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The Role of Gender Equality and Economic Development in Explaining Female Smoking Rates

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THE ROLE OF GENDER EQUALITY AND ECONOMIC DEVELOPMENT IN EXPLAINING FEMALE SMOKING RATES

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LIST OF TABLES AND FIGURES

Samina Shariff
The Role of Gender Equality and Economic Development in Explaining Female Smoking Rates
(Under the direction of Dr. Michael Eriksen, Faculty Member)

Globally female smoking rates are considerably lower than male smoking rates. However, there is great concern regarding female smoking due to the potential for future increases and the associated harm to health. To gain a better understanding regarding female smoking, this study examines the role of gender equality and economic development in explaining the variability in female smoking rates and female-to-male smoking differentials by examining data from 193 World Health Organization member states. Data on the dependent variables, female smoking prevalence rates and female-to-male smoking prevalence ratio, were obtained from the Tobacco Atlas. Data on independent variables i.e., measures of gender equality and gross national income per capita, proxy measure for economic development, were obtained from the 2005 Human Development Report, Central Intelligence Agency, and the World Bank. A composite gender equality index was constructed from the individual measures of gender equality. Multiple regression analysis showed composite gender equality index and gross national income per capita to be significant positive predictors of relative and absolute female smoking rates, with income being a stronger predicator. Individual measures of gender equality failed to show significance with either dependent variable. The results attest to the need for disentangling smoking from the notion of advancement in gender equality and economic development.

INDEX WORDS: female smoking prevalence, gender equality, gross national income, regional average, multiple linear regression, World Health Organization regions, cross-national

CHAPTER I

INTRODUCTION

The past two decades have seen an increase in cigarette consumption in middle- and low-income, less-developed countries [1]. Today, an estimated 1.25 billion people smoke, with about 82% of the world's smokers residing in middle-and low-income countries [1, 2]. In contrast, there has been a decline in overall cigarette consumption in high-income, more developed countries [1, 3]. Not only are there significant differences in the smoking patterns globally, but there are also wide variations in the smoking patterns of men and women worldwide. About 35% of men in developed countries and 50% of men in developing countries smoke [2]. For women, the pattern is reversed with more women smoking in developed countries (22%) than those in developing countries (9%) [2]. Smoking rates also vary significantly among countries. For example, the female smoking prevalence rates in Denmark, Norway, and Netherlands are 25%, 24.8%, and 28.4%, respectively, while those in Burkina Faso, Ethiopia, and Morocco are less than 1% [2]. In many countries in Asia, such as China, Thailand, Sri Lanka and Indonesia, and in much of the Middle East, male smoking rates are ten or more times greater than female smoking rates [2]. While in other countries, such as Nauru, Cook Islands, and Sweden, women have higher smoking rates than men. Alternatively, almost as many women as men smoke in many European countries and in countries such as Canada, United States, and Australia [2].

Higher smoking rates among males in a majority of countries give the impression of smoking being predominantly a male problem. However, there is great concern regarding female smoking due to the potential for future increases and the associated harm to health. By 2025, the absolute number of female smokers is expected to rise from the current 250 million to 532 million [4]. This represents a net increase of 112.8% over an 18 year period. The increase in spending power of women, weakening of social and cultural constraints that prevent smoking, clever tobacco marketing campaigns targeting women, and limited women-specific health education and quitting programs, especially in developing countries, will have enormous consequences for women's health and economic well-being [4].

Given the well-established link between smoking and a variety of fatal diseases, the addictive nature of nicotine, and the difficulty of cigarette cessation, the relative rise of smoking among women has generated much public health concern. Women, in addition to health risks they share with men, also face increased risks of cardiovascular disease with use of oral contraceptives, higher rates of infertility, early menopause, female-specific cancers, irregular menstruation, and pregnancy risks [5]. It has also been suggested that due to a combination of biological, psychological and social factors as well as reduced accessibility to quitting advice and treatment women may find it more difficult to quit smoking than men [6]. If the percent of women smokers increased to that of men, it would be an unmitigated global public health disaster. To prevent this from happening, it is important to understand the factors that explain the differential between male and female smoking prevalence rates cross-nationally. One explanation that has received mixed reviews in literature is the role of gender equality in explaining the global gender differences in prevalence rates. Another explanation that has generated interest is the role of economic development. Conflicting views spark the need for further research. Hence, this study will examine the global gender differential in smoking rates across all regions of the world and investigate whether this difference is a function of the level of gender equality. Specifically, the purpose of this study will be to answer the following questions:

1) What is the gender specific smoking prevalence rate and female-to-male smoking prevalence ratio by World Health Organization (WHO) region, level of gender equality, and level of economic development?
2) Is there an association between female smoking prevalence rates and relative female-to-male smoking prevalence ratio with the level of gender equality?
3) Is there an association between female smoking prevalence rates and relative female-to-male smoking prevalence ratio with the level of economic development?
4) Is there an association between the level of gender equality and the level of economic development in a nation?
5) If association exists, which measure is a stronger predictor for absolute and relative female smoking: gender equality or economic development?

CHAPTER II

REVIEW OF THE LITERATURE

Approximately 1 billion men and 250 million women in the world are current smokers [2]. In almost every country of the world, female smoking rates are lower than male smoking rates. Several studies have tried to explain why females tend to smoke less than males. Some explanations have focused on gender differences in coping strategies [7]; personality differences [8]; differences in the metabolism of nicotine [6]; influence of parents and peers [9]; and differences in smoking histories and social influences [10, 11]. While gender differences in smoking rates exist across the world, some countries exhibit a greater differential than do other countries. For example, countries such as China, Thailand, Sri Lanka, Indonesia, Morocco, and Ethiopia have male smoking rates that are ten or more times greater than female smoking rates. However, other countries such as Canada, United States, Australia, and many European nations have male and female rates that are close to parity (Table 2.1).

Table 2.1: Smoking Prevalence Rates for Selected Countries [2]

	Smoking prevalence (%)		**Male Prevalence / Female Prevalence**
Country	**Males**	**Females**	
Australia	18.6	16.3	1.1
Canada	22	17.0	1.3
China	57.4	3.5	16.4
Ethiopia	5.9	0.3	19.7
Indonesia	58.3	2.9	20.1
Morocco	28.5	0.1	285.0
Norway	27.2	24.8	1.1
Sri Lanka	23.2	1.7	13.6
Sweden	16.7	18.3	0.9
Thailand	48.5	2.9	16.7
United States	24.1	19.2	1.3

Surprisingly, little is known about the determinants of these global, gender differences in smoking and why these differences are higher in some countries than in others. Previous studies on this issue have focused more on describing the smoking prevalence of men and women globally than on tackling questions about the national sources of the differences [2, 12-15]. Of the studies that have examined determinants of cross-national smoking patterns, a majority have focused exclusively on high-income nations [16, 17]. This study will examine the contribution of gender equality and economic development in explaining gender differences in smoking prevalence by examining the data from 193 member states of the WHO [18].

Whereas adult smoking patterns show pronounced gender differences, little gender difference exists among teenage smokers. The Global Youth Tobacco Survey (GYTS) is an international surveillance project developed by WHO and the US Centers for Disease Control and Prevention to enable countries to monitor youth tobacco use and guide implementation and evaluation of tobacco prevention and control programs [19]. Findings from GYTS research [20-22] show that the difference in current cigarette smoking between boys and girls is smaller than the difference between men and women. Results of previous studies have shown that men are four times more likely than women to smoke [14]. By contrast, GYTS data have shown that boys aged 13–15 years are only 2.3 times more likely to smoke than girls, and in many countries there are no significant gender differences in cigarette smoking and other forms of tobacco use [21, 22]. If the similarity in smoking rates by sex persists as these students age into adulthood, this difference in behavior compared with older groups will have important implications for the global burden of chronic diseases and future mortality projections. Increase in tobacco use by girls and narrowing sex differential in tobacco use among adolescents is a recent and unexpected behavioral change in many parts of the world where tobacco prevalence among women is low compared with men [22].

The consequences of gender equality as an explanation for the difference between male and female smoking rates have received some support in the literature. Pampel [23] refers to this phenomenon as the 'gender-equality hypothesis'. Cigarette smoking, like all health behaviors, occurs within a complex social environment. Gender, a component of this social environment, defines and differentiates the roles, rights, responsibilities, and obligations of women and men. Society interprets the innate biological differences between females and males to create a set of social expectations that define appropriate behaviors for women and men and determine their differential access to rights, resources, and power in society [24]. The specific nature and degree of these differences vary from one society to the next and over time. Several conceptual frameworks exist in literature for a deeper understanding of the components of gender equality. The United Nations Human Development Report [25] refers to gender equality in terms of capabilities (education, health, and nutrition) and opportunities (economic and decision-making). World Bank defines gender equality in terms of equality under the law, equality of opportunity, and equality of voice (the ability to influence and contribute to the development process) [26]. Similarly, Pampel [16] defines gender equality in terms of women's status in work, family, political, economic, legal, public policy, educational, and occupational sectors. The gender-equality hypothesis suggests that movement towards social and economic gender equality might also lead to convergence of male and female smoking rates.

Traditional female norms protected women from smoking by defining it as inappropriate or unfeminine. Women either internalized the norms against these behaviors or faced sanctions under close social and family monitoring [27-29]. Anecdotal evidence suggests that these normative connotations continue to play an important role in determining women's smoking rates in low-prevalence countries. A 1997 national survey in Vietnam found that 50% of males 15 and over used tobacco compared to only 3.4% of females in the same age group. The main reason women gave for shunning smoking is that 'women shouldn't smoke' [30]. Increasing female social power, greater independence, and an autonomous lifestyle weaken the protective influence of gender norms. Waldron et al. [31] in their review of ethnographic studies in Africa, Asia, Latin America, and the Pacific, noted that women often had lower social power than men which was manifested through greater restrictions on women's behavior. These restrictions, including social prohibitions against women's smoking, were important contributors toward gender differences in tobacco use. They found that female smoking was rare in societies with strong constraints on women's freedom and access to household income. They predicted that women's smoking rates would likely increase in these societies as modernization brought changes in the features of their sex roles. Historically, changes that lead to increased female autonomy and independence have been linked to smoking uptake among Western women [32]. For example, during the early twentieth century in United States and Great Britain female smokers met with much social disapproval and were considered disreputable and sexually available. During the course of the century, gender differences in roles and behavior decreased considerably in Western Countries. Women's income and spending power rose, resulting in greater opportunities for education and employment, increased access to resources traditionally limited to males, and an increase in behaviors that were traditionally acceptable only for males [28]. Correspondingly, there was considerable relaxation of restrictions on women's behaviors. One component of this liberalization of norms was the increasing social acceptance of women's smoking [33]. These arguments suggest a relationship between gender equality and the increasing social acceptance of female smokers. This relationship is known only too well by the tobacco industry, which optimistically discusses in The Tobacco Reporter, an industry publication, its prospects in the Asian region in 1998: 'Rising per capita consumption…and an increasing acceptance of women smoking continue to generate new demand' [34].

The gender equality hypothesis suggests that, over time, the gap between male and female smoking rates will decline in countries with more gender equality. Accordingly, nations with higher levels of gender equality will experience similar male and female smoking rates compared to countries at lower levels of gender equality. Thus, female smoking prevalence rates relative to male smoking prevalence rates are expected to be higher in countries with comparable female to male school enrollment rates, income levels, literacy rates, and lower fertility rates.

There are, however, certain gaps in this gender equality theory. Pampel [16] notes that gender equality fails to affect a variety of other undesirable behaviors such as crime, drunk driving, homicide victimization, and suicide. Since there is little support for equality leading to convergence of these unhealthy behaviors between men and women, he feels that any association between gender equality and sex differences in smoking should be viewed with suspicion. Another weakness of the hypothesis is that it focuses simply on the behavior and roles of women while ignoring how changes in male behavior and roles account for sex differences in smoking [16]. Finally, studies of some high-income nations have found limited support for the gender equality argument. Pampel [16] used multilevel models and data for 16 European nations from 1988-1995 to conclude that gender differences in smoking prevalence had insignificant relationship with national measures of gender equality. Similarly, Pampel [23] used mortality data of 21 high-income nations from 1955 to 1996 to demonstrate little relationship between measures of gender equality and relative rates of male and female lung cancer deaths. Likewise, Pampel [29] used measures of gender equality, cigarette diffusion, and tobacco access data for 106 nations to demonstrate that gender equality had inconsistent effects on women's smoking relative to men. Gender equality measures such as total fertility rate, education, female share of the parliament, and influence of Islam appeared to affect relative female smoking rates. However, once a dummy variable control for western and high-income nations was added, only female share of the parliament and influence of Islam appeared to have an affect on relative female smoking [29].

An alternative explanation to gender equality is that factors associated with economic development such as increased disposable income, trade, and access to tobacco products may affect the smoking rates of men and women.

Economic development in a country leads to the creation of new employment opportunities and raises disposable income, thereby allowing larger portions of the population to purchase cigarettes. Findings regarding the relationship between income change and demand for cigarettes have been inconsistent. In some studies, the estimated coefficient of the income variable is significant and positive, implying that cigarettes are "normal" economic goods and that increasing income would have a positive effect on cigarette demand [35, 36]. In a meta-analysis of 48 studies, Andrews and Franke [37] found the weighted mean income elasticity was 0.36, significantly greater than zero. However, other studies using cross-sectional survey data [38, 39] have reported that income has either an insignificant or negative effect on demand for cigarettes.

Economic development is often accompanied by trade liberalization through the removal of various restrictive policies that protect domestic tobacco producers and growers from foreign competition [40]. These barriers include high tariffs on imported tobacco products, quotas or complete bans on imports, marketing restrictions, licensing requirements, restricted product lists, exchange controls, domestic content requirements, and subsidies on cultivation or production [40]. Economic theory predicts that barriers to trade in tobacco reduce the total supply of these products. Consequently, the prices for raw tobacco, cigarettes, and other tobacco products are likely to be higher under this scenario than they would in the absence of the trade barriers [41]. Several studies have documented the effect of changes in price on smoking. Increases in price have been found to negatively affect both the decision to smoke [42, 43] and the quantity of cigarettes consumed by smokers [43-45]. In contrast, increasing trade liberalization leads to greater competition in the domestic tobacco markets which in turn results in reduced prices for tobacco products and increases in their advertising and promotion [41]. Economic theory, and a growing body of empirical research, clearly indicates that liberalization of tobacco-related trade has contributed to global increases in cigarette smoking and other tobacco use, particularly in low-income and middle-income countries [41]. Such trade ties may also reflect cultural ties to Western nations through media, advertising, and entertainment that influence citizens to adopt smoking [46] .

Access to handmade products in tobacco producing nations will affect the propensity to smoke. Since tobacco and/or tobacco products are an important source of foreign currency, countries such as China, India, Lebanon, Malawi, and Zimbabwe devote relatively high percentages of their agricultural land to tobacco [2]. In such countries, citizens may have easier access to tobacco and be encouraged to smoke as an aid to economic development [2, 29]. Urbanization, another by-product of economic development, may also increase the ability to purchase cigarettes and provide relief from rural anti-smoking norms and traditions [29].

Although applied most directly to the level of cigarette use in a nation, economic development also has relevance to smoking of women relative to men. One might reason that if access to cigarettes is limited in a population, the more dominant group, men, will likely keep control of the scarce resource [29]. By making cigarettes more accessible to all the population, the forces of economic development, urbanization, world trade, and tobacco production will increase smoking more among less dominant groups such as women. Greater disposable income and ease of buying cigarette products in urban cities will also favor women, a group that traditionally has had less access to tobacco, resulting in a reduction in the gap between male and female smoking. Similarly, to the extent that foreign trade increases access of domestic populations to cigarettes, it will do most to change the low smoking rates of women and reduce sex differences in smoking [29]. Still further, handmade products in tobacco-growing nations give greater access to women who lack personal income to buy manufactured cigarettes and should reduce sex differences [29].

The Diffusion of Innovation theory, popularized by Everett Rogers, provides an important conceptual framework to understand how cigarette use spreads within a nation. The diffusion theory classifies adopters of innovations into 5 categories based on their propensity to accept a new idea or behavior [47]. The diffusion process mimics a wave-like or an S-shaped curve with the ‘innovators’ being the first ones to accept the innovation. The innovators are followed by the ‘early adopters’, ‘early majority’, ‘late majority’ and then finally the ‘laggards’ [48]. Each group possesses certain distinguishing characteristics. Innovators tend to be venturesome, well educated, information seekers, risk-takers, and have a high financial status. Early adopters usually tend to be social leaders. They are highly educated and wealthy like the innovators but are more visible and respected by their peers. Individuals belonging to the early majority do not take the risk of being the first ones to adopt a new idea, like the innovators and early adopters, but they do accept an innovation before the average person. They are above average in education and income, seldom hold positions of opinion leadership, and deliberate before adopting a new idea. Those belonging to the late majority are usually cautious, have limited income and education, and need pressure from their peers to adopt a new idea. The last category of individuals, laggards, tends to be suspicious of innovations, has limited resources, and pays little attention to the opinion of others [49].

