2007) stated the effects of passive smoking on the lower respiratory tract infections of children aged 2-12. Through questionnaire and testing of urine of 150 children healthy and 150 infected for cotinine level analyzed. The prevalence of parental indoor smoking was 71% in the infected children and 72% in healthy children. the rate of passive smoking when the cut off accepted for 60ng/mg of urinary cotinine level was 76.7% Infected children and 50.7% in the healthy children. the study found that the environmental tobacco smoke significantly associated with the respiratory tract infection in children. Additionally, the age of children and cotinine was negatively correlated. the study also show that low educated mother, bad environmental condition, low income, and

crowded family condition were significant, but the fuel used was insignificant clearly shows the parental tobacco has affects the lower respiratory tract infection among children. Many studies explore that parental tobacco have the significantly association with the children ARI. Study in India by Bonu., et al (2004) investigate the impact of parental tobacco and alcohol use on the child ARI, underweight and infant mortality. And shows that families where only one member using tobacco including smokeless tobacco has very worst health status of child, will found underweight and seeking care of ARI.

Maternal smoking impacts are high for non-going school children as they spent all the time with the mother. Preitsh O.M (2002) has evaluated cross section study, of sample data of 779 children aged 0-53 months in the region of RIO Brazil. Data include household characters, smoking habits, socioeconomics conditions, environmental conditions to analyze the association of acute respiratory infections. The maternal education, paternal education, maternal smoking in pregnancy, environmental condition, maternal smoking, overcrowding and number of smokers in the house were found significant in the bivariate analysis. Maternal smoking, overcrowding and smokers in the house increases with the presence of high Acute respiratory infections in children. and the worse the environmental score was the high will ARI presence in the children. environmental tobacco smoke is one of the top preventable environmental pollutants which is responsible for the respiratory problems.

2.4 Child mortality

Low-income and high-income groups, or countries, both believe that tobacco smoking is responsible for an enormous amount of health inequity (Palipudi, et al., 2012). A significant public health hazard that has a negative impact on children's health is

environmental tobacco smoke (ETS). The "Health Consequences of Involuntary Exposure to Tobacco Smoke" report notes that youngsters and non-user adults exposed to secondhand smoke before the age of twenty can die prematurely. According to some experts, the increase in respiratory infections and non-respiratory diseases in children is due to the parents' habit of smoking (kashikar...et al, 2007). The exposure of children in the secondhand smoking and parental tobacco use increased the risk of sudden infant death syndrome (SIDS), acute respiratory infection, and weakens the respiratory system, slow the growth of lungs which result the disability and deaths in children. World bank reports also states that babies born to smoker's mothers have low birth weight, high risk of respiratory diseases and more likely to die of SIDS. Tobacco causes the premature deaths and reduces the age of users about 20 to 30 years. The users of tobacco in the developing countries are unaware of its risk, the addiction of smoking starts mainly in the youth who are unaware of risk than adults and they underestimate the future cost of the smoking (Chaloupka, 1999).

Smoking is finding the biggest single cause of inequality in mortality and morbidity between rich and poor nations. Several studies national and international level of the developing countries has shown the association of tobacco use with socioeconomic determinants like age, gender, residence place, education, and ethnicity.

Bonu..., et al, (2004) investigated the infant child mortality rate is highly significant in families where smoking and alcohol users available. Also argue and recorded that the families have also low education level i.e., mother education is below secondary school, are poor and the age of mother is below 25 have high child deaths.

The children of the family who use solid fuel in the house have high risk of mortality and mobidity. Pandey & Lin, (2012) investigated the child mortality

associated with the parental tobacco use, and the solid fuel stove use in the house. By using secondary source of national family health survey of India 2005-2006. Data from multistage sample of the interview who are rural and urban male and female above the age 15, tobacco user and the women who use solid stove and become mother were extracted. Which argue that 22% women having deaths of child under 5 which is mostly of below 19 years age, 47 % of them belong to low education status and 12% are the tobacco users, also the 37% were face domestic violence and physical abuse and 70 % of the household relied on solid fuel stove.

2.5 Impact of Parental tobacco use on the children tobacco initiation

In many countries, children initiate tobacco use at very early ages. An estimated 82,000–99,000 young people start to smoke every day (Shafey, 2006). Most adult smokers start smoking from the adolescent. At start they are not using for any addiction but with time the addiction goes in the depth and the quitting is then not possible. There are many reasons of the tobacco use in the adolescence, but parental tobacco user is very common reason. Maternal smoking and paternal smoking equally influence offspring smoking. If parents are the smokers from the children of young age (3^{rd} grade) to the acquisition period (12^{th} grade) there are high chances that the child become daily smoker. The logistic regression analyses stated that there is high risk of children to become daily smoker when one of their parent's smokes with respect to nonsmoker family the odd ratio is 1.90 at p=.10 (AV Jr, et al., 2006).

To conduct an in-depth study on university students in Pakistan and examine their individual characteristics, smoking status, parental and sibling smoking were recorded in the study of Ahmad, et al. (2008). The logistic regression show that the parental smoking, siblings, and number of close friends were significant and highly predicative

of being smoker. The association of parental tobacco use and the risk of initiation of tobacco in adolescence is investigated in study in New England from 2001-2004 where about 564 adolescent age 12-17 were reported with one parent who use tobacco. The Discrete time survival analysis was performed to look at the influence of parental smoking history on adolescent smoking initiation. This study shows that the parents' smoking increases the likelihood that their children will start smoking. The likelihood of reproduction has an inverse relationship to the number of parents and the age of the parent in the population. This finding is interesting since it reveals that the influence of parental smoking on offspring gender is varied for each parent. Boys' initiations are far more than girls' traditional coming-of-age ceremonies. The study strongly emphasizes that parental smoking is vulnerable for the initiation of adolescent smoking and this vulnerability can reduced by parental smoking cessation (Gilman, et al, 2009).

