STRUCTURAL ADJUSTMENT, LITERACY AND EDUCATION

"...It was clear that structural adjustment hit health and education very badly. Among those people that were forcing structural adjustment, many now admit the negative effects. Structural adjustment said you must not recruit any more teachers and hospital workers, you must reduce their salaries. But you cannot improve the health of a country if you don't improve education and primary health care. These are the things that make the difference in terms of maternal and infant mortality and life expectancy. If you want to make an impact on health, you have to educate the people, particularly the women and girls, and also invest in basic health services. This was one of the things that structural adjustment attacked." [Sambe E., 2001]

Education has been suggested to be one of the domains through which structural adjustment impact health in developing countries. The United Nations Fund for development indicated that adjustment measures affect education through changes at the macro and micro levels of the economy. Adjustment at the macro level often implies a combination of budget containment measures for the public education system, limited access to post-primary public education, and higher user fees for education services at the secondary and tertiary levels. At the micro level, changes in household incomes and prices (user fees, reduced student subsidies) directly influence the demand for education by altering the opportunity cost of attending school [UNDP, 1989].

Household incomes has been also described to affect health and nutrition status, and thus indirectly influence attendance are learning ability. Finally, the World Bank itself confessed that adjustment affects education through changes in markets and
infrastructure (resulting from currency devaluation, fiscal and monetary restraint, and price liberalization) that affect the supply of education services and the opportunity cost of attending school [World Bank, 1990].

This chapter discusses the impact of structural adjustment on health through affecting education in three separate sections. The first explores the relationship between education and health and aims at establishing the areas where changes in educational inputs might affect the health status of a given population most. The second presents to the inequalities in education within and among developing countries. The third attempts to verify whether or not structural adjustment causes these inequalities and, if it does, to identify its relative contribution.

**Education and Health**

Education, particularly education of girls and women, has been identified as one of the strongest variables that affect the health status of the family, especially the young members of it. Education greatly enhances the ability of households to manage health problems, improve nutrition, ensure more effective diagnosis, and demand timely treatment. This greater capacity to gather and process information about health-care is one avenue of influence. Less tangible, but probably more important, is the role of education in empowering people to demand basic health-care services.

The independent statistical association between maternal illiteracy and childhood mortality was established in a considerable body of research. [Choe et al., 1995; Adjetunji, 1995; Golding et al., 1994; Kunstadter et al., 1993; Barell et al., 1988; Cleland and Van Ginneken, 1988; Defo, 1996; Din-Dzietham and Hertz-Picciotto, 1997; Binka et al., 1995; Sandiford et al., 1991. Bakketeig et al., 1993; Rao et al., 1997; Aaby et al., 1990; Singh and Yu, 1995; Hoa et al., 1997; Frenzen and Hogan, 1982; Napoles-Rodriquez et al., 1991; Bhuiya et al., 1989; Aksit and Aksit, 1989; Arntzen et al., 1993; Bicego and Boerma, 1993; Bloland et al., 1996; Kuate, 1994; Park et al., 1994; Sastry, 1997; Victora et al., 1992; Mahalanabis et al., 1996; Bronfman, 1992; Adetunji, 1994; Van den Broeck et al., 1996; CLHS, 1991; Swenson and Thang, 1993; Swensen et al., 1993; Arntzen et al., 1996; Tawiah, 1989; Kleinman et al., 1991]. It has been estimated that each one-year increment in maternal education corresponds on average to a 7±9% decline in indirectly calculated measures of childhood mortality [Cleland et al., 1988; Cochrane et al., 1980; UN, 1985].

The education effect was found to be much stronger during the 1±5 age segment than during infancy [UN, 1985]. The impact of maternal education on child survival was found in the vast majority of studies to be independent of other demographic and socio-economic variables, and some studies suggested a causal relation. Conceptual frameworks for pathways and effects of maternal education have been
developed and empirically examined using data from different countries [Mosely and Chen, 1984; Van Norren and Van Vianen, 1986; Bicego and Boerma, 1993].

Father education appeared in this study to be as important as mother education in determining child survival. However, very little was found in the literature about the role of father education in mortality. The traditional conception that in most cultural contexts fathers are not involved in the daily activities of child-rearing made most studies on childhood mortality differentials to focus on the mother's education more than on the father's [UN, 1985]. Moreover, further education has been treated less as an indicator of quality of child-rearing skills than as a predictor of economic status. The effect of father's education on mortality in this study, however, is not confounded by other socioeconomic indicators. Increased education of the father may improve the housing and sanitation conditions and the quality of food and enable parents to take better advantage of health care. Improved knowledge may undermine the traditional beliefs and practices that are detrimental to child health [UN, 1985].