Several authors have noted that the smoking epidemic in developed countries follows a similar pattern; spreading from relatively small pockets of a population, gaining momentum by diffusing to other parts of the population, and then eventually receding [16, 17, 29, 50, 51]. In the beginning of the epidemic, smoking is mainly a habit of individuals who are most open to innovations. In the middle stages, the prevalence of smoking increases rapidly, reaching peaks somewhere in the range of 50-80 percent. In the later stages smoking starts to decline, lead by the innovators who begin to adopt the novelty of healthy, smoke-free behavior [16]. The cigarette diffusion model additionally relates to sex differences, postulating that women lag behind men by several decades [50]. This may be because men, rather than women, are more often thought to possess characteristics associated with innovators. This has implications for gender differences in smoking (Figure 2.1).

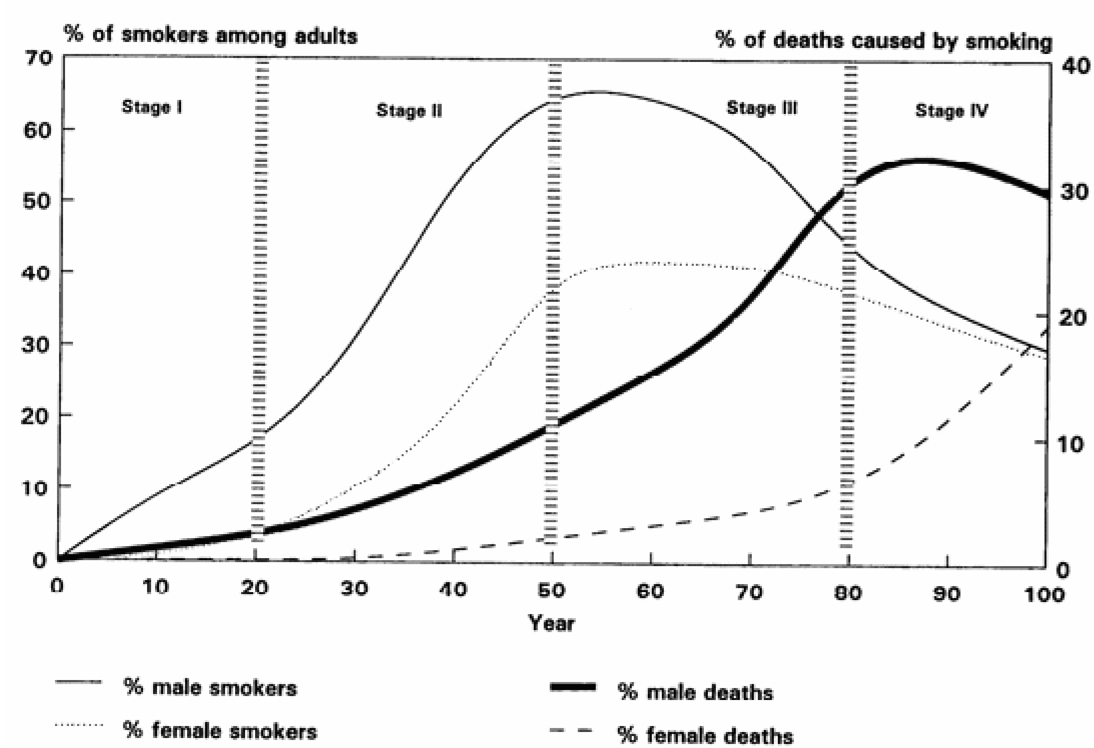


Figure 2.1: Cigarette Diffusion Epidemic [50]

Because men adopt cigarettes in large numbers before women do, men are affected by the epidemic first and the earliest stage shows a rising gap between men and women smoking prevalence rates. In the middle stage, the gap stops growing as smoking rises more quickly among women while leveling off among men. In later stages, the gap narrows as smoking starts declining among men but continues to grow among women. Eventually smoking peaks and declines among women as it does for men. Women do not reach the same peak as men due to their later start and the increased awareness in more recent decades about the harmful effects of smoking [16]. Thus, the cigarette diffusion model explains that the degree of gender difference in smoking that exists in a nation depends on the passage of time since the start of the diffusion process. Developed nations, compared to developing nations, should exhibit a narrower gender gap in smoking as they began the diffusion process earlier and have reached more advanced phases of the diffusion process. However, to produce the initial divergence in the timing of male and female adoption of cigarette smoking, the diffusion hypothesis needs some degree of gender inequality to exist in nations [23]. Moreover, the rate of diffusion from one phase to the next may also be a factor of the level of gender equality and economic development that exist in the nation.

Although the cigarette diffusion thesis has received some support in literature [16, 17, 23, 29], it suffers from certain limitations. For instance, it fails to explain why certain innovations, such as filtered cigarettes, were adopted by women before men and why some countries lag behind others in the adoption of smoking [23, 28]. Moreover, it does not address why in some countries such as China and Japan male smoking rates have peaked and started to decline but female smoking rates have scarcely changed. Adult male smoking rates in Japan declined from 81% in 1960 to 47% in 2004 [2] while adult female smoking rates remained approximately 13% over this 44 year period [2]. Although data dating as far back as 1960 are not available, adult male smoking rates in China have declined from 63% in 1996 [52] to 57.4% in 2006 [53] while those for females have only slightly changed from 3.8% [52] to 3.5% [53] in the same time period. The limited success of the diffusion model in these countries may have some implications for the gender-equality and economic development arguments. Perhaps the cigarette diffusion model works best for economically developed nations and may not be as relevant for developing nations; alternately, the model may have more relevance for nations with greater levels of gender equality. It is also possible that some countries are simply experiencing a longer lag period and will undergo a rise in female smoking rates sometime in the future. This lag time could possibly be a function of the level of gender equality or economic development in a country or both. Perhaps change is the level of gender equality or economic development will stimulate the diffusion model in these countries.

Both gender-equality and economic development hypotheses may contribute towards explaining why women and men smoke so differently worldwide. Conflicting views regarding the relative contributions of the two arguments spark the need for further research. To fully evaluate the effects of each hypothesis, studies need to make comparisons across many nations and not just those with high per-capita income. Since nations vary widely in levels of gender equality, stages of economic development, and gender difference in prevalence rates, cross-national data can provide crucial variation beyond that available from within national trends. Despite presenting a snap-shot over one time period, this study is cross-national and spans populations at diverse stages of gender equality, economic development, and gender prevalence levels. To examine the association between gender equality and sex differences in smoking, this study will control for economic development and WHO regions. Although the gender equality thesis has received limited support in the literature examined, this may be because previous studies have focused mainly on high-income nations. Conclusions drawn from studies on these nations with their established data-gathering procedures can not be generalized to low-income nations. Pampel [29] is the first study that examined the global patterns of sex differences in cigarette use in 106 nations. This study will take a step further by expanding the sample size to include 193 nations. However, not every nation had data available on all the variables included in the study. Data for some nations had to be estimated based on regional statistics.

CHAPTER III

METHODS AND PROCEDURES

The following section describes the dependent and independent variables, their sources, the procedure used for dealing with missing data, and the statistical analyses conducted. The study sample consisted of 193 countries classified by WHO region in Appendix A. WHO counts 193 member states distributed among six regions: African Region (AFRO), Eastern Mediterranean Region (EMRO), European Region (EURO), Region of the Americas (PAHO), South-East Asia Region (SEARO), and Western Pacific Region (WPRO). The WHO method of classifying countries was used to increase comparability with previous publications on global tobacco prevalence [14, 54].

Dependent Variable

Country-specific adult smoking prevalences were employed as the dependent variables. These were operationalized as: adult female smoking prevalence rate and female-to-male smoking prevalence ratio. Female-to-male smoking prevalence ratio was used instead of male-to-female smoking prevalence ratio because females rather than males are the main focus of this study. Adult female smoking prevalence rate was defined as the percentage of adult female population (15 years of age and over) who are current smokers. Female-to-male smoking prevalence ratio was obtained by dividing adult female smoking prevalence rate by adult male smoking prevalence. Data on the adult women and men smoking prevalence rates come from the second edition of the Tobacco Atlas [2], supplemented with data reported by WHO [55] on Andorra, and by Tobacco Control Country Profiles [56] on India. However, the specific age range that defined 'adult' smokers was not consistent in every country. With all sources combined, data on smoking prevalence from individual studies were available for 97.1% of the total sample population. Out of 193 countries, adult female smoking prevalence rates were available for 156 or 80.8% of countries, and adult male smoking prevalence rates were available for 154 or 79.8% of countries. Regional estimates were used for those countries without actual data. Data compiled in the Tobacco Atlas come largely from separate national surveys rather than from a single set of standardized instruments. As a result, the surveys differ in design, measures, samples, and quality. This study addresses these national differences in methodology by using female-to-male prevalence ratios in addition to female prevalence rates so that national biases and idiosyncrasies apply to both sexes.

Regional average prevalence values, weighted by population, were calculated separately for women and men and applied to the entire region, including those countries for which gender specific prevalence data were not available. The weighted average method was used in calculating regional prevalence to take into account different population sizes. Countries with larger population sizes contributed more to the weighted regional mean than those with smaller population sizes. This methodology for estimating missing prevalence values was adopted from Gajalakshmi et al. [1]. Regional average prevalence values were calculated by first classifying countries into their respective WHO regions and computing each country's adult (aged 15 years and more) female and male populations as a proportion of the regional adult female and male populations. Each country's female prevalence rate (for countries that had the information available) was multiplied by the corresponding adult female population proportion. The resulting values were added to yield the regional average female prevalence. This value was assumed to apply to the entire region and was used as an estimate for all countries in that region with missing female prevalence values. The same computations were performed for males to obtain male regional average prevalence estimates. The overall smoking prevalence rate for each region was computed by averaging female and male prevalence rates. This process was repeated for all WHO regions. Population data by sex and age category were available for 2006 from The World Factbook [57] for all countries except Niue, Serbia and Montenegro, and Timor-Leste. For these countries 2005 population estimates [58] were used. Appendix B lists female and male smoking prevalence rates and relative female smoking prevalence ratios by country.

Independent Variable

Gender equality and economic development were the independent variables used in this study.

Gender Equality

Several measures have been used by investigators in the past to gauge the level of gender equality in a country. However, there is no consensus on the best measures of gender equality when making global comparisons. For the purpose of this study gender equality was operationalized using the following four indicators: total fertility rate, female literacy rates, female combined gross enrollment for primary, secondary, and tertiary schools, and female earned income. Country-specific information on each of these measures is presented in Appendix C. An index was constructed from these four measures to reflect the level of gender equality in countries across all dimensions combined. In selecting indicators for this study, preference was given to those gender equality measures that were available for nearly all of the 193 countries.

Total fertility rate data for 2006 were obtained for 191 of 193 or 99% of countries from The World Factbook [57]. Data for Cook Islands were not available for 2006, so a

2001 estimate obtained from the same source was used. Niue, which belongs to the Western Pacific region (WPRO), also did not have any available data. Therefore, its fertility rate was estimated as the average fertility rate of all countries belonging to the WPRO. Total fertility rate determines the average number of children that would be born per woman if all women lived to the end of their childbearing years and bore children according to a given fertility rate at each age [57]. Although low fertility alone does not ensure gender equality, it is indicative of women's independence from family duties and patriarchal family norms, increased non-traditional opportunities for education, labor force participation, and other activities outside the family [29].

Female and male literacy rates were obtained from the 2005 Human Development Report [59], supplemented by data from The World Factbook [57]. Adult literacy rate was defined as the percentage of people aged 15 years or more who could, with understanding, both read and write a short, simple statement related to their everyday life [60]. However, it should be noted that since literacy does not have a single, universally accepted definition, different countries may measure literacy differently. Information on literacy, while not a perfect measure of educational results, is easily available across countries. The data used in this study refer to national literacy estimates from censuses or surveys conducted between the years 2000 and 2004, with 2003 as the median year. Data were available for 182 or 94.3% of countries. Average regional adult literacy rates were calculated separately for females and males and used as estimates for remaining 11 countries that did not have data available.

Figures on female and male combined gross enrollment for primary, secondary, and tertiary schools were obtained from the 2005 Human Development Report [59]. This variable was defined as the number of students enrolled in all levels of schooling, regardless of age, as a percentage of the population of official school age for the three levels [60]. Primary education referred to the basic elements of education attained from institutions such as primary and elementary schools [60]. Secondary education referred to general or specialized instruction, or both, at institutions such as middle schools, secondary schools, high schools, teacher training schools at this level, and vocational or technical schools [60]. Tertiary education referred to education at universities, teachers colleges, and higher level professional schools [60]. Some limitations of using gross enrollment rates include their failure to take into account students enrolled in other countries. Grade repetition and dropout rates can also distort the data. Furthermore, combined gross enrollment rates can hide important differences among countries due to differences in age ranges corresponding to a level of education and in the duration of education programs [61]. Despite these limitations, female and male combined gross enrollment rates serve as an important proxy measure for education attainment. Data were available for 162 or 83.9% of countries for the 2002-2003 school year. Average regional gross enrollment rates were calculated for females and males and used as estimates for the remaining 31 countries that did not have data available.

Female and male earned income figures were obtained from the 2005 Human Development Report [59]. Due to lack of gender-disaggregated income data, this variable was derived using the following information: ratio of female-to-male nonagricultural wage, female and male portions of the economically active population, total female and male populations, and GDP per capita [60]. Earned income data were reported in purchasing power parity (PPP) U.S. dollars. PPP is an exchange rate that accounts for price differences across countries, allowing international comparisons of real output and incomes [60]. At the PPP US$ rate, PPP US$1 has the same purchasing power in the domestic economy as $1 has in the United States. Earned income data were available for 153 or 79.3% of countries and were based on figures for the most recent year available during 1991-2003. Average regional male and female income was used as an estimate for remaining 40 countries that did not have data available.

A composite index labeled Gender Equality Index (GEI) was created to reflect the level of gender equality in countries across all four dimensions (fertility; adult literacy; gross enrollment in primary, secondary, and tertiary schools; and adult income) combined. The following three additional variables were created: female-to-male adult literacy ratio, female-to-male gross enrollment ratio, and female-to-male earned income ratio. Country-specific information for the three ratios is presented in Appendix D. Each of these three variables, as well as total fertility rate, was ranked into quartiles. For the fertility variable, a rank of four was given to countries that had the lowest average number of children per woman, and a rank of one was given to countries having the highest average number of children per woman. For the remaining three variables, a rank of four was given to countries with the highest ratios, and a rank of one to countries with the lowest ratios. GEI was computed by adding ranks received in all four categories for each country. The GEI rank scores, which ranged from four through sixteen, were recoded to reflect a range of 1 through 13. The highest score of 13 reflected nations with the most gender equality, and the lowest score of one represented nations with the least gender equality. Appendix A classifies nations according to their score on the GEI.

Economic Development

No established convention exists for the designation of "developed" and "developing" countries in the United Nations system [62]. In common practice, the term "developing country" applies to most African, Latin American, Caribbean, and Asian countries, as well as some countries in the Middle East and Eastern Europe. The term "developed country" commonly applies to countries such as Japan, Canada, United States, Australia, New Zealand, and Western Europe [62]. This study uses 2005 Gross National Income (GNI) per capita obtained from World Bank as a proxy for economic development [63]. GNI takes into account all production in the domestic economy (i.e., Gross Domestic Product) plus the net flows of factor income (such as rents, profits, and labor income) from abroad. To calculate GNI per capita in U.S. dollars, World Bank uses the Atlas method. The Atlas method reduces the impact of exchange rate fluctuations in cross-country comparisons of national incomes by using a three year moving average, price-adjusted conversion factor [64]. World Bank favors the Atlas method for comparing the relative size of economies and uses it to classify countries into low income ($875 or less), lower middle income ($876 - $3,465), upper middle ($3,466 - $10,725), or high income economies ($10,726 or more). While 189 of 193 or 98% of countries were classified into one of the four income categories, data on GNI per capita for 2005 were available for only 173 of these countries. To estimate GNI per capita for the remaining countries, average GNI per capita was calculated for each classification group. Hence, countries belonging to low income categories, lower middle income, and upper middle income were estimated as having a GNI per capita of $438 (average of $0 and $875), $2,171 (average of $876 and $3,465), and $7,096 (average of $3,466 and $10,725), respectively (rounded off to the nearest whole numbers). Countries belonging to high income groups with no available GNI per capita data were given a conservative estimate of $10,726. Finally, for the remaining 4 countries for which neither country classifications nor GNI per capita were available, average regional GNI per capita was used as an estimate. The estimate determined if these countries would be classified as low, lower middle, upper middle, or high income economies. Appendix A lists country-specific GNI per capita information and the corresponding GNI per capita category.

Statistical Analyses

Statistical programs available in SPSS for Windows, version 13.0, were utilized for data analysis [65].

Descriptive analyses were conducted to determine mean overall smoking prevalence (average of male and female prevalence rates), gender specific smoking prevalence, and female-to-male smoking prevalence ratio by WHO regions, GEI, and levels of economic development. Mean female-to-male smoking prevalence ratio for a region equals the mean of country-specific female-to-male smoking prevalence ratios within the region rather than the mean female smoking prevalence rate divided by mean male prevalence rate for a region. Similarly mean overall smoking prevalence rates for a region are the mean of country-specific overall smoking prevalence rates rather than the arithmetic mean of regional male and female smoking prevalence rates. Mean values of individual gender equality measures i.e., total fertility rate, female literacy rate, female-to-male literacy ratio, female gross enrollment rate, female-to-male gross enrollment ratio, female earned income, and female-to-male earned income ratio, were examined across GEI regions. Mean values of gender equality measures and composite GEI were examined across WHO regions and levels of economic development.