Kovess, et al, (2013) suggests that there are three levels of influence linked with a young person starting to smoke which include individual self addiction, Sociocultural mean friend or peer, and environmental like living in a smoking household. The study which is about the association of parental tobacco use and smoking initiation among children of Hong Kong. The school-based survey of primary students was taken for the year 2008 and the baseline was 2006. Cross section and prospective association of parental smoking, secondhand smoking and children initiation of smoking were analyzed by logistic regression. Also, socioeconomics and demographic information were included as independent variables. The result of cross section association between the parental smoking and ever smoking was significant for sociodemographic but insignificant when adjusted with the secondhand smoking (SHS). The exposure of home SHS for each day is predicted 16% excess risk to the initiation of children

smoking when the parental smoking was adjusted. The parental smoking creates secondhand smoking in home which increases the risk of children smoking initiation and higher the exposure more will be initiation. And conclude to reduce the secondhand smoking in the house to save children health and the smoking initiation (Wang, Ho, & Lam, 2011). The study of (Siahpush M, 2010) states that adiction, passive smoking, and the risks to children entirely invalidate the notion of personal choice and personal responsibility. A parent who is addicted to nicotine will find it exceedingly difficult not to expose their child to smoking, even if they smoke outside the home. And that child has no option about whether they are exposed. The fetus and the young child are the most sensitive to, and the least able to avoid, the health repercussions of exposure to smoking by their parents. Older children and teenagers are, in addition, exposed to the role modeling of smoking by their parents

According to the research done by Ahmad, Rashid, and McDonald (2008), Pakistan's university students filled out questionnaires with smoking information, demographic information, parental and sibling smoking status from 624 young individuals aged 18-25. A study done with the logistic regression which shows that roughly 23% of the participants were current smokers, with an average age of 17. The probability of being a smoker was significantly correlated with parental smoking, siblings, and the number of close friends. The child smoking which in future become becomes the next generation of smoking parents. Tobacco's global burden comprises not only tobacco-related fatalities, sickness, and lost years of productive life, but also environmental harms, exploitation of cigarette farm workers, and exacerbation of poverty in contexts where limited family income is redirected from food purchases to tobacco purchases (Efroymson D. et al, 2001).

2.6 Summary and Gap of literature

The prevalence of tobacco is growing over the globe. Rural societies and less income countries have high prevalence rate. People with low socioeconomic position and a lack of awareness have a significant tobacco burden. Study by Khan, et al.., (2015) investigated the tobacco effect on the reproductive age of women in Pakistan belong to area where the tobacco prevalence is high. The result show that rural, uneducated, or less educated, above 35 years have high prevalence of tobacco. Sreeramareddy… et al, (2011) also explain this context and analyzed for Nepal that show low income and rural area have high prevalence. Parental tobacco and exposure of environmental tobacco smoke badly damage the health of children and sometime cause of death. The study in Faisalabad by (Sultana, et al 2017) has investigated the respiratory diseases include asthma, COPD, infection, and TB, all these diseases are due to smoking. The socioeconomics and demographic situations matter a lot for the child mortality and other health risks. According to (Singh & Singh, 2014) Indian children are experiencing ARI and diarrhea of about 48% who are living in slums where the environment is polluted, air quality and water sanitation facilities were miserable. And the parental education and mother exposure to the mass media has strongly associated with the prevalence of ARI. The educated father or mother or both have less likely odd ratio of ARI and mother's access to mass media have less exposure to ARI. ETS is important public health problem that adversely effects the health of children. The exposure of children in the second-hand smoking and parental tobacco use increased the risk of sudden infant death syndrome (SIDS), acute respiratory infection, and weakens the respiratory system, slow the growth of lungs which result the disability and deaths in children. Chaloupka, (1999) stated that babies born to smoker's mothers have low birth weight, high risk of respiratory diseases and more

likely to die of SIDS. Bonu..., et al, (2004) investigated the infant child mortality rate is highly significant in families where smoking and alcohol users available. Bhatta & Glantz, (2018) investigate for the south or southeast Asian countries, where father or mother tobacco use are highly significant to the child mortality. The use of tobacco products not only effects the health of the user, but adversely effects the children health and causes the morbidity and mortality (DiFranza, et al, 1996). Most adult smokers start smoking from the adolescent. There are many reasons of the tobacco initiation by adolescence, but parental tobacco use is very common factor. Adult smokers are the role model which increases the likelihood of children smoking as well. There is a significant relationship between parental tobacco consumption and children's smoking initiation. The study AV Jr, et al., (2006) stated when there is one parent who smoke in home must have high probability of children tobacco initiation and if it continues from grade 3rd to 12th of children than the children will be daily smoker. The risk of adolescent smoking initiation is influenced by parental smoking history, as examined by Gilman, et al (2009), in England from 2001 to 2004. These data suggest that the number of parents and the year of exposure all have an effect on the offspring's starting point.

Gap of literature

Developing countries like Pakistan has high burden of health problem due to tobacco use. The prevalence is very high, and the young and adolescence initiation of tobacco is rising alarmingly. Parents are unaware of the serious health issues among their children due their tobacco use. Secondhand smoking or ETS is reason of children deaths and many health risks. Respiratory diseases are common and serious health issue in children due to ETS. Parents need awareness and quitting strategies to reduce the ETS which can be possible only by research and polices. Provide clean

environment and reduce exposure of children from secondhand smoking in the homes. There are few studies that examine the relationship between parental tobacco use and children's health in Pakistan using DHS data. And while numerous medical studies addressing this issue exist, each is limited to a particular area or institute, there was no such study conducted by the PDHS in 2017-18 that examined the impact of parental tobacco use on child ARI, mortality, and initiation across the country. The global tobacco epidemic, which is already catastrophic, is expected to worsen drastically. If current trends continue, 1 billion people will die as a result of tobacco use this century. These deaths will be concentrated among the most vulnerable, those in low- and middle-income countries, as well as among the poor and less educated within these countries. The resources available to combat the tobacco epidemic are limited, especially given the magnitude of tobacco's negative health effects. Tobacco has a negative impact on nearly all of the United Nations Millennium Development Goals. The Framework Convention, the MPOWER report, and other relevant documents contain a road map for combating this epidemic. Many of the recommended strategies have a solid empirical base. Using tobacco control strategies to educate parents about the health effects of tobacco. For further assistance, healthcare experts can refer families to free telephone counselling services at quit lines, which are accessible in many countries, including the United States, Canada, Germany, Australia, Taiwan, and Hong Kong. Healthcare providers in both developed and developing countries can serve as advocates for tobacco-free children and families, as well as community smoking cessation resources. These tobacco-free family measures are simple to learn and practice, and they can have a significant influence on the health of children all around the world (Tobacco control policy, 2021).

3 CHAPTER 2

Methodology

3.1 Data

The study is based on the secondary data source of the latest Demographic Health Survey of Pakistan of the year 2017-18. PDHS provide comprehensive overview of child health and maternal issues. The PDHS is the nationally representative sample of 11,869 households interviewed including 12,364 ever married women 15-49 interviewed. And 3145 men ever married 15-49. The DHS is the reliable and most authentic survey on health of women and children including knowledge, awareness for the maternal health and child mortality information. The study provides the tobacco information, ARI, child mortality and other socioeconomic and demographic information on the household of the entire country. The samples represent the entire country which is all the provinces Punjab, Sindh, KPK, and Baluchistan, AJK, ICT and FATA.