Parental, especially maternal, education has been also established as a determinant of the nutritional status of the family, especially young children. For example, there is ample evidence now that children of better educated mothers are less likely to suffer from malnutrition [Gupta, 1991; Waihenya, 1996; Rikimaru, 1998; Reed, 1996; Ruel, 1992; Cochrane, 1982; Islam, 1994]. Pathways between parental education, nutrition and health involve direct and indirect ones. Direct pathways are related to knowledge about nutritional needs, composing balanced diets, maintaining healthy nutritional practices, early recognition of illnesses and proper care seeking. Indirect pathways involve a better socio-economic position, including safe water and sanitation, and entitlement to health and nutrition resources. Furthermore, parental education was shown to be inversely related to the incidence of diarrhea and dehydration, major risk factors of malnutrition among young children in developing countries.

The impact of education on fertility rates and fertility attitudes is significant in developing countries. Several studies indicated that better education affect fertility attitudes such as desired family size, preference of sons, intention for contraception use, pregnancy spacing, etc. Furthermore, female education raises the average age at marriage, one of the strongest proximate determinants of fertility decline. Women position was shown also to be influenced with education, which in turn empower them to make a contraception decision.

Educated mothers are not only better able to gain information about health matters and nutrition, they are also far more likely to make use of preventive health-care service, thereby reducing the risk of infectious disease. The empowerment effects of education in enhancing demand for health-care services are well documented. In India, mothers with four years of education are twice as likely to register for ante-
nential care as mothers with no education, and three times as likely to immunise their children. Evidence from several countries suggests that educated women are more likely than their uneducated counterparts to secure access to treatment. In the Ibadan region of Nigeria, detailed research at health facilities has shown that literate women bring in sick children for treatment at an earlier stage, and that they are more likely to demand - and get - a specific diagnosis. The effect of education in enhancing women's ability to demand health services applies not only to episodes of severe sickness. Delays in treating diarrhoea and acute respiratory infections are major causes of child deaths in many of the poorest countries. Access to simple rehydration therapies could save many lives. Evidence from Zambia shows that educated women are far more likely both to identify the need for treatment at an earlier stage, and to demand it.

**Structural Adjustment and education**

To ascertain whether or not structural adjustment could have had a detrimental impact on health through pathways channeled through the literacy and education domain an empirical analysis was undertaken. The first step was to identify key indicators of the education and literacy domain to be included in the analysis. These indicators should be sensitive to the health status of the population.

We calculated the non-parametric Spearman coefficient for the correlation between 13 indicators of education and literacy with 4 key health status indicators. The literacy indicators included 1) the adult literacy ratio in 1995, 2) the male adult literacy ratio in 1995, 3) the female adult literacy in 1995, 4) the female's combined gross enrolment ratio in 1995, 5) the male's combined gross enrolment ratio in 1995, 6) the total gross primary enrolment ratio in 1995, 7) the female's primary gross enrolment ratio as % of male in 1995, 8) the total secondary gross enrolment ratio in 1995, 9) the female's secondary gross enrolment ratio as % of male in 1995, 10) the average years of education for female older than 25 years, 11) the male's education years excess over female in 1995, 12) the public expenditure on education as percent of GNP in 1995, and 13) the Public expenditure on education as percent of total government expenditure in 1993-95.

The health status indicators included 1) the total population's disability adjusted life expectancy at birth in 1995, 2) the infant mortality rate in 1998, 3) the maternal mortality ratio in the 1995, and 4) the proportion of population not expected to survive to age 40 in 1995. Table 16 shows the spearman coefficients for the correlation between the literacy indicators and the health status indicators.

The second step in the analysis encompassed the comparison of the means of the literacy indicators between adjusting and non-adjusting countries using a test of statistical significance. Only those literacy indicators that were shown to be significantly correlated with the health status indicators were included in the analysis.
Furthermore, the analysis was stratified by national income category as well as by region to control for the effect these two variables might have on the association between literacy indicators and structural adjustment.

Table 16. The correlation between the operational indicators of literacy and health