Bi-variate correlation was conducted between GEI and GNI per capita. Pearson correlation method was used to explore the strength of the relationship between the two variables. The correlation coefficient, which can range from -1 to +1, gives an indication of both the direction (positive or negative) and the strength of the relationship. The size of the absolute value (ignoring the sign) provides information on the strength of the relationship. A perfect correlation of 1 or -1 indicates that the value of one variable can be determined exactly by knowing the value of the other variable. A correlation of 0 indicates no relationship between the two variables. A positive correlation indicates that as one variable increases, the other also increases while a negative correlation indicates that as one variable increases, the other decreases.

Chi-square statistics were computed to further examine the association between GEI and GNI, with P-values indicating statistical significance. For chi-square computation, GNI per capita was recoded into 2 categories: low income and high income. Low and lower middle income categories were combined into low income category, while upper middle income and high income categories were combined into high income category. Similarly, GEI categories were also collapsed into 2 categories. Countries with a GEI score of 1 through 7 were classified as low gender equality countries, while those with a GEI score of 8 through 13 were classified as high gender equality countries.

A one way ANOVA was conducted to see whether female smoking prevalence rates and female-to-male smoking prevalence ratios differed within the four GNI per capita groups. One way analysis of variance is used when there is one independent variable with three or more groups and one dependent continuous variable. The F ratio compares variance between different groups with the variability within each of the groups [66]. A significant F test indicates that the groups differ, in which case post-hoc tests need to be conducted to show which of the groups differ. Tukey's post-hoc tests have been used in this study.

To explore the association of each independent variable with the dependent variables, univariate analyses were conducted. Analysis was conducted for each dependent variable, female smoking prevalence rate and female-to-male smoking prevalence ratio, separately. The independent variables analyzed for the first dependent variable, female smoking prevalence, were: total fertility rate, female literacy rate, female gross enrollment rate, female earned income, gender equality index, and GNI per capita. The independent variables analyzed for the second dependent variable, female-to-male smoking prevalence ratio, were: total fertility rate, female-to-male literacy ratio, female-to-male gross enrollment ratio, female-to-male earned income ratio, gender equality index, and GNI per capita. Analyses were performed for all countries combined and by WHO regions.

Finally, multiple linear regression analyses were used to explore how well gender equality measures, composite GEI, and GNI per capita predicted female smoking prevalence and female-to-male smoking prevalence ratios. Analysis was conducted for all data combined, as well as by WHO regions. Before running multiple regressions, preliminary analysis was carried out to make sure the assumptions of multicollinearity, normality, linearity, homoscedasticity, and independence of residuals were not violated. Tolerance and Variance Inflation Factor (VIF) values were examined to ensure that the models used were not compromised by multicollinearity. Tolerance values indicate how much of the variability of the specified independent variable is not explained by the other independent variables in the model [66]. VIF values are the inverse of Tolerance values. Tolerance values below a commonly quoted cut off point of .1 or VIF values above the cut-off point of 10 indicate that the correlation with other variables is high, suggesting the possibility of multicollinearity [66]. Since female income had a Tolerance value of less than .1 and a VIF value of greater than 10, it was removed from the multiple regression analysis with female smoking as the dependent variable. The assumptions of normality, linearity and homoscedasticity were checked by inspecting the residuals scatterplot and the Normal Probability Plot of the regression standardized residuals.

CHAPTER IV

RESULTS

This section describes the results obtained from the statistical analyses. Tables 4.1 through 4.3 show the mean overall smoking prevalence rates, gender specific smoking prevalence rates, and relative female smoking prevalence ratios by WHO regions, levels of gender equality, and levels of economic development. Considerable variations are observed within each classification.

Table 4.1 shows that, overall, 24.0% of the population aged 15 years and older were current smokers; 39.4% male smokers and 8.7% female smokers. Overall smoking prevalence was highest in the EURO and WPRO, at 30.3% and 29.5%, respectively, and lowest in the AFRO, at 10.8%. Among females, smoking prevalence was highest in the EURO and PAHO, at 18.8% and 15.9%, respectively, and lowest in the AFRO, at 2.2%. Among males, smoking prevalence was highest in the WPRO, at 54.3%, and lowest in the AFRO, at 15.1%. Regions with the highest female-to-male smoking prevalence were PAHO and EURO, with ratios of 0.63 and 0.51, respectively, while WPRO had the lowest ratio of 0.10. Overall, there were 0.26 times as many female smokers as male smokers, or 3.8 times as many male smokers as female smokers.

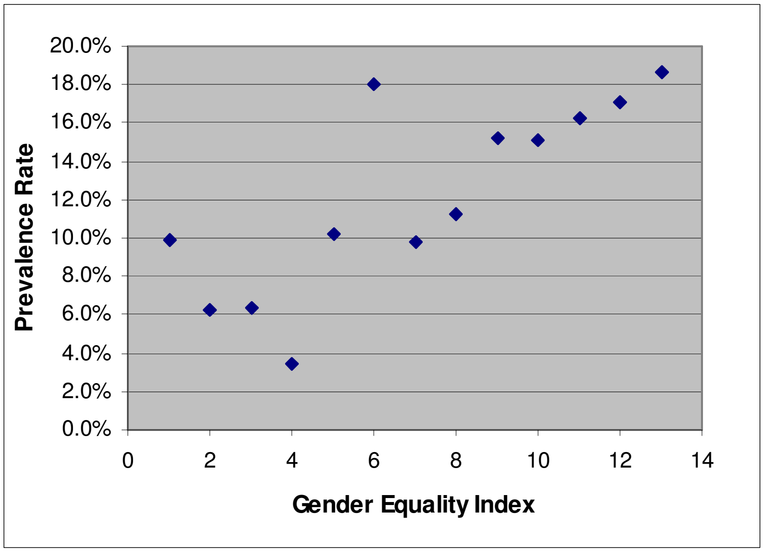
Table 4.1: Dependent Variables by WHO Region

WHO region	N	Overall Smoking Prevalence (%)	Female Smoking Prevalence (%)	Male Smoking Prevalence (%)	Female Prevalence/ Male Smoking Prevalence
AFRO	46	10.8	2.2	15.1	0.13
EMRO	21	20.7	6.1	34.2	0.15
EURO	53	30.3	18.8	40.8	0.51
PAHO	35	20.6	15.9	25.1	0.63
SEARO	11	21.2	5.2	36.5	0.13
WPRO	27	29.5	4.9	54.3	0.10
World	**193**	**24.0**	**8.7**	**39.4**	**0.26**

Classification by GEI (Table 4.2) showed that the overall and male smoking prevalence was highest in countries with the lowest level of gender equality, at 30.8% and 51.7%, respectively. Female smoking prevalence was lowest in countries with a GEI score of 4 and highest in countries with a GEI score of 13. There were fewer female relative to male smokers in countries with lower scores on GEI than in those with higher scores. Female-to-male smoking prevalence ratio was lowest in countries with a GEI score of 1 and 2, at 0.16, and highest in countries with the highest GEI score of 13, at 0.67. Increase in gender equality level appears to be accompanied by an increase in female smoking prevalence rate (Figure 4.1) and female-to-male smoking prevalence ratio (Figure 4.2).

Table 4.2: Dependent Variables by Gender Equality Index

Gender Equality Index	N	Overall Smoking Prevalence (%)	Female Smoking Prevalence (%)	Male Smoking Prevalence (%)	Female Prevalence/ Male Smoking Prevalence
1	5	30.8	9.9	51.7	0.16
2	16	17.2	6.3	28.1	0.16
3	15	16.2	6.3	26.0	0.21
4	14	13.0	3.4	22.5	0.17
5	16	21.3	10.2	32.5	0.29
6	18	28.7	18.0	39.3	0.44
7	23	21.0	9.8	32.2	0.33
8	17	24.5	11.3	37.8	0.29
9	22	26.2	15.2	37.2	0.44
10	14	24.5	15.1	33.9	0.46
11	10	30.5	16.3	44.7	0.40
12	18	24.7	17.1	32.3	0.59
13	5	25.5	18.7	32.4	0.67
World	**193**	**24.0**	**8.7**	**39.4**	**0.26**



R-Square= 0.63

Figure 4.1: Female Smoking Prevalence Rate by GEI

R-Square= 0.83

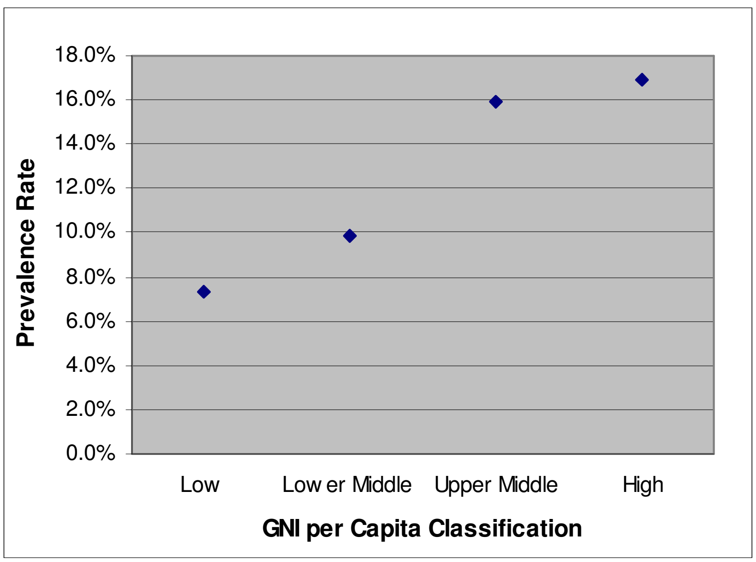
Figure 4.2: Female-to-Male Smoking Prevalence Ratio by GEI

Classification by economic development (Table 4.3) showed that the overall smoking prevalence rates were similar in lower middle, upper middle and high income regions but were lowest in low income regions, at 18.8%. Female smoking prevalence rate was lowest in low income countries, at 7.4%, and highest in high income regions, at 17.0%. Male smoking prevalence rate was highest in lower middle income regions, at

39.2%. There were less female relative to male smokers in low and lower-middle income countries than in high-income countries. Moving from low GNI per capita countries to high GNI per capita countries appears to be accompanied by an increase in female smoking prevalence rate (Figure 4.3) and female-to-male smoking prevalence ratio (Figure 4.4).

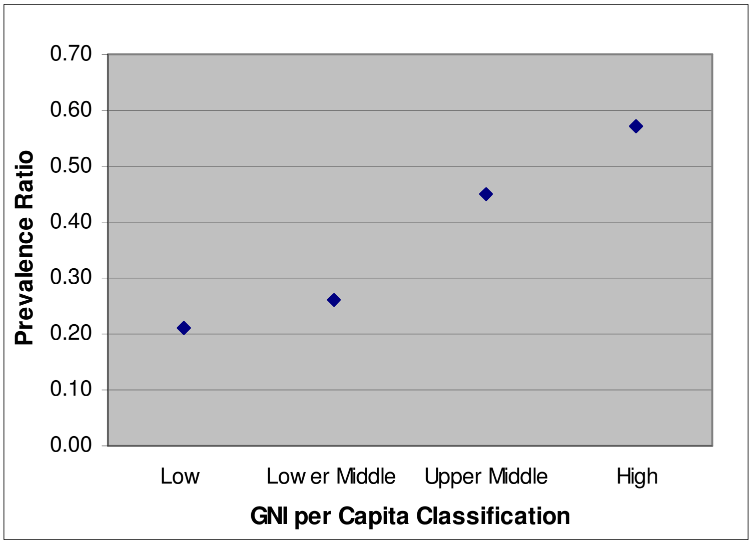
Table 4.3: Dependent Variables by Level of Economic Development

Economic Development	N	Overall Smoking Prevalence (%)	Female Smoking Prevalence (%)	Male Smoking Prevalence (%)	Female Prevalence/ Male Smoking Prevalence
Low income	54	18.8	7.4	30.2	0.21
Lower Middle income	57	24.5	9.9	39.2	0.26
Upper Middle income	41	24.5	15.9	33.1	0.45
High income	41	24.1	17.0	31.3	0.57
World	**193**	**24.0**	**8.7**	**39.4**	**0.26**



R-Square= 0.94

Figure 4.3: Female Smoking Prevalence Rate by GNI per Capita



R-Square= 0.96

Figure 4.4: Female-to-Male Smoking Prevalence Ratio by GNI per Capita

Table 4.4 examines mean values of independent variables across GEI regions. It shows that the total fertility rate is higher in countries with lower levels of gender equality. The remaining gender equality measures are lower in countries with lower levels of gender equality and higher in countries with higher levels of gender equality.

Table 4.4: Independent Variables by Gender Equality Index

Gender Equality Index	N	Total Fertility rate (children per woman)	Female Literacy rate (%)	Female/Male Literacy ratio	Female Gross Enrollment rate (%)	Female/ Male Gross Enrollment ratio	Female Earned Income (PPP US$)	Female/ Male Earned Income ratio
1	5	5.4	39.1	0.61	34.2	0.72	1,116	0.34
2	16	4.9	41.8	0.61	47.7	0.83	2,235	0.42
3	15	5.2	41.3	0.64	43.7	0.85	1,457	0.48
4	14	4.8	49.9	0.69	48.8	0.84	1,760	0.58
5	16	3.7	71.3	0.85	65.6	0.95	2,848	0.50
6	18	3.1	80.5	0.91	69.1	1.00	4,390	0.51
7	23	2.7	87.0	0.98	75.9	1.01	5,660	0.46
8	17	2.4	91.7	0.98	76.8	1.03	6,103	0.51
9	22	2.1	94.3	1.00	84.2	1.03	7,972	0.51
10	14	1.6	96.4	0.99	82.6	1.05	10,113	0.51
11	10	1.6	98.6	0.99	82.9	1.05	9,766	0.65
12	18	1.6	98.7	1.01	97.3	1.08	15,931	0.65
13	5	1.5	99.5	1.00	107.8	1.12	18,396	0.69

Table 4.5 examines mean values of the individual gender equality measures and composite GEI across WHO regions. The table shows that total fertility rate is highest in the AFRO, with 4.9 children per woman. AFRO also has the lowest: female literacy rate, at 51.5%; female-to-male literacy ratio, at 0.72; female gross enrollment rate, at 48.1%; female-to-male gross enrollment ratio, at 0.85; and female earned income, at PPP US$ 1,866. GEI rank was lowest in EMRO and AFRO at 3.81 and 3.93, respectively. Total fertility rate was lowest in the EURO, with 1.7 children per woman. EURO also had the highest: female literacy rate, at 97.5%; female-to-male literacy ratio, at 0.99; female gross enrollment rate, at 89%; female earned income, at PPP US$ 12,197; and female-to-male earned income ratio, at 0.58 (tied with the WPRO). EURO scored the highest mean GEI rank with a score of 10.25. Thus, AFRO, the region with the lowest female smoking prevalence (Table 4.1), also had the lowest values across most gender equality measures and EURO, the region with the highest female smoking prevalence, also had the highest values across most gender measures.

Table 4.5: Independent Variables by WHO Region

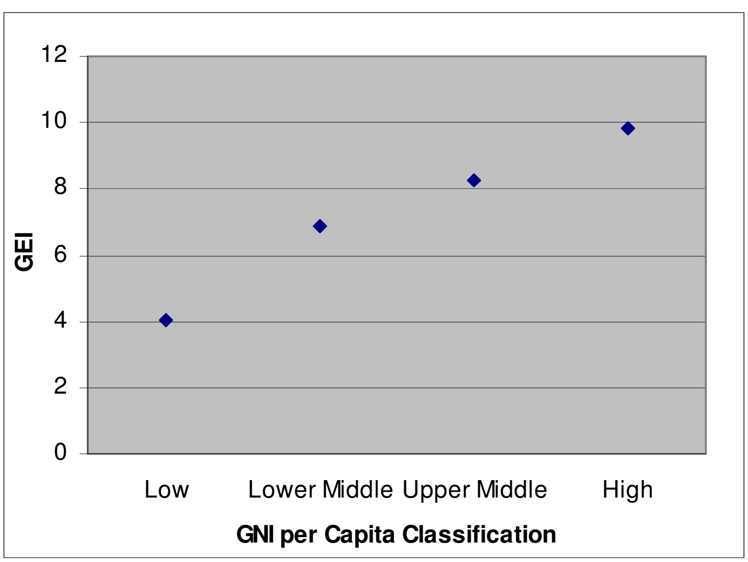
WHO region	N	Total Fertility rate (children per woman)	Female Literacy rate (%)	Female/Male Literacy ratio	Female Gross Enrollment rate (%)	Female/ Male Gross Enrollment ratio	Female Earned Income (PPP US$)	Female/ Male Earned Income ratio	GEI
AFRO	46	4.9	51.5	0.72	48.1	0.85	1,866	0.55	3.93
EMRO	21	3.8	59.0	0.74	64.5	0.96	3,131	0.30	3.81
EURO	53	1.7	97.5	0.99	89.0	1.04	12,197	0.58	10.25
PAHO	35	2.5	88.7	0.98	80.8	1.05	5,921	0.46	8.29
SEARO	11	3.0	69.3	0.82	56.6	0.96	2,403	0.52	5.36
WPRO	27	2.8	87.9	0.94	74.4	0.99	7,705	0.58	7.37

Table 4.6 examines mean values of the individual gender equality measures and composite GEI across levels of economic development. The table shows that high income economies tend to have lower fertility rates, higher female literacy rate, higher female-to-male literacy ratio, higher female gross enrollment rate, higher female-to-male gross

enrollment ratio, and higher female earned income. Low-income economies, which had the lowest female smoking prevalence, also had the lowest values across most gender equality measures and low GEI scores while high-income economies, which had the highest female smoking prevalence, also had the highest values across most gender measures and high GEI scores. Figure 4.5 shows that an increase in GNI per capita appears to be accompanied by an increase in GEI.