3.2 Variables

The study investigates the child mortality, ARI, and children tobacco initiation. Socioeconomic, demographic, and environmental indicators are used to predict these indicators. Multiple logistic regression analyses are used to predict the impact of parental tobacco use on the child health i.e., Episode of ARI, mortality, and children initiation towards tobacco use.

3.2.1 Outcome Variables

The PDHS data is cross section data where respondents were interviewed. Data sets are divided into 10 sub-groups according to the respondents' characters. Each

question is coded as unique name. STATA version of data are used to analyze the result of this study. The outcome or dependent variable ARI, Mortality and child smoking Initiation are constructed as yes/no dichotomous indicator from children related section of PDHS 2017-18 survey. The variables are generated from relevant questions, each variable which are used in this study are explained in detail.

Question asked about symptoms of ARI among children under 5 years of age a) Had the children have short rapid breathing or difficulty in breathing? b) Was the fast or difficult breathing due to a problem in the chest or runny nose? Respondents who answered as yes in response of short rapid breathing and problem in chest or runny nose are classified as ARI (NIPS & ICF, 2019).

The second outcome or dependent variable mortality is response of mothers that give birth but later died who have age below 5 years (NIPS & ICF, 2019). The respondents were asked as number of sons and number of daughters who died? The answer as yes or any numbers of son/daughter died in response of both questions are classified as mortality and recoded as 1 (yes). Those who answer no one died are recoded as 0 (No).

Child smoking initiation the third outcome variable is generated from the household questionnaire section. Household members who are not married and relation to the household head is son/daughter, son/daughter-in-law, grandchild, brother/sister, co-spouse, nephew/niece and use any type of tobacco are expressed as child smoking initiation (Bhatta & Glantz, 2018). This variable is self-reported using PDHS questionnaire. Questions asking the marital status, relationship with the household head and tobacco use. The variable is recoded as 1 (yes) when the respondents answer as non-married (0), if use tobacco (1) and if they have relation

with household head as son/daughter, son/daughter-in-law, or grandchild which are coded in PDHS as 3,4,5,8,9 and 13 respectively.

3.2.2 Explanatory variables

Independent variables of model ARI, Mortality and child smoking initiation are mostly same. All the variables are extracted and generated using different techniques and each have different form which are explained below.

3.2.2.1 ARI

The independent variables for the ARI include age of child, household income, residence type, father education, mother education, father smoking, mother smoking, household member smoking in household, other type of tobacco use, childbirth interval, cooking fuel type, cooking place, birth order of children, mother employment, household size and region. The variables are added due to their direct or indirect association with ARI, and some are added because of previous studies, which are cited accordingly. These variables are generated after merging two data sets of PDHS which is birth of child related data (BR) and household respondents' data (PR). Merging is taken in the light of DHS guideline. The BR (birth related) is primary data for analyses and sorted by household id (hhid) and household number (hvidx). PR (household member) is the secondary file which is merged 1:1 because the study analyzes the children character in the household (Analyzing DHS Data, 2021).

Literature show that Age of child and household income are significant variables for ARI (Prietsch, et al., 2002). Variable age of child in survey data is continuous that is from 1-59 months. The PDHS question, what is the age of child? Is

reported. Household income is the ranks of household income level, or wealth quantiles (poorest, poor, middle, rich, and richest). The household income variable highly affects the child ARI (Walker et al, 2015 & Caleyachetty, et al., 2014). Type of residence is divided into urban and rural coded as 0 and 1. Following the (Holmes, 2006; Jatrana, n.d) as mother education and father education is an important predictor that changes ARI and mortality. Father and mother education is the level of education attainment that are scaled from 0 to 3 (no education, primary, secondary, higher). Father smoking and mother smoking variables are generated from the household tobacco use which are filtered gender wise. The PDHS question, do you smoke tobacco? which is binary mean 0 and 1 form (No/yes). Variable household member smoking is generated from frequency of smoking cigarettes in house by household member which are recoded as 1 when any cigarette smoked while recoded as 0 when no cigarettes are smoked. Other type of tobacco use is the tobacco use excluding cigarettes and included smokeless and some smoking tobacco types like hookah and water pipe. This is also binary data in 0/1 form when respondents answer is yes when they use other type tobacco as 1 otherwise 0. Childbirth interval is the preceding birth gap in months. The variable is divided into 6 scales, those who have gap in birth less than 17 months are coded as 1, coded as 2 when among 18 to 23 months and so on till code 6 when the birth gap is 60+ months. The variable childbirth interval is used by (Prietsch SO, 2002) in his study. Cooking fuel type include good and bad fuel type. Good fuel is electricity, LPG, natural gas, biogas, and kerosene while bad fuels are coal, charcoal, wood, shrubs, agriculture crop and animal dung. These are divided into 12 scales from good fuel towards bad fuel. Cooking place is the status of kitchen which the household have, like they cook food in house, separate room, or outdoor. The kitchen status is coded from 1 to 3. Birth order number is the children birth

number in the household from 1 to 15th. Variable mother employment is taken from the women questionnaires section asking women about the status of employment but here I use merge data, so the women is the mother of the child. Mother employment is scale according to the employment status of mother if they are not employed it is coded as 0 if currently not working, when employed in the past then 1 and mothers who are currently employed are coded as 2. Mother employment variable is important variable which influence the health of child through lack of time (Caleyachetty, et al., 2014, & Shiva, et al., 2003). Literatures show crowding that are responsible for the ARI. The household size is used for the crowding (Prietsch, et al., 2002). Household size is the number of members living in the household which are divided into 7 groups from 1 member to 47 members. Regions include all four province of Pakistan including GB, ICT, AJK, and FATA. Dummies are generated for all regions declaring ICT as base. Comparing all the regions with Islamabad regressed in the model.

3.2.2.2 Mortality

Independent variables which are responsible for the mortality include age of child, household income, residence type, father education, mother education, father smoking cigarettes, mother smoking cigarettes, other type of tobacco use, household member smoking, tobacco use (including cigarettes), birth order number, mother age at marriage, and access to media. These variables are generated after merging two data sets of PDHS which is birth of child related data (BR) and household respondents' data (PR).