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DALE at birth</th>
<th>Infant mortality rate</th>
<th>Maternal mortality ratio</th>
<th>survival to age 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Literacy Ratio</td>
<td>0.6*</td>
<td>-0.8*</td>
<td>-0.8*</td>
<td>-0.7*</td>
</tr>
<tr>
<td>Male adult literacy (%) 1995</td>
<td>0.6*</td>
<td>-0.7*</td>
<td>-0.7*</td>
<td>-0.7*</td>
</tr>
<tr>
<td>Female adult literacy (%) 1995</td>
<td>0.7*</td>
<td>-0.8*</td>
<td>-0.8*</td>
<td>-0.7*</td>
</tr>
<tr>
<td>Combined gross enrolment ratio (%) 1995 Female</td>
<td>0.6*</td>
<td>-0.7*</td>
<td>-0.8*</td>
<td>-0.7*</td>
</tr>
<tr>
<td>Combined gross enrolment ratio (%) 1995 Male</td>
<td>0.5*</td>
<td>-0.5*</td>
<td>-0.6*</td>
<td>-0.5*</td>
</tr>
<tr>
<td>Gross enrolment ratio primary total (%) 1995</td>
<td>0.4*</td>
<td>-0.5*</td>
<td>-0.5*</td>
<td>-0.5*</td>
</tr>
<tr>
<td>Gross enrolment ratio primary female as % of male</td>
<td>0.5*</td>
<td>-0.7*</td>
<td>-0.8*</td>
<td>-0.6*</td>
</tr>
<tr>
<td>Gross enrolment ratio secondary total (%) 1995</td>
<td>0.7*</td>
<td>-0.8*</td>
<td>-0.7*</td>
<td>-0.7*</td>
</tr>
<tr>
<td>Gross enrolment ratio secondary female as % of male</td>
<td>0.6*</td>
<td>-0.7*</td>
<td>-0.8*</td>
<td>-0.7*</td>
</tr>
<tr>
<td>Years of education for female &gt;25Y</td>
<td>0.8*</td>
<td>-0.8*</td>
<td>-0.8*</td>
<td>-0.8*</td>
</tr>
<tr>
<td>Education years male excess over female</td>
<td>-0.3*</td>
<td>0.3*</td>
<td>0.3*</td>
<td>0.3*</td>
</tr>
<tr>
<td>Public expenditure on education (EOE) % of GNP</td>
<td>-0.1</td>
<td>0.0</td>
<td>-0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Public EOE % of total government expend) 1993-95</td>
<td>0.1</td>
<td>-0.2</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
</tbody>
</table>

**Adult Literacy Rate**

The adult literacy rate is defined as the percentage of population aged 15 years and over who can both read and write with understanding a short simple statement on his/her everyday life. Adult illiteracy is defined as the percentage of the population aged 15 years and over who cannot both read and write with understanding a short simple statement on his/her everyday life.

The adult literacy rate shows the accumulated achievement of primary education and literacy programs in imparting basic literacy skills to the population, thereby enabling them to apply such skills in daily life and to continue learning and communicating using the written word. Literacy represents a potential for further intellectual growth and contribution to economic-socio-cultural development of society. Illiteracy rates indicate the extent of need for policies and efforts in organizing adult literacy programs and quality primary education.

The adult literacy ratio in 1995 was shown to be correlated with the health status indicators in a statistically significant manner. It was shown to be directly related
with the total population’s disability adjusted life expectancy at birth and inversely related with the infant mortality rate, the maternal mortality ratio and the proportion of population not expected to survive to age 40. The non-parametric speaman coefficients for these correlations were 0.6, -0.8, -0.8 and -0.7, respectively. These correlations are illustrated in figures 229 through 232.

Figure 229. The Association between Adult Literacy Ratio and the Disability Adjusted Life Expectancy at Birth

Figure 230. The Association between Adult Literacy Ratio and the Infant Mortality Rate
Figure 231. The Association between Adult Literacy Ratio and the Maternal Mortality Ratio

Figure 232. The Association between Adult Literacy Ratio and the population not expected to survive to age 40
The adult literacy ratio ranged between a minimum of 13.6% in Niger and a maximum of 98.1 in Guyana. The adult literacy ratio was less than 50% in 22 countries. In an ascending order, these countries were Niger, Eritrea, Burkina Faso, Nepal, Mali, Senegal, Burundi, Ethiopia, Guinea, Cambodia, Benin, Mauritania, Pakistan, Yemen, Bangladesh, Gambia, Côte d'Ivoire, Mozambique, Angola, Morocco, Haiti and Madagascar. Adult literacy rate was more than 75% in 35 countries. These countries were Libya, the Democratic Republic of Congo, Kenya, Zambia, China, South Africa, Mauritius, Mongolia, Bolivia, Brazil, Malaysia, Indonesia, Jamaica, Zimbabwe, Bahrain, Jordan, Peru, Mexico, Ecuador, Sri Lanka, Panama, Venezuela, Colombia, Paraguay, the People Democratic Republic of Korea, Viet Nam, Thailand, Philippines, Costa Rica, Chile, Cuba, Argentina, Uruguay, the Republic of Korea, and Guyana. The mean for the adult literacy in all countries was estimated to be 65.8%±22.3. The lower and upper limits of the 95% confidence interval for the mean were 55.7% and 73.8%.

In all adjusting countries the mean for the adult literacy ratio was estimated at 66.2%±22.2, compared with 64.7%±22.9. The lower and upper limits of the 95% confidence interval for the mean were 60.6% and 71.8% for adjusting countries versus 55.7% and 73.8% for non-adjusting countries. The difference in the adult literacy rate between adjusting and non-adjusting countries was not statistically significant.