Table 4.6: Independent Variables by Level of Economic Development

Economic Development	N	Total Fertility rate (children per woman)	Female Literacy rate (%)	Female/Male Literacy ratio	Female Gross Enrollment rate (%)	Female/ Male Gross Enrollment ratio	Female Earned Income (PPP US$)	Female/ Male Earned Income ratio	GEI
Low-Income Economies	54	4.8	49.8	0.70	47.4	0.85	1,253	0.56	4.04
Lower-Middle Income Economies	57	2.8	83.5	0.92	71.6	1.00	3,734	0.48	6.89
Upper-Middle Income Economies	41	2.3	89.5	0.96	80.1	1.03	6,702	0.50	8.27
High-Income Economies	41	1.8	95.0	0.98	93.0	1.05	16,693	0.53	9.80



R-Square= 0.96

Figure 4.5: GEI by GNI per Capita

Table 4.7 shows correlation between GEI and GNI per capita is statistically significantly at the 99% level (r = 0.515). The direction of the relationship is positive, indicating that countries with high gender equality levels tend to have high GNI per capita.

Table 4.7: Bi-variate Correlation between GEI and GNI per Capita

		GNI Per Capita
GEI	Pearson Correlation	0.515**
	Sig. (2-tailed)	<0.001
	N	193
**. Correlation is significant at the 0.01 level (2-tailed).		

Tables 4.8 and 4.9 explore this relationship further. Chi-square test between GEI and GNI per capita reveals that out of 193 countries 82 countries had both low GEI and low GNI per capita. The mean female smoking prevalence rate in these countries was 7.6% and the mean female-to-male smoking ratio was 0.22. Mean female smoking prevalence rate in the 57 countries with both high GEI and high GNI per capita was 16.9% and the mean female-to-male smoking ratio in these countries was 0.54. Mean female smoking prevalence rate and mean female-to-male prevalence ratio in 25 countries with low GEI and high GNI per capita were 15.4% and 0.43, respectively. While, mean female smoking prevalence rate and mean female-to-male prevalence ratio in 29 countries with high GEI and low GNI per capita were 11.6% and 0.27, respectively. A statistically significant Pearson's chi-square value confirms an association between levels of GEI and GNI per capita.

Table 4.8: Chi-Square Test between GEI and GNI per Capita, with Mean Female Smoking Prevalence Rates

	High GNI per Capita	Low GNI per Capita	Total	X^2	P-Value
GEI					
High	57, 16.9%	29, 11.6%	86		
Low	25, 15.4%	82, 7.6%	107		
Total	82	111	193	35.9	<0.001

Table 4.9: Chi-Square Test between GEI and GNI per Capita, with Mean Female-to-Male Smoking Prevalence Ratios

	High GNI per Capita	Low GNI per Capita	Total	X^2	P-Value
GEI					
High	57, 0.54	29, 0.27	86		
Low	25, 0.43	82, 0.22	107		
Total	82	111	193	35.9	<0.001

Tables 4.10 and 4.11 show the results of a one way ANOVA conducted see whether female smoking prevalence rates and female-to-male smoking prevalence ratios differed within the four GNI per capita groups. A statistically significant difference is observed in the prevalence of female smoking ($F= 9.08$, $p=<0.001$) and female-to-male smoking prevalence ratio ($F=18.27$, $p=<0.001$) for the 4 income groups. Post-hoc comparisons using the Tukey test reveal that both mean female smoking prevalence rates and female-to-male smoking prevalence ratios for low and lower-middle income economies are significantly lower than those in upper-middle and high income economies.

Table 4.10: One-way ANOVA between GNI per capita Classifications and Female Smoking Prevalence Rate

	Low-Income economies	Lower middle income economies	Upper middle income economies	High income economies	P-Value
Mean	7.4[a]	9.9[a]	15.9[b]	17.0[b]	<0.001

Table 4.11: One-way ANOVA between GNI per capita Classifications and Relative Female Smoking Prevalence Ratio

	Low-Income economies	Lower middle income economies	Upper middle income economies	High income economies	P-Value
Mean	0.21[a]	0.26[a]	0.45[b]	0.57[b]	<0.001

To explore the association of each independent variable with the dependent variable, univariate analyses were conducted. Results of the analysis conducted for each dependent variable, female smoking prevalence and female-to-male smoking prevalence ratio, are shown separately. As seen in Table 4.12, in all countries combined, female smoking prevalence was significantly associated with all independent variables. Total fertility rate had a significant negative association, implying that an increase in total fertility rate is associated with a decline in female smoking prevalence. Female literacy rate, female gross enrollment rate, female earned income, GEI, and GNI per capita each had significant positive associations with female smoking prevalence. Since the direction of the relationship is positive, an increase in the variables is significantly associated with an increase in female smoking prevalence rates. Female earned income made the largest significant contribution (Beta=0.412), followed by female gross enrollment rate, GNI per capita, total fertility rate, GEI, and female literacy rate. Female earned income explained 16.9% of the variation in female smoking prevalence rates, while female gross enrollment rate explained 15.3% of the variance in female smoking prevalence rates, without controlling for the effects of other variables.

Univariate analysis was also broken down by WHO region. Four of six WHO regions, AFRO, EMRO, SEARO, and WPRO, showed no significant associations between the independent variables and female smoking prevalence rates. In EURO, female smoking prevalence rates were significantly associated with GNI per capita and three of four gender equality measures. These variables in order of decreasing importance are: female earned income, GNI per capita, female gross enrollment rate, and total fertility rate. Total fertility rate had a significant negative association, while the other significant variables had a positive association. The results imply that, in EURO, an increase in total fertility rate is associated with a decline in female smoking prevalence, while an increase in the other significant variables is associated with an increase in female smoking prevalence. Female earned income and GNI per capita explained 27.2%

and 21.6% of the variation, respectively, in female smoking prevalence rates in EURO. PAHO showed a significant positive association between female smoking prevalence rates and one independent variable: female gross enrollment rate. This implies that, in PAHO, an increase in female gross enrollment rates is significantly associated with an increase in female smoking prevalence rates. Female gross enrollment had a significant positive association in both EURO and PAHO, although it made a larger contribution toward female smoking prevalence rates in PAHO than it did in EURO. 19.8% of the variation in female smoking prevalence rates is explained by female gross enrollment in PAHO, while 14.1% of the variation in female smoking prevalence rates is explained by the variable in EURO.

Table 4.12: Univariate Analysis of the Association between Selected Independent Variables with Female Smoking Prevalence Rate

Independent Variable	R-Square	Beta	P-Value
All (N=193)			
Total Fertility rate	0.107	-0.327**	<0.001
Female Literacy rate	0.096	0.310**	<0.001
Female Gross Enrollment rate	0.153	0.392**	<0.001
Female Earned Income	0.169	0.412**	<0.001
Gender Equality Index	0.102	0.319**	<0.001
Gross National Income per capita	0.125	0.354**	<0.001
AFRO (N=46)			
Total Fertility rate	0.001	0.033	0.829
Female Literacy rate	0.026	-0.162	0.283
Female Gross Enrollment rate	0.022	-0.150	0.321
Female Earned Income	0.009	-0.094	0.533
Gender Equality Index	0.012	-0.109	0.471
Gross National Income per capita	0.001	-0.033	0.828
EMRO (N=21)			
Total Fertility rate	0.067	0.260	0.255
Female Literacy rate	0.053	-0.231	0.314
Female Gross Enrollment rate	0.011	-0.105	0.651
Female Earned Income	0.116	-0.341	0.131
Gender Equality Index	0.034	-0.185	0.422
Gross National Income per capita	0.089	-0.298	0.189
EURO (N=53)			
Total Fertility rate	0.124	-0.353**	0.010
Female Literacy rate	0.004	-0.067	0.636
Female Gross Enrollment rate	0.141	0.375**	0.006
Female Earned Income	0.272	0.521**	<0.001
Gender Equality Index	0.001	0.028	0.840
Gross National Income per capita	0.216	0.465**	<0.001
PAHO (N=35)			
Total Fertility rate	0.081	-0.285	0.097
Female Literacy rate	0.069	0.263	0.127
Female Gross Enrollment rate	0.198	0.445**	0.007
Female Earned Income	0.006	0.080	0.647
Gender Equality Index	0.013	-0.114	0.513
Gross National Income per capita	0.009	0.095	0.588
SEARO (N=11)			
Total Fertility rate	0.156	0.394	0.230
Female Literacy rate	0.210	-0.458	0.156
Female Gross Enrollment rate	0.001	-0.028	0.934
Female Earned Income	0.253	-0.503	0.115
Gender Equality Index	0.003	-0.054	0.874
Gross National Income per capita	0.071	-0.267	0.428
WPRO (N=27)			
Total Fertility rate	0.089	0.299	0.130
Female Literacy rate	0.008	-0.087	0.664
Female Gross Enrollment rate	0.000	0.010	0.959
Female Earned Income	0.003	0.055	0.786
Gender Equality Index	0.044	-0.209	0.296
Gross National Income per capita	0.001	0.026	0.897
** P-Value is significant at the 0.01 level			
* P-Value is significant at the 0.05 level			

Table 4.13 shows the results of univariate analysis conducted between the second dependent variable, female-to-male smoking prevalence ratio, and the independent variables: total fertility rate, female-to-male literacy ratio, female-to-male gross enrollment ratio, female-to-male earned income ratio, GEI, and GNI per capita. In all countries combined, female-to-male smoking prevalence ratio was significantly associated with five out of six variables. Total fertility had a significant negative association, implying that an increase in total fertility rate is associated with a decline in the relative female prevalence ratio. The other significant variables, female-to-male literacy ratio, female-to-male gross enrollment ratio, GEI, and GNI per capita, each showed positive associations. Hence, an increase in these variables is significantly associated with an increase in female-to-male smoking prevalence ratios. GNI per capita made the largest significant contribution (Beta = 0.515), followed by GEI, total fertility rate, relative female literacy ratio, and relative female enrollment ratio. GNI per capita explained 26.5% of the variation in female-to-male smoking prevalence ratio, while GEI explained 16.8% of the variance in female-to-male smoking prevalence ratio, without controlling for the effects of other variables.

The analysis was also broken down by WHO regions. Five of six WHO regions showed no significant association between the independent variables and relative female smoking ratio. However, GNI per capita and two of four gender equality measures were significantly associated with the dependent variable in EURO. These variables in decreasing order of importance are: GNI per capita, total fertility rate, and relative female gross enrollment ratio. Total fertility rate showed a significant negative association with relative female smoking prevalence, while the other significant variables showed a positive association. GNI per capita explains 51.1% of the variation in female-to-male smoking prevalence ratio in EURO.

Table 4.13: Univariate Analysis of the Association between Selected Independent Variables with Female-to-Male Smoking Prevalence Ratio

Independent Variable	R-Square	Beta	P-Value
All (N=193)			
Total Fertility rate	0.112	-0.334**	<0.001
Female/ Male Literacy ratio	0.100	0.317**	<0.001
Female/ Male Gross Enrollment ratio	0.098	0.314**	<0.001
Female/ Male Earned Income ratio	0.019	0.137	0.057
Gender Equality Index	0.168	0.410**	<0.001
Gross National Income per capita	0.265	0.515**	<0.001
AFRO (N=46)			
Total Fertility rate	0.009	0.093	0.540
Female/ Male Literacy ratio	0.000	-0.018	0.904
Female/ Male Gross Enrollment ratio	0.014	-0.118	0.436
Female/ Male Earned Income ratio	0.003	0.058	0.702
Gender Equality Index	0.000	-0.003	0.984
Gross National Income per capita	0.002	-0.046	0.759
EMRO (N=21)			
Total Fertility rate	0.001	0.034	0.882
Female/ Male Literacy ratio	0.013	-0.116	0.617
Female/ Male Gross Enrollment ratio	0.005	-0.074	0.750
Female/ Male Earned Income ratio	0.047	-0.217	0.346
Gender Equality Index	0.000	-0.002	0.994
Gross National Income per capita	0.011	-0.105	0.652
EURO (N=53)			
Total Fertility rate	0.076	-0.276*	0.046
Female/ Male Literacy ratio	0.016	0.126	0.368
Female/ Male Gross Enrollment ratio	0.076	0.275*	0.046
Female/ Male Earned Income ratio	0.000	-0.008	0.952
Gender Equality Index	0.500	0.223	0.108
Gross National Income per capita	0.511	0.715**	<0.001
PAHO (N=35)			
Total Fertility rate	0.041	-0.202	0.245
Female/ Male Literacy ratio	0.013	0.114	0.514
Female/ Male Gross Enrollment ratio	0.030	0.172	0.322
Female/ Male Earned Income ratio	0.000	-0.015	0.930
Gender Equality Index	0.000	0.021	0.904
Gross National Income per capita	0.086	0.293	0.087
SEARO (N=11)			
Total Fertility rate	0.195	0.441	0.174
Female/ Male Literacy ratio	0.114	-0.337	0.310
Female/ Male Gross Enrollment ratio	0.000	0.010	0.978
Female/ Male Earned Income ratio	0.007	0.084	0.806
Gender Equality Index	0.002	-0.040	0.906
Gross National Income per capita	0.051	-0.226	0.504
WPRO (N=27)			
Total Fertility rate	0.013	0.116	0.564
Female/ Male Literacy ratio	0.006	0.077	0.702
Female/ Male Gross Enrollment ratio	0.008	0.092	0.647
Female/ Male Earned Income ratio	0.012	0.109	0.587
Gender Equality Index	0.000	0.008	0.968
Gross National Income per capita	0.048	0.218	0.275
** P-Value is significant at the 0.01 level			
* P-Value is significant at the 0.05 level			

Tables 4.14 and 4.15 show the results from multiple linear regression analysis. The multiple regression analysis results explain which variables included in the model contribute to the prediction of the dependent variable. Analysis is conducted separately for each dependent variable: female smoking prevalence (Table 4.14) and relative female smoking prevalence (Table 4.15). Female earned income was removed from the model with female smoking prevalence as the dependent variable due to multicollinearity with other variables. Table 4.14 shows that, in all countries combined, GNI per capita was the only variable that made a statistically significant ($P<.05$) unique contribution towards the female smoking prevalence rate. The Beta finding indicates that an increase in GNI per capita by one standard deviation is associated with an increase in female smoking prevalence rate by 0.185 standard deviation units, controlling for the effect of other independent variables. 17.9% of the variance in the dependent variable is explained by this model. Measures of gender equality did not reach statistical significance.

The analysis was also broken down by WHO region. Three of six WHO regions, AFRO, EMRO, and SEARO, showed no significant association between the independent and dependent variables. In EURO, total fertility and GNI per capita were found to be significant predictors of prevalence. GNI per capita made a larger unique contribution (Beta=0.39) and was positively associated with female smoking prevalence, while fertility made a smaller unique contribution (Beta= -0.187) and was negatively associated with female smoking prevalence. The Beta findings indicate that an increase in GNI per capita by one standard deviation is associated with an increase in female smoking prevalence rate by 0.39 standard deviation units, while an increase in total fertility rate by one standard deviation is associated with a decrease in female smoking prevalence rate by 0.187 standard deviation units, controlling for the effect of other independent variables. PAHO showed a significant positive association between female smoking prevalence and female gross enrollment rate, while the effect of other variables was controlled for. WPRO showed a significant positive association between female smoking prevalence and total fertility. Although fertility is a significant predictor in both WPRO and EURO, it is a larger and positive predictor of female smoking prevalence in WPRO and a smaller and negative predictor in EURO. In EURO, 34.1% of the variance in female smoking prevalence is explained by the model, while in PAHO and WPRO 23.9% and 19% of the variance in the female smoking is explained by the models.