Many of the variables including age of child, household income, residence type, father education, mother education other type of tobacco use, household member smoking, cooking fuel type and birth order number having same nature and same

characters that are used in the ARI model. Hence following the same technique that are explained in the above paragraph 3.4.1 which are same variables. The variables which are different and used in the mortality model are explained one by one. Variable father smoking cigarettes and mother smoking cigarettes are binary variables which are generated from the household smoking cigarettes variable that is filtered gender wise. Respondents answer yes if they smoke cigarettes and coded as 1 (AV Jr, et al., 2006)otherwise 0. Tobacco use that include smoking cigarettes and other type of tobacco is coded 1 when answer of the respondents is yes. Mother age at marriage is the women respondents that is the age of mothers at marriage which is between 10 to 39 years. Mother age at marriage is the continuous variable and is analyzed by (Bonu, et al., 2004) in his study for child mortality in India. Access to media is the frequency of listening to radio which are code as 1 if the respondents listen radio less than once in week, coded 2 when listening radio once in week. If they don't listen is coded as o. Data collected by (Wang, et al., 2011) in the study to analyse the association of parental tobacco use for mortality include access to media.

3.2.2.3 Child smoking initiation

Predictors for Child smoking initiation include parental tobacco use, household member tobacco use, age of child, parental education, and household character like income, residence type, region. Each variable is generating using the PDHS questionnaires which are asked from two different sections. The sections childbirth character (BR) and household characters (PR) are merged based on their household line number.

Age of child, household income, type of residence, mother and father education follow the same technique which is followed in the generating of independent

variables of ARI model. The variable father/ mother smoking cigarettes using the question asked from the household member that they smoke cigarettes in house or not then only father and mother data is extracted and divided into two variables. For this if code is applied mean replace 1 (yes) if household member that smoke is mother/ father. Variable Other type of tobacco use is question asking parents that they use any other type of tobacco or not. If they use any other type of tobacco excluding cigarettes are recoded as 1 (yes) otherwise 0.

3.3 Statistical analysis

The association between ARI, mortality, and child smoking initiation and parental tobacco use is determined using multivariate logistic regression analysis. Because the outcome variables are binary, i.e., they have a value of 0 or 1. They should be analyzed using multivariate logistic regression and Chi-squared tests to verify if variables significantly associated with the dependent variables. For the interpretation odd ratio for each independent variable is calculated using e^{β}. Where β is the coefficient of predictor (Choueiry, 2021).

3.4 Model

Due to binary nature of the dependent variable logit model is used. Each model is illustrated in equation form.

3.4.1 Acute respiratory infection (ARI) among children

Examining the child ARI, study use socioeconomic characters, demographic information's, and some environmental indicators. Children under 5 years of age who

are having any symptoms of ARI which are short rapid breathing, problem in the chest and blockage in chest or nose are recoded and taken as dependent variable. While parental tobacco use including maternal and paternal tobacco use or both, parents' education, and child characters related variables i.e., age, birth order number and birth interval are the independent variables. The independent variables also add some household characters that effect child health including kitchen status, fuel type used for cooking, income, residence, and region.

3.4.1.1 **General form of ARI Model**

$$y = \beta_\circ + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \cdots \beta_{16} x_{16} + \varepsilon_\circ \qquad (3.1)$$

Table 3.1: Data Description of ARI Model

VARIABLES	DESCRIPTION
Y	Y is the output variable ARI
B_O	β_o is the intercept
B	β is the coefficient of their predictor x
X_1	x1 is age of child
X_2	x_2 is household income
X_3	x_3 is type of residence
X_4	x_4 is father education
X_5	x_5 is mother education
X_6	x_6 is father smoking
X_7	x_7 is mother smoking
X_8	x_8 is household member smoking
X_9	x_9 is other type tobacco use
X_{10}	x_{10} is the birth interval
X_{11}	x_{11} cooking fuel type
X_{12}	x_{12} kitchen Status
X_{13}	x_{13} childbirth order
X_{14}	x_{14} women employment
X_{15}	x_{15} household size
X_{16}	x_{16} region

3.4.2 Mortality

Analyzing the mortality of child with association of parental tobacco use logistic regression model is used. Mortality (a binary variable) is dependent or explanatory variable while parental tobacco use (parental and other family member in the house), cooking fuel choices, access to media, age of mother at marriage, and other

socioeconomic and demographic information are independent variables. The model for mortality is given below.

3.4.2.1 General form of mortality Model

$$y = \beta_\circ + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \ldots \beta_{14} x_{14} + \varepsilon_\circ \quad (3.2)$$

Table 3.2: Data Description of Mortality Model

VARIABLES	DESCRIPTION
Y	Y is the output variable mortality
B_O	β_o is the constant
B	β is the coefficient of their predictor x
X	x is the independent variable
X_1	x1 is age of child
X_2	x_2 is household income
X_3	x_3 is type of residence
X_4	x_4 is father education
X_5	x_5 is mother education
X_6	x_6 is father smoking
X_7	x_7 is mother smoking
X_8	x_8 is household member smoking
X_9	x_9 is other type tobacco use
X_{10}	x_{10} is the tobacco use (both smoking and smokeless)
X_{11}	x11 cooking fuel type
X_{12}	x_{12} childbirth order
X_{13}	x_{13} mother age at marriage
X_{14}	x_{14} access to media

3.4.3 Smoking initiation

The children tobacco use is investigated from those tobacco users who are never married in the household mean are brother, sister, daughter, or son to the household

head and are smoker/ user of tobacco. This includes the parental tobacco use, their status and other socio economic and demographic information. The model for the child smoking initiation is given below.

3.4.3.1 General form of smoking initiation model

$$y = \beta_\circ + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \ldots \beta_{10} x_{10} + \varepsilon_\circ \quad (3.3)$$

Table 3.3: Data Description of Smoking Initiation Model

VARIABLES	DESCRIPTION
Y	Y is the output variable which is child smoking initiation.
B_O	β_o is the constant
B	β is the coefficient of their predictor x
X	x is the independent variable
X_1	x_1 is age of child
X_2	x_2 is household income
X_3	x_3 is type of residence
X_4	x_4 is father education
X_5	x_5 is mother education
X_6	x_6 is father smoking
X_7	x_7 is mother smoking
X_8	x_8 is household member smoking
X_9	x_9 is other type tobacco use
X_{10}	x_{10} childbirth order

4 CHAPTER 4
RESULTS AND DISCUSSION

4.1 Prevalence of tobacco use among rural/urban

The use of tobacco and its products varies by area. This study show that tobacco use is prevalent among rural populations. There is total 4126 tobacco users, majority of them are men belonging from rural areas as shown in table 4.1. Tobacco and its products are used by 869 men and 815 women in the urban population, which represents 40% of the total users. A total of 2442 rural residents (59.19 percent) use tobacco and tobacco products. There are 1278 men and 1164 women in this group. ARI episodes are common in rural areas, owing to the high frequency of tobacco use among the rural population. Table 4.1 shows that 5.34 percent of children exhibit ARI symptoms. While 4.84 percent of youngsters in urban areas have an ARI problem.