Table 4.14: Multiple Regression Analysis of the Association of Selected Independent Variables with Female Smoking Prevalence Rate

Independent Variable	R-Square	Beta	P-Value
All (N=193)	0.179		
Total Fertility rate		-0.091	0.451
Female Literacy rate		-0.030	0.816
Female Gross Enrollment rate		0.236	0.061
Gross National Income per capita		0.185*	0.026
AFRO (N=46)	0.047		
Total Fertility rate		-0.152	0.524
Female Literacy rate		-0.166	0.486
Female Gross Enrollment rate		-0.187	0.485
Gross National Income per capita		0.083	0.704
EMRO (N=21)	0.142		
Total Fertility rate		0.288	0.389
Female Literacy rate		0.074	0.848
Female Gross Enrollment rate		0.176	0.565
Gross National Income per capita		-0.343	0.289
EURO (N=53)	0.341		
Total Fertility rate		-0.187*	0.026
Female Literacy rate		-0.275	0.137
Female Gross Enrollment rate		0.134	0.393
Gross National Income per capita		0.390*	0.012
PAHO (N=35)	0.239		
Total Fertility rate		-0.142	0.654
Female Literacy rate		0.060	0.850
Female Gross Enrollment rate		0.444*	0.019
Gross National Income per capita		-0.158	0.392
SEARO (N=11)	0.439		
Total Fertility rate		0.392	0.335
Female Literacy rate		-0.470	0.332
Female Gross Enrollment rate		0.580	0.217
Gross National Income per capita		-0.322	0.450
WPRO (N=27)	0.190		
Total Fertility rate		0.639*	0.046
Female Literacy rate		0.136	0.720
Female Gross Enrollment rate		-0.066	0.871
Gross National Income per capita		0.443	0.195
** P-Value is significant at the 0.01			
* P-Value is significant at the 0.05			

Table 4.15 shows the results of multiple linear regression analysis conducted using the second dependent variable, female-to-male smoking prevalence ratio. Consistent with the results of the previous model, overall, GNI per capita was the only variable that made a statistically significant ($P<.05$) unique contribution towards the relative female smoking prevalence ratio. Measures of gender equality did not reach statistical significance. 28.9% of the variance in the dependent variable is explained by this model.

The analysis was also broken down by WHO region. Four of six WHO regions, AFRO, EMRO, PAHO, and SEARO, showed no significant association between the independent and dependent variables. GNI per capita was found to be significant positive predictor of relative female smoking prevalence ratio in EURO and WPRO, although it made a larger contribution in EURO (Beta=0.701) than it did in WPRO (Beta=.55). The Beta findings indicate that an increase in GNI per capita by one standard deviation is associated with an increase in female-to-male smoking prevalence ratio by 0.701 and 0.55 standard deviation units in EURO and WPRO, respectively, controlling for the effect of other independent variables. In EURO, 55.4% of the variance in female-to-male prevalence ratio is explained by the model while in WPRO 21.4% is explained by the model.

Table 4.15: Multiple Regression Analysis of the Association of Selected Independent Variables with Female-to-Male Smoking Prevalence Ratio

Independent Variable	R-Square	Beta	P-Value
All (N=193)	0.289		
Total Fertility rate		-0.038	0.708
Female/ Male Literacy ratio		0.070	0.536
Female/ Male Gross Enrollment ratio		0.063	0.557
Female/ Male Earned Income ratio		0.060	0.346
Gross National Income per capita		0.439**	<0.001
AFRO (N=46)	0.043		
Total Fertility rate		0.068	0.780
Female/ Male Literacy ratio		0.296	0.310
Female/ Male Gross Enrollment ratio		-0.329	0.259
Female/ Male Earned Income ratio		0.080	0.656
Gross National Income per capita		0.031	0.882
EMRO (N=21)	0.114		
Total Fertility rate		-0.377	0.385
Female/ Male Literacy ratio		-0.373	0.450
Female/ Male Gross Enrollment ratio		-0.117	0.747
Female/ Male Earned Income ratio		-0.383	0.219
Gross National Income per capita		0.076	0.851
EURO (N=53)	0.554		
Total Fertility rate		-0.172	0.125
Female/ Male Literacy ratio		-0.077	0.487
Female/ Male Gross Enrollment ratio		0.056	0.647
Female/ Male Earned Income ratio		-0.018	0.859
Gross National Income per capita		0.701**	<0.001
PAHO (N=35)	0.173		
Total Fertility rate		-0.122	0.541
Female/ Male Literacy ratio		0.030	0.889
Female/ Male Gross Enrollment ratio		0.172	0.397
Female/ Male Earned Income ratio		-0.323	0.141
Gross National Income per capita		0.376	0.070
SEARO (N=11)	0.418		
Total Fertility rate		0.498	0.285
Female/ Male Literacy ratio		-0.359	0.548
Female/ Male Gross Enrollment ratio		0.503	0.379
Female/ Male Earned Income ratio		0.136	0.759
Gross National Income per capita		-0.270	0.564
WPRO (N=27)	0.214		
Total Fertility rate		0.530	0.064
Female/ Male Literacy ratio		0.097	0.770
Female/ Male Gross Enrollment ratio		0.086	0.776
Female/ Male Earned Income ratio		0.161	0.449
Gross National Income per capita		0.550*	0.050
** P-Value is significant at the 0.01			
* P-Value is significant at the 0.05			

Table 4.16 shows the results of multiple linear regression analysis conducted using female smoking prevalence rate as the dependent variable and GEI and GNI per capita as the independent variables. Overall, both independent variables made statistically significant ($P<.05$) unique contributions towards the dependent variable. GNI per capita made a larger unique contribution (Beta=0.258) than GEI (Beta=0.186). Table 4.12 had shown that a model consisting of GEI alone explained 10.2%, while a model consisting of GNI per capita alone explained 12.5% of the variance in female smoking prevalence rates, without controlling for the effects of other variables. These two variables introduced together in a model explained 15.1% of the variance in female smoking prevalence rate.

When the analysis was broken down by WHO regions, GNI per capita was found to be significant positive predictor of female smoking prevalence rate in EURO alone. The Beta finding indicates that an increase in GNI per capita by one standard deviation is associated with an increase in female smoking prevalence rate by 0.476 standard deviation units in EURO, controlling for the effect of other independent variables. 22.0% of the variance in the dependent variable is explained by the model.

Table 4.16: Multiple Regression Analysis of the Association of GEI and GNI per Capita with Female Smoking Prevalence Rate

Independent Variable	R-Square	Beta	P-Value
All (N=193)	0.151		
GEI		0.186*	0.018
Gross National Income per capita		0.258**	<0.001
AFRO (N=46)	0.012		
GEI		-0.120	0.488
Gross National Income per capita		0.024	0.889
EMRO (N=21)	0.090		
GEI		0.047	0.882
Gross National Income per capita		-0.331	0.308
EURO (N=53)	0.220		
GEI		-0.061	0.635
Gross National Income per capita		0.476**	<0.001
PAHO (N=35)	0.050		
GEI		-0.246	0.247
Gross National Income per capita		0.233	0.272
SEARO (N=11)	0.073		
GEI		0.049	0.897
Gross National Income per capita		-0.284	0.459
WPRO (N=27)	0.064		
GEI		-0.288	0.214
Gross National Income per capita		0.165	0.472
** P-Value is significant at the 0.01 level			
* P-Value is significant at the 0.05 level			

Table 4.17 shows the results of multiple linear regression analysis conducted using female-to-male smoking prevalence ratio as the dependent variable and GEI and GNI per capita as the independent variables. Overall, both independent variables made statistically significant ($P<.05$) unique contributions towards the dependent variable. GNI per capita made a larger unique contribution (Beta=0.414) than GEI (Beta=0.197). Table 4.13 had shown that a model consisting of GEI alone explained 16.8% while a model consisting of GNI per capita alone explained 26.5% of the variance in female-to-male smoking prevalence ratio, without controlling for the effects of other variables. These two variables introduced together explained 29.4% of the variance in female-to-male smoking prevalence ratio.

When the analysis was broken down by WHO regions, GNI per capita was found to be a significant positive predictor of female-to-male smoking prevalence ratio in EURO and PAHO. The Beta finding indicates that an increase in GNI per capita by one standard deviation is associated with an increase in female-to-male smoking prevalence ratio by 0.698 standard deviation units in EURO and 0.412 standard deviation units in PAHO, controlling for the effect of other independent variables. 51.9% and 11.6% of the variance in the dependent variable is explained by the model in EURO and PAHO, respectively.

Table 4.17: Multiple Regression Analysis of the Association of GEI and GNI per Capita with Female-to-Male Smoking Prevalence Ratio

Independent Variable	R-Square	Beta	P-Value
All (N=193)	0.294		
GEI		0.197**	0.006
Gross National Income per capita		0.414**	<0.001
AFRO (N=46)	0.003		
GEI		0.025	0.888
Gross National Income per capita		-0.058	0.738
EMRO (N=21)	0.021		
GEI		0.141	0.672
Gross National Income per capita		-0.203	0.542
EURO (N=53)	0.519		
GEI		0.093	0.357
Gross National Income per capita		0.698**	<0.001
PAHO (N=35)	0.116		
GEI		-0.211	0.302
Gross National Income per capita		0.412*	0.049
SEARO (N=11)	0.053		
GEI		0.048	0.900
Gross National Income per capita		-0.243	0.529
WPRO (N=27)	0.060		
GEI		-0.126	0.582
Gross National Income per capita		0.279	0.229
** P-Value is significant at the 0.01 level			
* P-Value is significant at the 0.05 level			

CHAPTER V

DISCUSSION AND CONCLUSION

The roles of behavioral, psychological, biological, and social factors in explaining female smoking rates are well documented in literature. Less well documented are the roles of gender equality and economic development in explaining global female smoking rates and gender differences in female and male smoking rates. Using data from 193 countries, this study examined the roles of gender equality and economic development in explaining absolute female smoking prevalence rates and relative female smoking prevalence ratios by answering the following questions:

1) What is the gender specific smoking prevalence rate and female-to-male smoking prevalence ratio by WHO region, level of gender equality, and level of economic development?
2) Is there an association between female smoking prevalence rates and relative female-to-male smoking prevalence ratio with the level of gender equality?
3) Is there an association between female smoking prevalence rates and relative female-to-male smoking prevalence ratio with the level of economic development?
4) Is there an association between the level of gender equality and the level of economic development in a nation?
5) If association exists, which measure is a stronger predictor for absolute and relative female smoking: gender equality or economic development?

Several interesting findings emerged from the study.

Gender Specific Smoking Prevalence Rate and Female-to-Male Smoking Prevalence Ratio by WHO region, Level of Gender Equality, and Level of Economic Development

The study presented the overall smoking prevalence, gender specific smoking prevalence, and the relative female smoking prevalence by WHO region, GEI, and level of economic development. The analysis revealed that globally there are 0.26 times as many female as male smokers. In EURO and PAHO the gender differential in smoking rates, at 0.51 and 0.63, respectively, is much narrower than in other WHO regions, where it ranges from 0.10 to 0.15. The ratios imply that there are at least half as many female as male smokers in EURO and PAHO, while in other WHO regions female smokers are much less compared to male smokers. Similarly, in EURO and PAHO the prevalence of female smokers, at 18.8% and 15.9%, respectively, is much higher than in other WHO regions, where it ranges from 2.2% to 6.1%. Consistent with this study, past studies on smoking prevalence rates by WHO region also report the highest female smoking prevalence rate and lowest gender differential for PAHO and EURO [12, 54].

Analysis by gender equality levels showed that regions with the highest score on GEI also had the highest female smoking prevalence rate of 18.7% and the highest female-to-male prevalence ratio of 0.67. Since previous studies have not examined smoking prevalence rates by the level of gender equality within a country, there is no measure of comparison.

Analysis by levels of economic development showed that upper-middle and high-income regions had high female smoking prevalence rates of 15.9% and 17.0%, respectively and high female-to-male prevalence ratios of 0.45 and 0.57, respectively. By contrast low and lower middle-income regions had low female smoking prevalence rates of 7.4% and 9.9%, respectively, and low female-to-male prevalence ratios of 0.21 and 0.26, respectively. These results are consistent with the results of previous studies regarding global trends in adult cigarette use. Forey et al. [67] reported that in many high-income nations, smoking of men and women had moved toward parity. By contrast, smoking among women in middle-and low-income nations had generally remained uncommon [68]. Jha et al. [15] also found that females in low-income countries had a lower prevalence of smoking (8%) than those in high-income countries (21%). Their analysis also showed that female-to-male smoking prevalence ratios are higher for high-income countries (0.57) than low income countries (0.16). Similarly, Mackay et al. [2] reported that 22% of women in developed countries and 9% of women in developing countries are current smokers compared to 50% of men in developing countries and 35% of men in developed countries. These figures translate into female-to-male smoking prevalence ratios of 0.18 in developing countries and 0.63 in developed countries. Thus, previous studies confirm the finding of the present study that female smoking rates are lower for less economically developed regions than for high economically developed regions. Previous studies also confirm that the ratio of female and male smoking rates is lower for less economically developed regions than for high economically developed regions.

Association of Female Smoking Prevalence Rate and Relative Female-to-Male Smoking Prevalence Ratio with Level of Gender Equality

Descriptive figures obtained by plotting the dependent variables against GEI suggested that an increase in gender equality is associated with an increase in both dependent variables. To explore these relationships further, univariate analysis and multiple regressions were conduced between female smoking prevalence rate and relative female-to-male smoking prevalence ratio with measures of gender equality. Interestingly, despite showing significant influence on the two dependent variables in the univariate analyses in all nations combined, the individual gender equality measures failed to show any significance after controlling for the effects of confounding variables. Analysis within WHO regions showed only two gender equality variables, female gross enrollment rate and total fertility rate, as important predictors of female smoking prevalence rates. In PAHO, female gross enrollment rate was a positive predictor of female smoking prevalence rates. Total fertility rate was a negative predictor of female smoking prevalence in EURO but a positive predictor of female smoking prevalence in WPRO. Having fewer children is an indication of a woman's independence from family duties and patriarchal family norms. It also implies increased opportunities for her to obtain higher education and employment opportunities outside the family. In EURO, having fewer children translated into high female smoking prevalence, but in WPRO, it translated into lower female smoking prevalence. Results of the regional analysis need to be viewed with caution due to the severely restricted sample size.

Despite the lack of influence of individual gender equality measures, combining these into an index showed a different picture. The composite GEI showed a significant positive relationship with both absolute female smoking prevalence rates and relative female smoking prevalence ratios globally. Increasing composite gender equality was predictive of increase in both dependent variables. However, the index had little meaningful influence when analyzing within groups of nations defined by WHO region.

The poor performance of the index in regional analysis may be due to the severely restricted the sample size.

Consistent with previous studies, this study confirms the lack of significant relationship between female smoking prevalence rates and gender differential in smoking rates with individual measures of gender equality. For example, Pampel [16] used multilevel models and data for 16 European nations from 1988-1995 to conclude that gender differences in smoking prevalence had an insignificant relationship with national measures of gender equality. However, the study also found that, in all nations combined, a significant association existed between the composite gender equality index and the dependent variables. An increase in the composite index was accompanied by an increase in the percent of female smokers and an increase in the ratio of female to male smokers. These results support the gender equality hypothesis which predicts that nations with higher levels of gender equality will experience similar male and female smoking rates compared to countries at lower levels of gender equality. To confirm the results of this study, it is recommended that future studies repeat the analysis using an index with different gender equality indicators. Measures such as the female share of legislature, female share of the non-agricultural labor force, and country-specific divorce and abortion rate would be useful additions to the GEI, but information regarding these is not available for all countries.

Association of Female Smoking Prevalence Rate and Relative Female-to-Male Smoking Prevalence Ratio with Economic Development

Economic development consistently stood out as an important predictor of both percent of female smokers as well as the ratio of female to male smokers in all nations combined. Descriptive figures obtained by plotting the dependent variables against GNI per capita suggested that an increase in GNI per capita is associated with an increase in both dependent variables. Furthermore, the results of one-way ANOVA analyses showed that nations with higher levels of GNI per capita had significantly higher prevalence of female smokers and a higher ratio of female to male smokers. Consistent with these results, univariate analyses and multiple regression results showed GNI per capita to be a significant positive predictor of female smoking prevalence rates and relative female-to-male smoking prevalence ratios. The limited sample size diluted the effect of GNI per capita when making comparisons across WHO regions; however, the effect on EURO remained consistently strong.

By showing economic development as an important predictor of the percent of female smokers, this study highlights an important downside of development. Negative health effects of economic development have been the subject of previous studies. Beaglehole and Yach [69] in their study discussed the growing burden of non-communicable diseases, such as heart disease, stroke, cancer, diabetes and obesity, with rising economic development. Similarly, IOM [70] also noted that the form and burden of diseases change as a country undergoes economic development. Developing countries begin with a disease burden dominated by nutritional, perinatal, and infectious diseases and, in the process of development, make the transition to one dominated by non-communicable diseases, particularly cardiovascular diseases. One explanation for this phenomenon is that economic development raises disposable income, allowing for the adoption of a life-style high in fat, sugar, and salt; increased tobacco use; and reduced physical activity. Thus, previous studies have alluded to the predictive value of economic development in increasing rates of tobacco use.

Association between the Gender Equality and Economic Development

The study found a significant positive association between the composite gender equality measure and economic development. This result implies that, overall, an increase in gender equality is accompanied by an increase in economic development and vice versa. This finding is not surprising. Social observers have long noted that the status of women and overall economic development tend to go hand-in-hand. In the poorest quartile of countries in 1990, only 5% of adult women had any secondary education, one-half of the level of men. On the other hand, in the richest quartile 51% of adult women had at least some secondary education, 88% of the level of men [71]. Dollar and Gatti [71] used two-stage least squares estimation to examine the relationship between gender equality in education and economic growth using data for over 100 countries. They found that an increase in female secondary education attainment created a better environment for economic growth. Similarly, Chen [72] showed that economic development tends to lead to some improvements in gender equality in the labor market. Conversely literature has also produced evidence indicating that gender inequality tends to have a negative effect on economic development. For example, Klasen [73] reported that if countries of South Asia, Sub-Saharan Africa, Middle East, and North Africa had achieved gender equality in schooling as rapidly as the East Asian countries during 1960 to 1992, their income per capita could have grown by an additional 0.5 to 0.9 percentage point per year. Finally, Hill and King [74] conducted panel regressions using data from 152 countries during 1960-85 to conclude that gender inequality in education has a negative effect on the level of aggregate output. They found that a low female-to-male primary and secondary school enrollment ratio is associated with a lower level of GNP. These studies support that conclusion of the present study that gender equality and economic development reinforce one another in both positive and negative directions.

Which Measure Is a Stronger Predictor: Gender Equality or Economic Development?

This study shows that GNI per capita is more important in predicting high female smoking prevalence and female-to-male smoking prevalence ratio than composite GEI in all nations combined. The effect of individual gender equality measures is not compared with the effect of economic development since multiple regression analyses already established the insignificance of individual gender equality measures in predicting the dependent variables. In all nations combined, GNI per capita (Beta=0.354) is more strongly associated with female smoking prevalence than GEI (Beta=0.319), without controlling for the effects of other variables. The same effect is observed in the multiple regression analysis. GNI per capita (Beta=0.258) emerges as a stronger predictor of female smoking prevalence rate than GEI (Beta=0.186). GNI per capita is also a stronger predictor of the gender differential in smoking rates than GEI. In all nations combined, GNI per capita (Beta=0.515) is more strongly associated with female-to-male smoking prevalence ratio than GEI (Beta=0.410), without controlling for the effects of other variables. The same effect is observed in the multiple regression analysis. GNI per capita (Beta=0.414) emerges as a stronger predictor of female smoking prevalence rate than GEI (Beta=0.197). While GNI per capita is a stronger predictor than GEI, Chi-square tests show that the level of gender equality plays a strong role within lower income regions. Lower-income nations with high gender equality had a mean female smoking prevalence rate of 11.6%, while lower-income nations with low gender equality had a mean female smoking rate of 7.6%. So, although income is a more important predictor overall, gender equality seems to play an important role in determining female smoking prevalence rates in lower income countries.

By revealing a positive influence on female smoking rates, the study sheds light on the darker side of gender equality and economic development. As globalization moves across Asia, Middle East, and Africa carrying social change in its wake, there is fear of rise in female tobacco use. Although the prevalence of cigarette use among women is low compared to men, the fear is well founded. Normative traditions that protect women from the dangers of smoking are part of structures that relegate women to subservient positions within the family and wider community. However, moving away from these traditions towards a more progressive society is accompanied by increase in smoking among women. Given this relationship, the obvious question is how to have an equitable and prosperous society without increasing female smoking.

A large degree of the relationship between gender equality, economic development, and female smoking is manipulated by the tobacco industry, primarily through marketing. In the early 19th century, the imagery surrounding tobacco was very masculine. In fact, anti-tobacco literature referred to smokers using male pronouns assuming that they would be male [75]. Tobacco industry capitalized on changes in the social and economic status of women by deliberately linking images of emancipation, autonomy, and sophistication to its products. One example of this tactic is the ‘Torches of

Freedom' campaign developed by Edward Bernays, a public relations expert hired by the American Tobacco Company to promote cigarette consumption among women. On Easter Sunday, 1929, Mr. Bernays hired several young women to march down New York's Fifth Avenue with cigarettes or 'torches of freedom' in their hands to protest against women's inequality [76]. What billed itself as a feminist promotion of the emancipation of women was, in reality, a public relations ploy to encourage women to smoke by associating smoking with liberation and freedom. Another example is the Virginia Slims "You've Come a Long Way, Baby" campaign, which made repeated references to the suffrage movement as a way of associating cigarettes with freedom [77]. A 1990 editorial in Tobacco Reporter noted the growth opportunities represented by women as: "Women are becoming more independent and, consequently, adopting less traditional lifestyles. One symbol of their newly discovered freedom may well be cigarettes" [78].

Various other social marketing strategies have been employed by the tobacco industry to associate smoking as a symbol of liberation, unconventionality, and rejection of values of safety, carefulness, and conformity. In Sri Lanka, in a modern version of the 1929 Easter Parade march, the Ceylon Tobacco Company hired young women to drive around in "Players Gold Leaf" cars and jeeps handing out free cigarette samples and promotional items [79]. In a country where only 1% of women smoke, this appears to be part of a wider strategy to challenge the social taboo that respectable women in Sri Lanka should not smoke and certainly not in the street [76]. By spending billions of dollars on its marketing and promotion activities every year, the tobacco industry has manipulated gender equality in a way to associate it with smoking.

Grouping by WHO regions, GNI per capita, and GEI shows that in some regions the percent of women smokers are much less compared to male smokers. Ironically, these low rates make women a profitable target for the tobacco companies. With declining markets in countries where tobacco use has its firmest hold, namely in the regions where female-to-male smoking rates are close to parity, the tobacco industry is turning its focus to countries where the female market is relatively unexplored. By exploiting ideas of liberation, economic independence, affluence, power, and other key values for women, the tobacco industry is accelerating the conversion process. The same marketing techniques that have been used to promote smoking among women in developed countries are now being applied to women and girls in developing countries. Trends of increasing smoking among women are of particular concern, given that women are often role models, primary caregivers, and educators in the home. Female smoking rates are of a particular concern in developing countries because governments in developing countries are preoccupied with other health issues and mostly see tobacco as a problem confined to men [4]. Also, women-specific health education and quitting programs are especially rare in developing countries [4].

The roles of gender equality and economic development in female smoking rates attest to the importance of gender specific research and economic interventions. One recommendation that relates to the issue of gender equality is to call for a comprehensive ban on tobacco advertising. There is some evidence that total bans on tobacco advertising and promotion are effective [80]. Partial restrictions on advertising, in contrast, allow the tobacco industry to exploit other media and alternative promotional tactics [80]. In addition to advertising policies, economic policies are essential to improving tobacco control. Taxation is one of the most powerful tools to reduce tobacco use. Since many countries still have extremely low tax rates on tobacco, there is ample scope to raise taxes. World Bank data reveal that in high-income countries, the average percentage of all government revenue derived from tobacco tax is 0.63% [81]. The average in middle-income countries and low-income countries is 0.51% and 0.42%, respectively [81]. Tobacco tax revenues earmarked for tobacco control measures can generate even greater reductions in tobacco use than tax increases alone. Increased funding to support smoking cessation programs for women, gender-sensitive training of health personnel, and the development of community-based programs are also important fiscal policies that can help women [5]. Research exploring the global variability in female smoking rates is in its nascent stages, and much more gender-specific research is needed in this area.

Several limitations of this study need to be mentioned. Data compiled in this study come largely from separate national surveys rather than from a single set of standardized instruments. Because they differ in design, definition, measures, samples, and quality, the cross-national surveys face problems of comparability. For example, the age category that defined ‘adult’ smokers was not consistent in every country. In Ireland, an adult was defined as a person aged 18 years and older while in Jamaica, it was a person aged 25 and older. Additionally, data were not available for all countries or over time. To deal with the limitations of time-series data, cross-sectional data on smoking prevalence and gender equality measures were used in the study and preference was given to those gender equality measures that were available for a majority of the 193 countries. However, data were not available for the same cross-sectional time period for all variables. For example, while the total fertility data are primarily for 2006, the adult literacy data are based on surveys conducted between 2000 and 2004 and GNI per capita data are for 2005. To deal with the limitation of gaps in data, regional estimates were used as a proxy for missing variables. However, these estimated data are less likely to be robust. It would be useful for future studies to use alternative methods to predict missing values, perhaps by using country level information, and compare the results to see if similar conclusions are reached. The necessity of using cross-national surveys and estimating missing data attest to the need of developing a standardized adult global surveillance system. The GYTS is an example of such an effort to generate youth tobacco use information on a global basis. It uses a standard methodology for constructing sampling frames, preparing questionnaires, following field procedures, and using data management procedures [82]. However, no similar effort of tobacco surveillance exists for adults. Also, to improve the quality of future studies, better as well as additional efforts are needed to monitor global smoking prevalence and gender equality measures over time, particularly among low-income nations. This study did not address gender differentials in the rates of cigarette consumption, use of other forms of tobacco products, and duration of smoking. It would be interesting to explore the effect of gender equality on these in future studies.

Overall, the weaker performance of composite gender equality measure compared to GNI per capita may be due to the inability to operationalize some important regional, cultural, and historical influences on gender equality. In addition to the variables included in the study, gender equality is also influenced by various other factors such as pervasiveness of arranged marriages, attitudes towards women’s sexuality (including incidence and prevalence of female genital circumcision, rape laws, punishment for female adultery), level of religiosity, average age at which women marry, occurrence of domestic violence, female infanticide, divorce rates, abortion rates, and occurrence of prostitution (disaggregated by age). For example, arranged marriages are still a customary from of marriage in several countries in Africa, Middle East, and South Asia, particularly Bangladesh, India, and Pakistan. Family honor and image are highly valued among societies where arranged marriages are prevalent. Girls are taught to preserve family honor and stay away from vices such as smoking. The effect of GEI on female smoking prevalence may be different if these other confounders were taken into consideration. However, data regarding these issues is not readily available, is hard to measure, and is prone to gross underreporting due to its sensitive nature. Understanding the effect of gender equality on global patterns of sex differences in smoking would benefit from development of better gender equality indicators for a fuller sample of nations. Further research is needed to fully understand the reasons behind the weaker performance of composite gender equality measure compared to GNI per capita. It would also be useful for future studies to further explore the interrelationship between gender equality and GNI per capita to understand if gender equality follows increase in GNI per capita or vice versa.

In this study, conclusions were based on aggregate measures of smoking prevalence rates, gender equality and economic development. Aggregate data is valuable since it provides variation beyond what is available from within national trends. However, using aggregate measures can mask the variations that exist within countries. For example, averages at a global or country level may depict gender equality, whereas sub-national figures may depict gender inequality. Similarly, aggregate data do not distinguish among the groups of women within nations most likely to adopt smoking with an increase in GNI per capita or transition toward more progressive gender roles. To corroborate the results obtained, it would be useful for future studies to explore the relationship between the variables using sub-national data in addition to national averages. Another advantage of using sub-national data would be the increase in sample size. The limited influence of gender equality measures, composite GEI, and GNI per capita by WHO regions may have been a result of the limited sample size. By including sub-national data, future studies could address this limitation. By expanding the sample size, future studies may be able to explore if, indeed, composite GEI and GNI per capita hold more value in the EURO and why this may be the case.

Overall, data in this study tended to be very consistent except for the countries with GEI score of 6 as shown in Figures 4.1 and 4.2. This is because this category includes Cook Islands and Nauru, two countries with the highest female smoking prevalence rates.

Finally, few indicators exist for measuring the quality of equality – the process that brings it about and the nature of the outcomes. Achieving numerical equality is clearly important in a world where even this goal has yet to be attained. However, unless indicators are also developed for measuring quality of change, we run the risk of placing too much weight on mere quantitative change as opposed to the way in which it is achieved. Equality in education, income, and literacy are more than justified in use as gender equality measures, but they are not sufficient to measure the quality of gender equality. Achieving parity in educational outcomes is not the same as ensuring that all girls are properly educated and can fully develop their capabilities. Even though education provides women with an essential capability and intrinsic value, gender equality and empowerment of women can remain elusive goals without the opportunity to fully use the capability, for example, in employment, or by participating in decision making in the political arena.

Even with these shortcomings, it is clear from this analysis that absolute and relative female smoking prevalence rates in a sample of all nations in the world are influenced by gender equality and economic development. There is need for educational programs to cleave out association between economic and gender progress and female smoking. There is also need for emphasis that true economic and gender progress is associated with a future freedom from addiction. One organization that has created a public education campaign along these lines is The National Organization for Women, the largest organization of feminist activists in the United States [83]. The organization's Redefining Liberation campaign was funded by a grant from the Centers for Disease Control and Prevention. One phase of the campaign resulted in the creation of the "Redefining Liberation" video which redefines women's liberation and reminds young women of their rights to health [84].

These results of this study are relevant now more than ever with the tobacco industry shifting its focus from the West to developing regions where they may be less government control and public debate about the role of transnational companies. In the coming years these developing countries will transition to higher levels of equality and economic development. This transition, coupled with the strategic marketing and promotional effort of tobacco companies, could potentially translate into a staggering increase in the number of female smokers. To prevent this from happening, it will be important to disentangle smoking from the notion of advancement in gender equality and economic development in the coming years. In societies where smoking is not culturally acceptable, the challenge will be to prevent the association between gender equity and economic development with taking up tobacco use. In societies where smoking rates are rising or stable, the challenge will be to dissociate tobacco use from the positive values it may be associated with. In societies where women's smoking rates are declining, the challenge will be to maintain and reinforce that decline.

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Appendix A

Country Classification by WHO Regions, GEI, and GNI per Capita

	Classification By:			
Countries	**World Health Organization Region**	**Gender Equality Index ***	**Gross National Income Per Capita Category ***	**Gross National Income per Capita ($) ***
Afghanistan	EMRO	2	L	438
Albania	EURO	9	LM	2580
Algeria	AFRO	4	LM	2730
Andorra	EURO	11	H	10726
Angola	AFRO	4	LM	1350
Antigua and Barbuda	PAHO	9	H	10920
Argentina	PAHO	9	UM	4470
Armenia	EURO	12	LM	1470
Australia	WPRO	12	H	32220
Austria	EURO	9	H	36980
Azerbaijan	EURO	8	LM	1240
Bahamas	PAHO	12	H	15800
Bahrain	EMRO	7	H	14370
Bangladesh	SEARO	6	L	470
Barbados	PAHO	12	UM	7096
Belarus	EURO	12	LM	2760
Belgium	EURO	12	H	35700
Belize	PAHO	7	UM	3500
Benin	AFRO	4	L	510
Bhutan	SEARO	2	L	870
Bolivia	PAHO	5	LM	1010
Bosnia and Herzegovina	EURO	8	LM	2440
Botswana	AFRO	9	UM	5180
Brazil	PAHO	9	LM	3460
Brunei Darussalam	WPRO	8	H	10726
Bulgaria	EURO	11	LM	10726
Burkina Faso	AFRO	4	L	400
Burundi	AFRO	4	L	100
Cambodia	WPRO	5	L	380
Cameroon	AFRO	2	LM	1010
Canada	PAHO	12	H	32600
Cape Verde	AFRO	5	LM	1870
Central African Republic	AFRO	3	L	350
Chad	AFRO	3	L	400
Chile	PAHO	6	UM	5870
China	WPRO	9	LM	1740
Colombia	PAHO	9	LM	2290
Comoros	AFRO	3	L	640

Countries	World Health Organization Region	Gender Equality Index *	Gross National Income Per Capita Category *	Gross National Income per Capita ($) *
	Classification By:			
Cook Islands	WPRO	6	UM	8087
Costa Rica	PAHO	8	UM	4590
Cote d'Ivoire	AFRO	1	L	840
Croatia	EURO	10	UM	8060
Cuba	PAHO	9	LM	2171
Cyprus	EURO	8	H	16510
Czech Republic	EURO	12	UM	10710
Democratic Republic of Congo	AFRO	3	L	120
Denmark	EURO	13	H	47390
Djibouti	EMRO	1	LM	1020
Dominica	PAHO	10	UM	3790
Dominican Republic	PAHO	7	LM	2370
Ecuador	PAHO	7	LM	2630
Egypt	EMRO	3	LM	1250
El Salvador	PAHO	5	LM	2450
Equatorial Guinea	AFRO	2	UM	7096
Eritrea	AFRO	2	L	220
Estonia	EURO	13	UM	9100
Ethiopia	AFRO	2	L	160
Fiji	WPRO	5	LM	3280
Finland	EURO	13	H	37460
France	EURO	10	H	34810
Gabon	AFRO	4	UM	5010
Gambia	AFRO	3	L	290
Georgia	EURO	10	LM	1350
Germany	EURO	10	H	34580
Ghana	AFRO	5	L	450
Greece	EURO	8	H	19670
Grenada	PAHO	7	UM	3920
Guatemala	PAHO	4	LM	2400
Guinea	AFRO	2	L	370
Guinea-Bissau	AFRO	4	L	180
Guyana	PAHO	7	LM	1010
Haiti	PAHO	7	L	450
Honduras	PAHO	8	LM	1190
Hungary	EURO	12	UM	10030
Iceland	EURO	12	H	46320
India	SEARO	2	L	720
Indonesia	SEARO	6	LM	1280
Iran	EMRO	4	LM	2770
Iraq	EMRO	2	LM	2171
Ireland	EURO	9	H	40150