Table 4.1 Prevalence of Tobacco Use Over Rural/Urban And ARI

Prevalence	**Frequency (Number)**	**Percentage (%)**	**Men (Number)**	**Women (Number)**	ARI (%)	
					No	Yes
Urban	1,684	40.81	869	815	95.16	4.84
Rural	2,442	59.19	1,278	1,164	94.66	5.34
Total	4,126	100	2,147	1,979	94.83	5.17

Author analysis

4.2 Prevalence of tobacco use among the regions

According to (Nayab et al.., 2020) Baluchistan province of Pakistan has high tobacco users than the other provinces while using HIES Data. The same findings are

observed in our study, which uses DHS data. Baluchistan consumes 25.6 percent tobacco which is higher than other provinvces (Figure 4.1). Sindh is the second most consuming tobacco province, the prevalence is 16.5 percent. Punjab shows 7 percent prevalence of tobacco and their products. The prevalence in Gilgit Baltistan (GB) is 5.6%. The province of Khyber Pakhtunkhwa (KP) has an extremely low prevalence of 3 percent. It is low in all provinces, including Islamabad Capital Territory (ICT) and Azad Jammu Kashmir (AJK) where the prevalence is 4.6 and 4.1 percent respectively. FATA has a prevalence rate of only 1.8 percent.

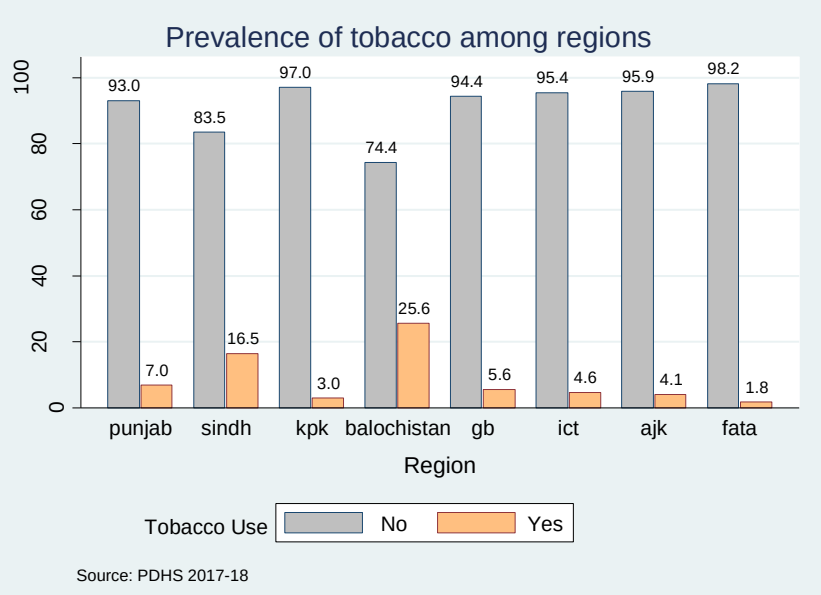

Figure 4.1 Prevalence of tobacco among provinces

4.3 ARI

We attempt to explore the factors affecting ARI by employing multiple logistic regression. Since the ARI is in binary form so logistic regression is more appropriate. The probability of ARI is 0.78 when all variables are 0, implying that there are some

variables which are affecting ARI but not included in the model. The likelihood of ARI decreases by 4% for each year when a child's age increases (Table 4.2). Children from high-income families had fewer ARI episodes because their parents take good care of their children's health. The findings indicate that income has a negative and significant effect on the ARI. Which means that a one-level increase in income reduces the probability of ARI by 13%. Tobacco-using families in rural areas have lower ARI among their children. When compared to urban residents, the likelihood of ARI decreases by 26% when the residence is rural. The findings clearly suggest that ARI is prevalent in urban settings where tobacco consumption is considerable. Because rural areas have open houses, clean environments, and well-ventilated dwellings, and parents in joint families avoid smoking in front of their children in Pakistan. Literature also supports these findings as Walker et al (2015) reported that remote or rural communities in Australia have considerably low ARI events than the urban or cities population. The father's and mother's education levels are inconsequential according to logistic regression. That is, they have no effect on the ARI's odd ratio. Children's birth intervals are not accountable for any variations in ARI events. Our findings indicate that both father and maternal tobacco usage are contributing to the upsurge in ARI. Children whose fathers smoke have a 39 percent increased risk of developing ARI compared to children whose fathers do not smoke. The results indicate that maternal smoking is highly significant at a 95% confidence interval. Tobacco-using mothers are 45% more likely to have ARI in their children than non-smoking mothers. Apart from parents, household members who smoke are insignificant. Other modes of tobacco usage are also negligible. As the type of fuel changes from good to bad, the probability of ARI increases by 1.03. In other words, using dirty fuel for cooking increases the likelihood of ARI by 3% as compared to

using clean/eco-friendly fuel for cooking. Families that utilise inefficient cooking fuels such as coal and dung experience an increase in ARI episodes. Cooking establishments have a negligible relationship with ARI. The birth order of the children is significant and has a positive relationship with ARI. A one-unit increase in the birth order number increases the probability of ARI by 3%. Children whose moms were employed had a higher risk of ARI (OR 1.17 at 90% confidence interval) than children whose mothers were not worked. Regions are the dummy variables with base as Islamabad (ICT). Comparing with ICT only punjab and kpk shows significance. ARI increases in the above mentioned regions. ARI increases by 25% in Punjab and 23% in KPK. As due to rise of cigarates smokings in these regions the ARI are high.

Table 4.2 Result of logistic regression of ARI

ARI	Coefficient	Odd Ratio	P>|Z|
Intercept	-0.25 (0.26)	0.78	0.34
Age of Child	-0.04*** (0.01)	0.96	0
Household Income	-0.14*** (0.04)	0.87	0
Residence Type	-0.3*** (0.07)	0.74	0
Father Education	0.02* (0.02)	1.02	0.2
Mother Education	0.02 (0.03)	1.02	0.6
Father Smoking	0.33*** (0.14)	1.39	0.02
Mother Smoking	0.37*** (0.14)	1.45	0.01
Household Member Smoking	0.06 (0.06)	1.06	0.32
Other Type of Tobacco Use	-0.02 (0.18)	0.98	0.92
Birth interval	0.01 (0.02)	1.01	0.61
Cooking Fuel Type	0.02 (0.01)	1.02	0.23
Cooking Place	0.03 (0.09)	1.03	0.72
Birth Order Number	0.03*** (0.01)	1.03	0.03
Mother Employment	0.16*** (0.04)	1.17	0
Household Size	0 (0.02)	1	0.99
Punjab	0.22* (0.13)	1.25	0.1
Sindh	-0.18 (0.14)	0.84	0.2
KPK	0.21* (0.14)	1.23	0.12
Baluchistan	-0.18 (0.15)	0.84	0.24
Gilgit Baltistan	-0.04 (0.16)	0.96	0.81
AJK	0.15 (0.15)	1.16	0.3
FATA	-0.16 (0.16)	0.85	0.34