	Classification By:			
Countries	**World Health Organization Region**	**Gender Equality Index ***	**Gross National Income Per Capita Category ***	**Gross National Income per Capita ($) ***
Israel	EURO	9	H	18620
Italy	EURO	10	H	30010
Jamaica	PAHO	12	LM	3400
Japan	WPRO	9	H	38980
Jordan	EMRO	6	LM	2500
Kazakhstan	EURO	11	LM	10726
Kenya	AFRO	6	L	530
Kiribati	WPRO	5	LM	1390
Kuwait	EMRO	6	H	24040
Kyrgyzstan	EURO	9	L	440
Laos	WPRO	4	L	440
Latvia	EURO	12	UM	6760
Lebanon	EMRO	6	UM	6180
Lesotho	AFRO	7	LM	960
Liberia	AFRO	2	L	130
Libya	EMRO	5	UM	5530
Liechtenstein	EURO	11	H	10726
Lithuania	EURO	13	UM	7050
Luxembourg	EURO	7	H	65630
Macedonia	EURO	9	LM	2830
Madagascar	AFRO	5	L	290
Malawi	AFRO	4	L	160
Malaysia	WPRO	7	UM	4960
Maldives	SEARO	6	LM	2390
Mali	AFRO	3	L	380
Malta	EURO	9	H	13590
Marshall Islands	WPRO	8	LM	2930
Mauritania	AFRO	3	L	560
Mauritius	AFRO	5	UM	5260
Mexico	PAHO	7	UM	7310
Micronesia	WPRO	7	LM	2300
Moldova	EURO	11	LM	880
Monaco	EURO	11	H	10726
Mongolia	WPRO	11	L	690
Morocco	EMRO	2	LM	1730
Mozambique	AFRO	4	L	310
Myanmar	SEARO	7	L	438
Namibia	AFRO	7	LM	2990
Nauru	WPRO	6	UM	8087
Nepal	SEARO	3	L	270
Netherlands	EURO	9	H	36620
New Zealand	WPRO	12	H	25960

	Classification By:			
Countries	World Health Organization Region	Gender Equality Index *	Gross National Income Per Capita Category *	Gross National Income per Capita ($) *
Nicaragua	PAHO	7	LM	910
Niger	AFRO	3	L	240
Nigeria	AFRO	2	L	560
Niue	WPRO	6	UM	8087
Norway	EURO	12	H	59590
Oman	EMRO	3	UM	9070
Pakistan	EMRO	2	L	690
Palau	WPRO	8	UM	7630
Panama	PAHO	8	UM	4630
Papua New Guinea	WPRO	5	L	660
Paraguay	PAHO	6	LM	1280
People's Republic of Korea (North Korea)	SEARO	8	L	438
Peru	PAHO	5	LM	2610
Philippines	WPRO	9	LM	1300
Poland	EURO	12	UM	7110
Portugal	EURO	10	H	16170
Qatar	EMRO	7	H	10726
Republic of Congo	AFRO	4	LM	950
Republic of Korea (South Korea)	WPRO	7	H	15830
Romania	EURO	10	UM	3830
Russian Federation	EURO	11	UM	4460
Rwanda	AFRO	5	L	230
Saint Kitts and Nevis	PAHO	9	UM	8210
Saint Lucia	PAHO	10	UM	4800
Saint Vincent and the Grenadines	PAHO	10	UM	3590
Samoa	WPRO	8	LM	2090
San Marino	EURO	10	H	10726
Sao Tome and Principe	AFRO	2	L	390
Saudi Arabia	EMRO	3	H	11770
Senegal	AFRO	3	L	710
Serbia and Montenegro	EURO	8	LM	10726
Seychelles	AFRO	9	UM	8290
Sierra Leone	AFRO	1	L	220
Singapore	WPRO	7	H	27490
Slovakia	EURO	11	UM	7950
Slovenia	EURO	12	H	17350
Solomon Islands	WPRO	7	L	590
Somalia	EMRO	2	L	438
South Africa	AFRO	6	UM	4960
Spain	EURO	10	H	25360
Sri Lanka	SEARO	7	LM	1160
Sudan	EMRO	1	L	640

	Classification By:			
Countries	World Health Organization Region	Gender Equality Index *	Gross National Income Per Capita Category *	Gross National Income per Capita ($) *
Suriname	PAHO	8	LM	2540
Swaziland	AFRO	5	LM	2280
Sweden	EURO	13	H	41060
Switzerland	EURO	11	H	54930
Syria	EMRO	3	LM	1380
Tajikistan	EURO	7	L	330
Tanzania	AFRO	6	L	340
Thailand	SEARO	8	LM	2750
Timor-Leste	SEARO	4	L	750
Togo	AFRO	2	L	350
Tonga	WPRO	9	LM	2190
Trinidad and Tobago	PAHO	10	UM	10440
Tunisia	EMRO	6	LM	2890
Turkey	EURO	5	UM	4710
Turkmenistan	EURO	9	LM	10726
Tuvalu	WPRO	6	UM	8087
Uganda	AFRO	5	L	280
Ukraine	EURO	9	LM	1520
United Arab Emirates	EMRO	8	H	23770
United Kingdom	EURO	12	H	37600
United States	PAHO	12	H	43740
Uruguay	PAHO	10	UM	4360
Uzbekistan	EURO	8	L	510
Vanuatu	WPRO	6	LM	1600
Venezuela	PAHO	7	UM	4810
Vietnam	WPRO	7	L	620
Yemen	EMRO	1	L	600
Zambia	AFRO	3	L	490
Zimbabwe	AFRO	6	L	340

* Legend:

1. Cells in gray denote estimates
2. Gender Equality Index ranges from 1 through 13 with 1 representing countries with the lowest level of gender equality and 13 representing countries with the highest level of gender equality
3. Gross National Income per capita categories are coded as:
   - L: Low Income
   - LM: Lower Middle Income
   - UM: Upper Middle Income
   - H: High Income

Appendix B

Country-Specific Female and Male Smoking Prevalence Rates and Relative Female Smoking Prevalence Ratio

Countries	Female (%) *	Male (%)*	Female/ Male Smoking Prevalence Ratio
Afghanistan	17.0	82.0	0.21
Albania	18.0	60.0	0.30
Algeria	0.4	32.3	0.01
Andorra	30.0	42.0	0.71
Angola	2.2	15.1	0.15
Antigua and Barbuda	15.9	25.1	0.63
Argentina	24.9	32.3	0.77
Armenia	2.4	61.8	0.04
Australia	16.3	18.6	0.88
Austria	24.2	33.9	0.71
Azerbaijan	0.6	40.8	0.01
Bahamas	3.8	19.3	0.20
Bahrain	3.1	15.0	0.21
Bangladesh	26.7	54.8	0.49
Barbados	0.8	20.1	0.04
Belarus	7.1	53.2	0.13
Belgium	25.0	30.0	0.83
Belize	15.9	25.1	0.63
Benin	2.2	15.1	0.15
Bhutan	5.2	36.5	0.14
Bolivia	19.4	37.6	0.52
Bosnia and Herzegovina	29.7	49.2	0.60
Botswana	2.2	15.1	0.15
Brazil	14.0	21.8	0.64
Brunei Darussalam	4.9	54.3	0.09
Bulgaria	23.0	43.8	0.53
Burkina Faso	0.6	17.7	0.03
Burundi	11.4	15.6	0.73
Cambodia	10.0	66.7	0.15
Cameroon	2.2	15.1	0.15
Canada	17.0	22.0	0.77
Cape Verde	2.2	15.1	0.15
Central African Republic	2.2	15.1	0.15
Chad	2.2	24.1	0.09
Chile	36.8	48.3	0.76
China	3.5	57.4	0.06
Colombia	11.3	26.8	0.42
Comoros	17.0	27.5	0.62
Cook Islands	71.1	34.4	2.07
Costa Rica	9.7	29.0	0.33

Countries	Female (%) *	Male (%)*	Female/ Male Smoking Prevalence Ratio
Cote d'Ivoire	1.8	42.3	0.04
Croatia	26.6	34.1	0.78
Cuba	26.2	48.1	0.54
Cyprus	7.6	38.5	0.20
Czech Republic	20.1	31.1	0.65
Democratic Republic of Congo	2.2	15.1	0.15
Denmark	25.0	31.0	0.81
Djibouti	10.0	75.0	0.13
Dominica	15.9	25.1	0.63
Dominican Republic	10.9	15.8	0.69
Ecuador	17.4	45.5	0.38
Egypt	12.1	45.4	0.27
El Salvador	12.0	38.0	0.32
Equatorial Guinea	2.2	15.1	0.15
Eritrea	2.2	15.1	0.15
Estonia	17.9	45.0	0.40
Ethiopia	0.3	5.9	0.05
Fiji	3.9	26.0	0.15
Finland	19.3	25.7	0.75
France	21.2	30.0	0.71
Gabon	2.2	15.1	0.15
Gambia	4.4	38.5	0.11
Georgia	6.3	53.3	0.12
Germany	28.0	37.3	0.75
Ghana	0.7	7.4	0.09
Greece	29.0	46.8	0.62
Grenada	15.9	25.1	0.63
Guatemala	2.0	21.0	0.10
Guinea	47.3	58.9	0.80
Guinea-Bissau	2.2	15.1	0.15
Guyana	15.9	25.1	0.63
Haiti	6.1	14.6	0.42
Honduras	11.0	36.0	0.31
Hungary	27.8	40.5	0.69
Iceland	19.6	25.4	0.77
India	2.5	29.4	0.09
Indonesia	2.9	58.3	0.05
Iran	2.1	22.0	0.10
Iraq	5.0	40.0	0.13
Ireland	26.0	28.0	0.93
Israel	17.8	31.9	0.56
Italy	17.2	31.3	0.55
Jamaica	11.6	37.7	0.31
Japan	14.5	46.9	0.31
Jordan	8.3	50.5	0.16

Countries	Female (%) *	Male (%)*	Female/ Male Smoking Prevalence Ratio
Kazakhstan	9.3	65.3	0.14
Kenya	1.0	21.3	0.05
Kiribati	32.3	56.5	0.57
Kuwait	1.9	34.4	0.06
Kyrgyzstan	4.5	51.0	0.09
Laos	12.5	58.7	0.21
Latvia	19.2	51.1	0.38
Lebanon	30.6	42.3	0.72
Lesotho	1.0	38.5	0.03
Liberia	2.2	15.1	0.15
Libya	6.1	34.2	0.18
Liechtenstein	18.8	40.8	0.46
Lithuania	12.8	43.7	0.29
Luxembourg	26.0	39.0	0.67
Macedonia	32.0	40.0	0.80
Madagascar	2.2	15.1	0.15
Malawi	4.8	20.5	0.23
Malaysia	1.6	43.0	0.04
Maldives	15.6	37.4	0.42
Mali	2.2	15.1	0.15
Malta	17.6	29.9	0.59
Marshall Islands	4.9	54.3	0.09
Mauritania	2.2	15.1	0.15
Mauritius	1.0	32.1	0.03
Mexico	4.7	12.9	0.36
Micronesia	4.9	42.0	0.12
Moldova	1.8	33.6	0.05
Monaco	18.8	40.8	0.46
Mongolia	7.5	52.4	0.14
Morocco	0.1	28.5	0.00
Mozambique	2.2	15.1	0.15
Myanmar	12.2	36.4	0.34
Namibia	9.6	22.8	0.42
Nauru	59.0	49.8	1.18
Nepal	24.0	48.5	0.49
Netherlands	28.4	35.8	0.79
New Zealand	22.2	23.7	0.94
Nicaragua	5.3	25.1	0.21
Niger	11.3	40.6	0.28
Nigeria	0.5	15.4	0.03
Niue	14.5	37.5	0.39
Norway	24.8	27.2	0.91
Oman	1.5	15.5	0.10
Pakistan	3.4	28.5	0.12
Palau	4.0	14.0	0.29

Countries	Female (%) *	Male (%)*	Female/ Male Smoking Prevalence Ratio
Panama	6.1	19.7	0.31
Papua New Guinea	28.0	46.0	0.61
Paraguay	6.8	23.4	0.29
People's Republic of Korea (North Korea)	5.2	36.5	0.14
Peru	17.8	52.5	0.34
Philippines	7.6	40.5	0.19
Poland	25.0	40.0	0.63
Portugal	9.5	32.8	0.29
Qatar	0.5	37.0	0.01
Republic of Congo	2.2	15.1	0.15
Republic of Korea (South Korea)	4.4	64.9	0.07
Romania	10.1	32.3	0.31
Russian Federation	15.5	60.4	0.26
Rwanda	4.0	7.0	0.57
Saint Kitts and Nevis	15.9	25.1	0.63
Saint Lucia	5.6	37.3	0.15
Saint Vincent and the Grenadines	1.9	17.4	0.11
Samoa	24.0	60.0	0.40
San Marino	17.0	28.0	0.61
Sao Tome and Principe	2.2	15.1	0.15
Saudi Arabia	4.9	14.4	0.34
Senegal	2.2	15.1	0.15
Serbia and Montenegro	33.6	48.0	0.70
Seychelles	6.9	37.0	0.19
Sierra Leone	7.4	40.8	0.18
Singapore	3.5	24.2	0.14
Slovakia	14.7	41.1	0.36
Slovenia	20.1	28.0	0.72
Solomon Islands	23.0	54.3	0.42
Somalia	6.1	34.2	0.18
South Africa	7.7	23.2	0.33
Spain	24.6	39.2	0.63
Sri Lanka	1.7	23.2	0.07
Sudan	1.5	23.5	0.06
Suriname	15.9	25.1	0.63
Swaziland	2.9	10.5	0.28
Sweden	18.3	16.7	1.10
Switzerland	23.1	26.5	0.87
Syria	5.7	44.3	0.13
Tajikistan	18.8	40.8	0.46
Tanzania	1.3	23.0	0.06
Thailand	2.9	48.5	0.06
Timor-Leste	1.1	36.5	0.03
Togo	2.2	15.1	0.15
Tonga	10.5	52.9	0.20

Countries	Female (%) *	Male (%)*	Female/ Male Smoking Prevalence Ratio
Trinidad and Tobago	4.2	42.4	0.10
Tunisia	2.4	49.5	0.05
Turkey	17.6	49.4	0.36
Turkmenistan	1.0	27.0	0.04
Tuvalu	31.0	51.0	0.61
Uganda	3.3	25.2	0.13
Ukraine	11.1	52.5	0.21
United Arab Emirates	1.3	17.3	0.08
United Kingdom	25.0	27.0	0.93
United States	19.2	24.1	0.80
Uruguay	23.8	34.6	0.69
Uzbekistan	0.9	24.1	0.04
Vanuatu	5.0	49.1	0.10
Venezuela	21.4	35.9	0.60
Vietnam	1.7	35.3	0.05
Yemen	29.0	77.0	0.38
Zambia	1.0	16.0	0.06
Zimbabwe	2.2	20.0	0.11

* Legend:

1. Cells in gray denote estimates

Appendix C

Country-Specific Fertility, Female Literacy, Female Gross Enrollment Rates and Female Earned Income

Countries	Total Fertility rate (children per woman) *	Female Literacy rate (%) *	Female Gross Enrollment rate (%) *	Female Earned Income (PPP US$) *
Afghanistan	6.7	21.0	64.5	3,131
Albania	2.0	98.3	70.0	3,266
Algeria	1.9	60.1	72.0	2,896
Andorra	1.3	100.0	89.0	12,197
Angola	6.4	53.8	27.0	1,797
Antigua and Barbuda	2.2	88.7	80.8	5,921
Argentina	2.2	97.2	99.0	6,635
Armenia	1.3	99.2	74.0	3,026
Australia	1.8	99.0	117.0	24,827
Austria	1.4	99.0	90.0	15,878
Azerbaijan	2.5	98.2	68.0	2,683
Bahamas	2.2	96.3	80.8	13,357
Bahrain	2.6	83.0	85.0	7,685
Bangladesh	3.1	31.4	54.0	1,245
Barbados	1.7	99.7	94.0	11,976
Belarus	1.4	99.4	91.0	4,842
Belgium	1.6	99.0	119.0	19,951
Belize	3.6	77.1	78.0	2,695
Benin	5.2	22.6	43.0	910
Bhutan	4.7	34.0	14.0	2,403
Bolivia	2.9	80.4	84.0	1,615
Bosnia and Herzegovina	1.2	91.1	89.0	3,759
Botswana	2.8	81.5	71.0	6,617
Brazil	1.9	88.6	93.0	4,704
Brunei Darussalam	2.3	90.2	75.0	7,705
Bulgaria	1.4	97.7	78.0	6,212
Burkina Faso	6.5	8.1	20.0	986
Burundi	6.6	51.9	31.0	545
Cambodia	3.4	64.1	54.0	1,807
Cameroon	4.4	59.8	50.0	1,310
Canada	1.6	99.0	96.0	23,922
Cape Verde	3.4	68.0	73.0	3,392
Central African Republic	4.4	33.5	48.1	829
Chad	6.3	12.7	28.0	902
Chile	2.0	95.6	81.0	5,753
China	1.7	86.5	68.0	3,961
Colombia	2.5	94.6	72.0	4,557
Comoros	5.0	49.1	42.0	1,216