*** Significant at 1 %

** Significant at 5%

*Significant at 10%

4.4 Region wise ARI and tobacco use

Tobacco usage and ARI are different in each region. Children with ARI episodes are more likely to live in areas where tobacco use is high. Cases of ARI are expected to be more prevalent in Baluchistan than in other areas. Baluchistan's ARI-affected children have a tobacco-using parent in 50.8 percent of cases (Figure 4.2). Then there's Sindh, where 25% of ARI-affected children's parents are tobacco users. GB and ICT account for 6.4 and 4.8 percent of parents' tobacco consumption, respectively. Cases of ARI among children have been reported, Punjab, AJK and KP have 4.7, 4.3 and 3.1 percent of tobacco users, respectively. FATA shows very low ARI. The graph (4.2) clearly illustrates that ARI is caused by the parents' tobacco use. Tobacco consumption is only 36 percent in non-affected ARI homes in Baluchistan.

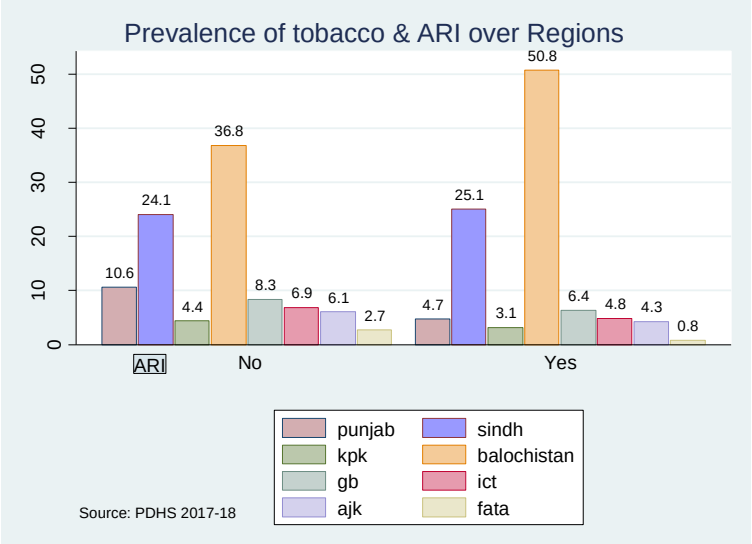

Figure 4.2 Percentage of tobacco usage by area for children with or without ARI

4.5 ARI and Tobacco Usage with Relation to Income

This study investigates the association between ARI and household income. Children from low-income families have a higher prevalence of ARI and tobacco use. Their rate is depicted in figure 4.3. Children from the poorest households had an ARI of 49.1 and use tobacco. It is obvious that when tobacco usage in the household is high, the ARI will be high. The poorer have 57.2 percent of ARI for tobacco users, whereas

the middle income has 44.4 percent. The ARI is lowered from 44.9 percent to 29.3 percent when income increase from richer to richest, respectively. The data clearly shows that high-income households have exceptionally low rates of ARI in their children and parental tobacco use, emphasizing that the income gap must be overcome.

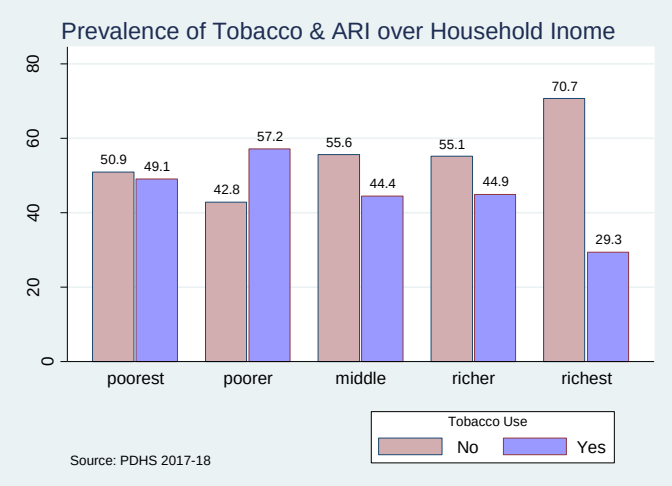

Figure 4.3 ARI and Tobacco Usage Over Household Income

4.6 Mortality

A household who had lost one or more children under age of 5 years is regarded as a dependent variable in the model and is referred to as mortality. The relationship between child mortality and parental cigarette usage is depicted in the following table: 4.3. The independent variables that contributed significantly positively to the model (mortality) in our study include child's age, the type of residence, the mother's smoking status, the smoking status of household members, the father's smoking status, other types of tobacco usage, all types of tobacco (smoking and smokeless), and birth order at a level greater than 95 percent C. I. While the mother's education, household income, and age at the time of marriage all had a negative and significant

impact. Since older children are more exposed to ETS, they are more likely to suffer than younger ones which are shown in the table 4.4. Each additional year of a child's age increases the likelihood of mortality by 9%. This outcome is probably due to tobacco exposure; when a child is exposed more to tobacco, his or her risk of dying increases. The results show that children from high-income families are less likely to die than children from low-income families. Growing one level of income from poorest to richest reduces the probability of mortality by 0.83. In other words, one-level increase in wealth reduces the relative risk of mortality by 17%. High-income families provide enough health care and assistance to their children, whereas the low income bear no healthcare expenditures. According to our findings, rural areas are more likely to have a greater rate of death than urban areas. Children's health suffers as a result of a lack of services in remote areas and improper healthcare facilities. Children from rural areas suffer a 25% greater chance of mortality than urban residents. Rural communities are more likely to consume tobacco, which has a bigger influence on child health and mortality than it does in urban areas. This result is supported by study (Bhatta & Glantz, 2018), which shows that rural areas have higher death rates than urban areas. The analysis reveals a relatively low mortality rate for children born to educated mothers. Increased maternal education by one level reduces the relative risk of child mortality by 9%. Children whose fathers smoke have a 73% higher risk of mortality compared to children whose fathers do not smoke. The findings of this study, mother smoking is severely detrimental to a child's health, it increases 97 percent risk of child mortality compared to nonsmoking mothers. It is reported that children who live in families where any other family members smoke cigarettes have a high mortality rate. Smoking household members has a 28 percent risk of mortality compared to non-smoking household members. Other tobacco

products, excluding cigarettes, have a major impact on mortality. The addition of one more tobacco user result in an 88 percent increase in mortality. When parents use both types of tobacco, i.e., smoking cigarettes and other types of tobacco, the mortality rate increases. Tobacco use, including smoking, causes a 73% increase in mortality. Tobacco use is responsible, regardless of whether it is parental smoking, household member smoking, or other types of tobacco use, and smoking cigarettes or other types of tobacco use increases child mortality. The type of cooking fuel used, which includes both clean and dirty fuel, has an impact on the health of children (Roser, 2013). When the degree of cooking fuel is increased from ecofriendly to bad fuel consumption, the chance of death decreases by 2%. This means that the use of clean fuels such as gas, electric heaters, and oil reduces mortality, whereas the use of dirty fuels such as coal, dung, and wood increases mortality. Children born in the most recent birth order or those born after other children have a lower risk of mortality than first born children. A one-unit increase in birth order increases the probability of mortality by 49%. Mother's age at marriage also has a detrimental effect on mortality. Mothers who marry at a young age have a high rate of infant mortality, but mothers who marry later in life have a far lower rate. As illustrated in Table 4.3, increasing the mother's age at marriage results in a 3% decrease in mortality.

Table 4.3 Result of Logistic Regression of Mortality

Mortality	Coefficient	Odd ratio	P>|z|
Constant	-5.76 (0.38)	.01	0
Age of Child	0.09*** (0.01)	1.09	0
Household Income	-0.19*** (0.03)	0.83	0
Residence type	0.23*** (0.07)	1.25	0.01
Father Education	0.01 (0.03)	1.01	0.83
Mother Education	-0.09** (0.05)	0.91	0.04
Father Smoking	0.55** (0.26)	1.73	0.03
Mother Smoking	0.68*** (0.26)	1.97	0.01
Household Member Smoking	0.25*** (0.06)	1.28	0
Other Type of Tobacco Use	0.63*** (0.26)	1.88	0.01
Tobacco Use (all)	0.55** (0.27)	1.73	0.04
Cooking fuel type	-0.02* (0.01)	1.02	0.18
Birth Order Number	0.40*** (0.01)	1.49	0
Age At Marriage	-0.03*** (0.01)	1.03	0
Access To Media	0.05 (0.06)	1.05	0.37

*** Significant at 1 %
** Significant at 5%
* Significant at 10%

4.7 The relationship between mortality and tobacco usage and household income

Tobacco usage and household income have an impact on the mortality of children. Figure 4.4 depicts the relationship between child mortality and parental tobacco use in this study. Mortality decreases from 13% to 9% as income grows. As

income increases, education improves and tobacco usage declines, resulting in a drop in mortality.

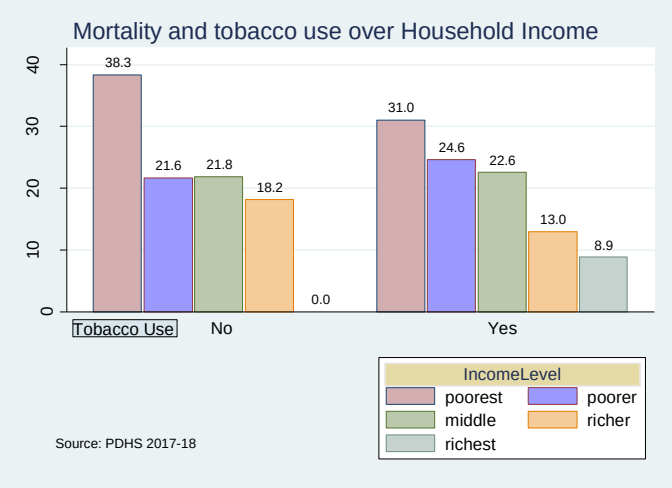

Figure 4.4 Mortality over the Household income level and tobacco use

4.8 Child smoking Initiation

Numerous factors contribute to children starting to smoke, but the availability of cigarettes and parental smoking are the primary contributors (Harvey et al.., 2016). The relationship between child smoking initiation and parental smoking behavior, as well as other characteristics, is summarized in Table 4.4. When all other variables are zero, the intercept in the table reveals that the odd ratio is 0, meaning that the likelihood of starting smoking is 0.5. As per our findings, the age of a child has a favorable and significant relationship with mortality. A one-year increase in a child's age is associated with a 49 percent increase in the risk of the child initiating to smoke. The likelihood of a child smoking decreases probability of 0.88 with household income increases. In other words, increasing household wealth reduces relative smoking initiation by 12% for each level of income score. Father education in our findings show significant contribution (at 90% C.I). When a father's education level

rises by one level, smoking initiation rises by 9%. This is because that educated fathers are mostly jobholders and spend most of their time away from home, and impose less limitations on their children than illiterate or unemployed fathers (Hill et al., 2005). Both father and mother smoking show relevance at the 1% significance level. Father smoking increases the likelihood of a child starting to smoke by 72.9. While maternal smoking raises the likelihood of a child starting to smoke by 75.94. At 90%, household member smoking is significant. C.I. smoking by a household member reduces kid smoking initiation by 19%. The household member is defined as anyone else (other than parents) who smokes cigarettes in the house, which minimizes smoking initiation. Other types of tobacco usage by parents are significant at the 1% level. The use of various forms of tobacco (other than cigarettes) raises the likelihood of a child starting to smoke by 259.83. Regions are the dummy variables with base as Islamabad (ICT). Comparing with ICT only AJK and FATA are shows significance. Mean child smoking initiation reduces in the above mentioned regions. Smoking initiation decreases by 86% in fata. The FATA are the triable area where the parents monetering are high related to ICT and other provinces. As we have seen, parental tobacco use, whether cigarette or other sort of tobacco, enhances children's smoking initiation. Cigarette smoking by parents is associated with a higher rate of smoking initiation than other tobacco use.

Table 4.4 Result of Logistic Regression of Child Smoking Initiation

Child smoking initiation	**Coef.**	**Odd ratio**	**P>|z|**
Constant	-12.07 (0.48)	0	0
Age of Child	0.4*** (0.01)	1.49	0
Household Income	-0.13*** (0.05)	0.88	0.02
Type of residence	-0.02 (0.12)	0.98	0.89
Mother Education	-0.05 (0.08)	0.95	0.56
Father Education	0.09* (0.05)	1.09	0.06
Father Smoking	4.29*** (0.17)	72.97	0
Mother Smoking	4.33*** (0.18)	75.94	0
Household member smoking	-0.21** (0.11)	0.81	0.05
Use other type tobacco	5.56*** (0.16)	259.82	0
Punjab	0.03 (0.27)	1.03	0.92
Sindh	0.02 (0.26)	1.02	0.95
Baluchistan	-0.12 (0.27)	0.89	0.64
KPK	-0.34 (0.3)	0.71	0.25
Gilgit Baltistan	0.16 (0.33)	1.17	0.63
AJK	-0.45* (0.32)	0.64	0.17
FATA	-1.98*** (0.56)	0.14	0

*** Significant at 1 %
** Significant at 5%
*Significant at 10%

In view of the findings from our study analysis, we may conclude that parental tobacco use has a significant impact on child ARI, mortality, and smoking initiation. Income and mother education are among the high significant factors which negatively

affect mortality, ARI and child smoking initiation. Sreeramareddy et al. (2011) highlighted the income component of child mortality in their study and proposed that the income disparity be resolved in order to control child mortality.