Countries	Total Fertility rate (children per woman) *	Female Literacy rate (%) *	Female Gross Enrollment rate (%) *	Female Earned Income (PPP US$) *
Cook Islands	3.1	87.9	74.4	7,705
Costa Rica	2.2	95.9	69.0	5,236
Cote d'Ivoire	4.5	38.2	34.0	792
Croatia	1.4	97.1	76.0	8,047
Cuba	1.7	96.8	81.0	5,921
Cyprus	1.8	95.1	79.0	11,864
Czech Republic	1.2	99.0	81.0	12,843
Democratic Republic of Congo	6.5	51.9	24.0	500
Denmark	1.7	99.0	106.0	26,587
Djibouti	5.3	58.4	23.0	3,131
Dominica	1.9	94.0	78.0	5,921
Dominican Republic	2.8	87.3	81.0	3,608
Ecuador	2.7	89.7	80.8	1,696
Egypt	2.8	43.6	64.5	1,614
El Salvador	3.1	77.1	67.0	2,939
Equatorial Guinea	4.6	76.4	60.0	10,771
Eritrea	5.1	45.6	30.0	579
Estonia	1.4	99.8	99.0	10,745
Ethiopia	5.2	33.8	29.0	487
Fiji	2.7	91.4	73.0	3,146
Finland	1.7	100.0	112.0	23,211
France	1.8	99.0	94.0	20,642
Gabon	4.7	53.3	70.0	4,765
Gambia	5.3	30.9	45.0	1,391
Georgia	1.4	100.0	71.0	1,566
Germany	1.4	99.0	88.0	19,534
Ghana	4.0	45.7	43.0	1,915
Greece	1.3	88.3	93.0	12,531
Grenada	2.3	88.7	96.0	5,921
Guatemala	3.8	63.3	59.0	2,073
Guinea	4.9	24.7	29.0	466
Guinea-Bissau	5.8	21.9	34.0	1,692
Guyana	2.0	98.2	78.0	2,426
Haiti	4.9	50.0	80.8	1,250
Honduras	3.6	80.2	80.8	1,447
Hungary	1.3	99.3	92.0	11,287
Iceland	1.9	99.0	102.0	25,411
India	2.7	47.8	56.0	1,569
Indonesia	2.4	83.4	65.0	2,289
Iran	1.8	70.4	65.0	3,094
Iraq	4.2	24.4	64.5	3,131
Ireland	1.9	99.0	97.0	22,125
Israel	2.4	95.6	93.0	14,159

Countries	Total Fertility rate (children per woman) *	Female Literacy rate (%) *	Female Gross Enrollment rate (%) *	Female Earned Income (PPP US$) *
Italy	1.3	98.3	89.0	17,176
Jamaica	2.4	91.4	77.0	3,279
Japan	1.4	99.0	83.0	17,795
Jordan	2.6	84.7	79.0	2,004
Kazakhstan	1.9	99.3	87.0	5,221
Kenya	4.9	70.2	50.0	1,001
Kiribati	4.2	87.9	74.4	7,705
Kuwait	2.9	81.0	85.0	8,448
Kyrgyzstan	2.7	98.1	83.0	1,388
Laos	4.7	60.9	55.0	1,391
Latvia	1.3	99.7	95.0	8,050
Lebanon	1.9	81.0	80.0	2,430
Lesotho	3.3	90.3	67.0	1,480
Liberia	6.0	41.6	48.1	1,866
Libya	3.3	70.7	100.0	3,131
Liechtenstein	1.5	100.0	89.0	12,197
Lithuania	1.2	99.6	98.0	9,595
Luxembourg	1.8	100.0	89.0	34,890
Macedonia	1.6	94.1	71.0	4,861
Madagascar	5.6	65.2	40.0	603
Malawi	5.9	54.0	69.0	486
Malaysia	3.0	85.4	73.0	6,075
Maldives	4.9	97.2	75.0	2,403
Mali	7.4	11.9	27.0	742
Malta	1.5	89.2	80.0	9,893
Marshall Islands	3.9	93.7	74.4	7,705
Mauritania	5.9	43.4	43.0	1,269
Mauritius	2.0	80.5	71.0	6,084
Mexico	2.4	88.7	76.0	5,068
Micronesia	3.2	88.0	74.4	7,705
Moldova	1.9	95.0	64.0	1,200
Monaco	1.8	99.0	89.0	12,197
Mongolia	2.3	97.5	80.0	1,478
Morocco	2.7	38.3	54.0	2,299
Mozambique	4.6	31.4	38.0	910
Myanmar	2.0	86.2	49.0	2,403
Namibia	3.1	83.5	72.0	4,201
Nauru	3.1	87.9	74.4	7,705
Nepal	4.1	34.9	55.0	949
Netherlands	1.7	99.0	99.0	20,512
New Zealand	1.8	99.0	104.0	18,379
Nicaragua	2.8	76.6	71.0	2,018
Niger	7.5	9.4	17.0	601

Countries	Total Fertility rate (children per woman) *	Female Literacy rate (%) *	Female Gross Enrollment rate (%) *	Female Earned Income (PPP US$) *
Nigeria	5.5	59.4	57.0	614
Niue	2.8	87.9	74.4	7,705
Norway	1.8	100.0	106.0	32,272
Oman	5.8	65.4	63.0	4,013
Pakistan	4.0	35.2	31.0	1,050
Palau	2.5	90.0	74.4	7,705
Panama	2.7	91.2	82.0	4,597
Papua New Guinea	3.9	50.9	37.0	1,896
Paraguay	3.9	90.2	74.0	2,316
People's Republic of Korea (North Korea)	2.1	99.0	56.6	2,403
Peru	2.5	82.1	88.0	2,231
Philippines	3.1	92.7	83.0	3,213
Poland	1.3	99.7	93.0	8,769
Portugal	1.5	91.3	97.0	12,853
Qatar	2.8	88.6	84.0	3,131
Republic of Congo	6.1	77.1	44.0	689
Republic of Korea (South Korea)	1.3	96.6	87.0	11,698
Romania	1.4	96.3	73.0	5,391
Russian Federation	1.3	99.2	89.0	7,302
Rwanda	5.4	58.8	53.0	985
Saint Kitts and Nevis	2.3	88.7	94.0	5,921
Saint Lucia	2.2	90.6	78.0	5,921
Saint Vincent and the Grenadines	1.8	96.0	68.0	5,921
Samoa	2.9	98.4	72.0	7,705
San Marino	1.3	95.0	89.0	12,197
Sao Tome and Principe	5.6	62.0	59.0	1,866
Saudi Arabia	4.0	69.3	57.0	4,440
Senegal	4.4	29.2	37.0	1,175
Serbia and Montenegro	1.8	94.1	89.0	12,197
Seychelles	1.7	92.3	85.0	1,866
Sierra Leone	6.1	20.5	38.0	325
Singapore	1.1	88.6	74.4	16,489
Slovakia	1.3	99.6	76.0	10,681
Slovenia	1.3	99.6	99.0	14,751
Solomon Islands	3.9	87.9	74.4	1,391
Somalia	6.8	25.8	64.5	3,131
South Africa	2.2	80.9	78.0	6,505
Spain	1.3	97.2	96.0	13,854
Sri Lanka	1.8	88.6	69.0	2,579
Sudan	4.7	49.9	35.0	918
Suriname	2.3	84.1	78.0	5,921
Swaziland	3.5	78.1	58.0	2,669
Sweden	1.7	99.0	124.0	21,842

Countries	Total Fertility rate (children per woman) *	Female Literacy rate (%) *	Female Gross Enrollment rate (%) *	Female Earned Income (PPP US$) *
Switzerland	1.4	99.0	88.0	28,972
Syria	3.4	74.2	60.0	1,584
Tajikistan	4.0	99.3	69.0	854
Tanzania	5.0	62.2	40.0	516
Thailand	1.6	90.5	72.0	5,784
Timor-Leste	3.5	69.3	56.6	2,403
Togo	5.0	38.3	52.0	1,082
Tonga	3.0	99.0	84.0	7,705
Trinidad and Tobago	1.7	97.9	67.0	6,792
Tunisia	1.7	65.3	76.0	3,840
Turkey	1.9	81.1	62.0	4,276
Turkmenistan	3.4	98.3	89.0	4,603
Tuvalu	3.0	87.9	74.4	7,705
Uganda	6.7	59.2	72.0	1,169
Ukraine	1.2	99.2	87.0	3,891
United Arab Emirates	2.9	80.7	79.0	3,131
United Kingdom	1.7	99.0	133.0	20,790
United States	2.1	99.0	97.0	29,017
Uruguay	1.9	98.1	93.0	5,763
Uzbekistan	2.9	98.9	74.0	1,385
Vanuatu	2.7	87.9	58.0	7,705
Venezuela	2.2	92.7	76.0	2,890
Vietnam	1.9	86.9	61.0	2,026
Yemen	6.6	28.5	41.0	413
Zambia	5.4	59.7	45.0	629
Zimbabwe	3.1	86.3	51.0	1,751

* Legend:

1. Cells in gray denote estimates

Appendix D

Country-Specific Female-to-Male Literacy, Gross Enrollment, and Income Ratios

Countries	Female-to-Male Literacy Ratio *	Female-to-Male Gross Enrollment Ratio *	Female-to-Male Earned Income Ratio *
Afghanistan	0.41	0.98	0.29
Albania	0.99	1.03	0.56
Algeria	0.76	0.95	0.31
Andorra	1.00	1.05	0.56
Angola	0.66	0.84	0.62
Antigua and Barbuda	0.98	1.05	0.49
Argentina	1.00	1.09	0.37
Armenia	0.99	1.07	0.70
Australia	1.00	1.03	0.72
Austria	1.00	1.02	0.35
Azerbaijan	0.99	0.96	0.58
Bahamas	1.02	1.05	0.64
Bahrain	0.90	1.10	0.31
Bangladesh	0.62	1.04	0.54
Barbados	1.00	1.12	0.61
Belarus	1.00	1.06	0.65
Belgium	1.00	1.08	0.54
Belize	1.01	1.03	0.24
Benin	0.49	0.65	0.69
Bhutan	0.57	0.88	0.53
Bolivia	0.87	0.93	0.45
Bosnia and Herzegovina	0.93	1.05	0.46
Botswana	1.07	1.01	0.61
Brazil	1.00	1.04	0.43
Brunei Darussalam	0.95	1.04	0.57
Bulgaria	0.99	1.01	0.67
Burkina Faso	0.44	0.74	0.73
Burundi	0.78	0.78	0.72
Cambodia	0.76	0.84	0.76
Cameroon	0.78	0.83	0.45
Canada	1.00	1.04	0.64
Cape Verde	0.80	1.00	0.48
Central African Republic	0.52	0.87	0.61
Chad	0.31	0.58	0.59
Chile	1.00	0.99	0.39
China	0.91	0.97	0.66
Colombia	1.01	1.04	0.51
Comoros	0.77	0.82	0.55
Cook Islands	0.95	0.99	0.57
Costa Rica	1.00	1.03	0.37
Cote d'Ivoire	0.64	0.68	0.37

Countries	Female-to-Male Literacy Ratio *	Female-to-Male Gross Enrollment Ratio *	Female-to-Male Earned Income Ratio *
Croatia	0.98	1.03	0.56
Cuba	1.00	1.03	0.49
Cyprus	0.96	1.01	0.47
Czech Republic	1.00	1.01	0.64
Democratic Republic of Congo	0.65	0.77	0.55
Denmark	1.00	1.09	0.73
Djibouti	0.75	0.74	0.29
Dominica	1.00	1.07	0.49
Dominican Republic	0.99	1.14	0.36
Ecuador	0.97	1.05	0.30
Egypt	0.65	0.98	0.26
El Salvador	0.94	0.99	0.44
Equatorial Guinea	0.83	0.85	0.40
Eritrea	0.67	0.75	0.51
Estonia	1.00	1.14	0.64
Ethiopia	0.69	0.69	0.52
Fiji	0.97	1.00	0.37
Finland	1.00	1.09	0.72
France	1.00	1.04	0.59
Gabon	0.72	0.95	0.59
Gambia	0.69	0.90	0.59
Georgia	1.00	1.01	0.42
Germany	1.00	0.98	0.54
Ghana	0.73	0.90	0.75
Greece	0.94	1.02	0.45
Grenada	0.98	1.00	0.49
Guatemala	0.84	0.94	0.33
Guinea	0.45	0.64	0.49
Guinea-Bissau	0.44	0.69	0.68
Guyana	0.99	1.01	0.39
Haiti	0.93	1.05	0.56
Honduras	1.01	1.05	0.37
Hungary	1.00	1.06	0.62
Iceland	1.00	1.12	0.69
India	0.65	0.88	0.38
Indonesia	0.90	0.97	0.52
Iran	0.84	0.90	0.29
Iraq	0.44	0.98	0.29
Ireland	1.00	1.09	0.41
Israel	0.97	1.04	0.55
Italy	0.99	1.05	0.46
Jamaica	1.09	1.08	0.66
Japan	1.00	0.98	0.46
Jordan	0.89	1.03	0.31
Kazakhstan	0.99	1.05	0.64

Countries	Female-to-Male Literacy Ratio *	Female-to-Male Gross Enrollment Ratio *	Female-to-Male Earned Income Ratio *
Kenya	0.90	0.94	0.93
Kiribati	0.95	0.99	0.57
Kuwait	0.96	1.13	0.35
Kyrgyzstan	0.99	1.02	0.65
Laos	0.79	0.82	0.65
Latvia	1.00	1.13	0.62
Lebanon	0.88	1.04	0.31
Lesotho	1.23	1.03	0.39
Liberia	0.57	0.87	0.49
Libya	0.77	1.08	0.29
Liechtenstein	1.00	1.05	0.56
Lithuania	1.00	1.09	0.68
Luxembourg	1.00	1.01	0.39
Macedonia	0.96	1.03	0.56
Madagascar	0.85	0.98	0.59
Malawi	0.72	0.92	0.68
Malaysia	0.93	1.07	0.47
Maldives	1.00	1.01	0.53
Mali	0.45	0.71	0.60
Malta	1.03	1.03	0.39
Marshall Islands	1.00	0.99	0.57
Mauritania	0.73	0.91	0.56
Mauritius	0.91	1.00	0.37
Mexico	0.96	1.03	0.38
Micronesia	0.97	0.99	0.57
Moldova	0.97	1.07	0.65
Monaco	1.00	1.05	0.56
Mongolia	0.99	1.16	0.66
Morocco	0.61	0.87	0.40
Mozambique	0.50	0.79	0.68
Myanmar	0.92	1.02	0.53
Namibia	0.96	1.03	0.51
Nauru	0.95	0.99	0.57
Nepal	0.56	0.83	0.51
Netherlands	1.00	1.00	0.53
New Zealand	1.00	1.11	0.68
Nicaragua	1.00	1.04	0.45
Niger	0.48	0.68	0.57
Nigeria	0.80	0.80	0.41
Niue	0.95	0.99	0.57
Norway	1.00	1.09	0.75
Oman	0.80	1.00	0.19
Pakistan	0.57	0.72	0.34
Palau	0.97	0.99	0.57
Panama	0.99	1.08	0.51

Countries	Female-to-Male Literacy Ratio *	Female-to-Male Gross Enrollment Ratio *	Female-to-Male Earned Income Ratio *
Papua New Guinea	0.80	0.84	0.57
Paraguay	0.97	1.01	0.33
People's Republic of Korea (North Korea)	1.00	0.97	0.53
Peru	0.88	1.01	0.27
Philippines	1.00	1.04	0.59
Poland	1.00	1.06	0.62
Portugal	0.96	1.08	0.54
Qatar	0.99	1.05	0.29
Republic of Congo	0.87	0.85	0.56
Republic of Korea (South Korea)	0.97	0.87	0.48
Romania	0.98	1.04	0.58
Russian Federation	0.99	1.05	0.64
Rwanda	0.83	0.91	0.62
Saint Kitts and Nevis	0.98	1.13	0.49
Saint Lucia	1.01	1.08	0.49
Saint Vincent and the Grenadines	1.00	1.05	0.49
Samoa	0.99	1.03	0.57
San Marino	0.98	1.05	0.56
Sao Tome and Principe	0.73	0.92	0.49
Saudi Arabia	0.80	0.98	0.21
Senegal	0.57	0.86	0.55
Serbia and Montenegro	0.95	1.05	0.56
Seychelles	1.01	1.00	0.49
Sierra Leone	0.52	0.73	0.42
Singapore	0.92	0.99	0.51
Slovakia	1.00	1.03	0.65
Slovenia	1.00	1.08	0.62
Solomon Islands	0.95	0.99	0.66
Somalia	0.52	0.98	0.29
South Africa	0.96	1.00	0.45
Spain	0.98	1.05	0.44
Sri Lanka	0.96	1.03	0.51
Sudan	0.72	0.85	0.32
Suriname	0.91	1.13	0.49
Swaziland	0.97	0.95	0.39
Sweden	1.00	1.18	0.69
Switzerland	1.00	0.96	0.90
Syria	0.82	0.92	0.29
Tajikistan	1.00	0.84	0.62
Tanzania	0.80	0.95	0.71
Thailand	0.95	1.00	0.61
Timor-Leste	0.85	0.97	0.53
Togo	0.56	0.68	0.47
Tonga	1.00	1.02	0.57
Trinidad and Tobago	0.99	1.05	0.46

Countries	Female-to-Male Literacy Ratio *	Female-to-Male Gross Enrollment Ratio *	Female-to-Male Earned Income Ratio *
Tunisia	0.78	1.04	0.37
Turkey	0.85	0.84	0.46
Turkmenistan	0.99	1.05	0.63
Tuvalu	0.95	0.99	0.57
Uganda	0.75	0.96	0.67
Ukraine	0.99	1.04	0.53
United Arab Emirates	1.07	1.14	0.29
United Kingdom	1.00	1.18	0.62
United States	1.00	1.09	0.62
Uruguay	1.01	1.12	0.53
Uzbekistan	0.99	0.96	0.66
Vanuatu	0.95	0.98	0.57
Venezuela	0.99	1.04	0.42
Vietnam	0.93	0.91	0.68
Yemen	0.41	0.59	0.31
Zambia	0.78	0.90	0.56
Zimbabwe	0.92	0.94	0.58

* Legend:

1. Cells in gray denote estimates