The outcomes of this study suggest that parental tobacco use should be reduced through education of parents, particularly mothers, and compliance with legislation in restricting secondhand smoking exposure. Income disparities must be narrowed.

5 CHAPTER 5
Conclusion and recommendations

This study shows that parental cigarette smoking has an impact on children's health. Parental tobacco use raises the risk of ARI in children, which is also a cause of child mortality. Tobacco usage among parents raises the chance of their children starting to smoke. The analyses show that parental tobacco use is responsible for ARI, child mortality, and an increase in the commencement of tobacco use among their children. Household income had a detrimental impact on the ARI, mortality, and the initiation of kid smoking. With each level of income increase, the ARI is reduced by 9%, while child mortality is reduced by 17% and child smoking initiation is reduced by 13%. The type of residence also has a big impact. Mother education has a major impact on mortality. The chance of mortality decreases by 9% for each level of education attained by the mother. In addition, each level of mother education reduces kid smoking initiation by 2%. Urban areas have a higher risk of ARI than rural areas. When a child lives in a rural region, the ARI is reduced by 23%. In rural locations, children start smoking at a lower rate than in metropolitan areas, at around 1%. Only mortality is high in rural areas, which is due to poverty and a low level of education.

Smoking increases the risk of ARI, mortality, and child smoking initiation. But mother smoking highly responsible for it. Mother smoking has 28% more likely episodes of ARI than the nonsmoking mothers. While mother smoking rises the child mortality by 68% compare the nonsmoking mothers. Mother smoking are more likely have child smoking initiation. Other household members smoking increases the risk of mortality and child smoking initiation. Other type of tobacco use is more likely increase the mortality about 63% and increases the child smoking initiation by 57%.

Tobacco harms three Millennium Development Goals, including child health, maternal health, and environmental sustainability. This is especially significant given the prevalence of tobacco use among the poor and those with the least education, who are also the least aware of tobacco's negative health effects. Children are particularly vulnerable (The Millennium Development Goals, 2007). According to WHO around 1200 people start tobacco daily in Pakistan (WHO, 2005). Currently the use of Sisha and vape (electric cigarette) emerging among young and educated class which are the lack of awareness and weak implementations of tobacco control policies. Many studies prove that household tobacco use is responsible for the Adolescence initiation of tobacco. SHS are very dangerous and detrimental particularly for the child health (AD, et al., 2010). SHS possess harm to children and infants. Parents monitoring is reduced when they are employed. Household income which is among highest factors in the child health as this study show that high income families have very low mortality, ARI, and very low child smoking initiation. Education of parents specifically mother education reduces the child ARI and mortality. When mother is educated, she is aware the consequences of smoking indoor. The fuel use in kitchen also is among factor of ARI and mortality of child. Bad fuel use like coal, wood, dung etc. increases the risk of ARI and mortality among children.

5.1 Recommendations

Taking these findings into account, some form of enforcing policy is essential to limit cigarette consumption. Legislation requiring a smoke-free environment is necessary (Ossip et al.., 2014). The Ministry of National Health Services (MNHS) has signed the Framework Convention on Tobacco Control (FCTC) in order to safeguard the people from health and economic consequences, but additional aggressive initiatives

are required (Nayab et al, 2018). Education strategies are required to limit exposure to secondhand smoke (SHS) in the home. Strict tobacco policies are necessary, since the study (Kovess et al., 2013) demonstrates that secondhand smoking exposure is increased in areas with lax tobacco control measures. As the study demonstrates, when a mother's education level is low, her child's health is at greater danger than when the mother is educated. As a result, female education must be improved. Parental tobacco use, particularly smoking tobacco, needs to be reduced in households, as children exposed to a smoking environment have a higher risk of ARI and mortality. Below are some bullet points that are offered in light of this study's findings.

- Female education needs to improve as children with health problems are reduced as a result of mother education.
- Tobacco usage by parents must be reduced in their household. Tobacco-free household guidelines should be incorporated into the national tobacco control policy.
- Income disparities, which are a major predictor of mortality and child health, must be narrowed.
- Rural sections of the country must flourish by expanding hospitals and educational institutions.
- Promotion of communication tactics aimed at increasing community understanding of the health, environmental, and economic repercussions of tobacco use and exposure to SHS.
- Creating and promoting anti-tobacco public awareness campaigns and media campaigns.

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Appendix

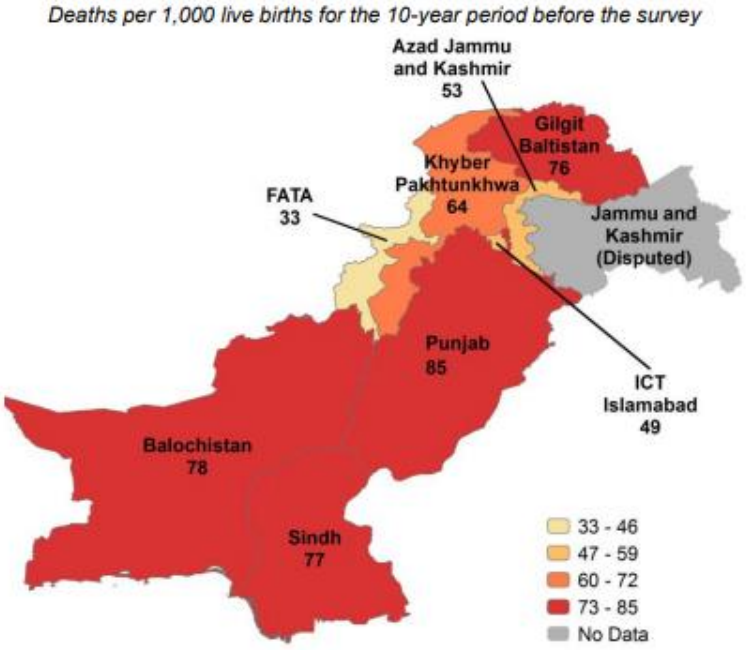

Figure 7.1 Mortality of children over the region