Stratifying the analysis by national income category showed that there was statistically significant difference between different category with respect to the adult literacy ratio. However, there was no statistically significant differences between adjusting and non-adjusting countries in each national income category.

The aggregate adult literacy rate for low income countries was estimated to be 53.9%±20.5, compared with 78.4±16.0 for lower middle income countries and 82.4%±12.6 for upper middle income countries. The 95% confidence interval for the mean ranged between 48.0% and 58.8% in low income countries, between 71.8% and 85.0% in lower middle income countries and between 75.7% and 89.1% in upper middle income countries. The student t-test showed that these differences were statistically significant.

Adjusting low income countries had an aggregate mean of adult literacy ratio of 55.2%±19.1 (96% CI, 49.0% - 61.5%), compared with 49.1±25.3 (95% CI, 32.1 - 66.1%) for non-adjusting low income countries. The estimates of the mean for adjusting and non-adjusting countries in the lower middle income category were 80.8%±16.0 and 72.1%±15.3 respectively. The 95% confidence interval for the mean ranged between 72.9% and 88.8% in adjusting countries and between 58.0
and 86.2% in non-adjusting countries of this national income category. In the upper middle income category, adjusting countries had a mean adult literacy rate of 87.9%±11.9 (95% CI, 76.9% - 99.0%), compared with 78.1%±12.0 (95% CI, 68.9% - 87.3%) for non-adjusting countries. The differences were no statistically significant.

Figure 233. The Adult Literacy Ratio in Adjusting and Non-adjusting Countries by National Income Category

Figure 234. Adults Literacy Ratio in Adjusting and Non-adjusting Countries by Region
Stratifying the analysis by region revealed that the adult literacy ratio differed significantly between regions. However, it did not differ between adjusting and non-adjusting countries within each region. The regional aggregate mean was estimated to be 53.9±19.4 (95% CI, 47.6% - 60.2%) in sub-Saharan Africa, 61.1%±16.1 (95% CI, 51.8% - 70.3%) in the Middle East and North Africa, 73.6%±23.6 (95% CI, 61.0% - 86.2%) in the Asia and Pacific and 84.9%±13.6 (95% CI, 78.7% - 91.1%) in the Latin America.

In the sub-Saharan Africa, adjusting countries had a mean adult literacy rate of 53.3%±17.1 (95% CI, 46.8 - 59.8), compared with 55.7% ±25.8 (95% CI, 37.2 - 74.1) for non-adjusting countries. In the Middle East and North Africa, the mean adult literacy ratio was estimated at 58.0%±17.7 (95% CI, 39.4 - 76.5) for adjusting countries and at 63.4%±15.5 (95% CI, 50.4 - 76.4) for non-adjusting countries. The difference was not statistically significant. Adjusting countries in the Asia and Pacific had a mean adult literacy ratio of 71.8%±24.5 (95% CI, 55.3 - 88.3), compared with a mean of 77.4%±23.7 (95% CI, 48.0 - 100) for non-adjusting countries in the region. Finally, the adjusting Latin American Countries had an average adult literacy rate of 87.4%±9.5 (95% CI, 82.5 - 92.3), compared with an average of 74.2%±23.7 (95% CI, 36.5 - 100) for non-adjusting Latin American countries. The differences were statistically insignificant.

Figure 235. The Association between Adult Literacy Ratio and the duration of Structural Adjustment Implementation
To ascertain the dose response relationship between structural adjustment we examined the correlation and the association between the adult literacy rate and the duration of structural adjustment implementation in years. The non-parametric Spearman correlation coefficient and the linear regression β coefficients were estimated at -0.006 and 0.01 respectively. Both coefficients were shown to be statistically insignificant (figure 235).

The female Literacy Rate

The female literacy rate is defined as the percentage of female aged 15 years and over who can both read and write with understanding a short simple statement on her everyday life. The female literacy ratio in 1995 was shown to be correlated with the health status indicators in a statistically significant manner. It was shown to be directly related with the total population’s disability adjusted life expectancy at birth and inversely related with the infant mortality rate, the maternal mortality ratio and the proportion of population not expected to survive to age 40. The non-parametric spearman coefficients for these correlations were 0.7, -0.8, -0.8 and -0.7, respectively. These correlations are illustrated in figures 236 through 239.

Figure 236. The Association between Female Literacy Ratio and the Disability Adjusted Life Expectancy at Birth
Figure 237. The Association between Female Literacy Ratio and the Infant Mortality Rate

Figure 238. The Association between Female Literacy Ratio and the Maternal Mortality Ratio
The female literacy ratio ranged between a minimum of 6.3% in Niger and a maximum of 97.7 in Uruguay. The female literacy ratio was less than 50% in 362 countries. In an ascending order, these countries were Niger, Burkina Faso, Eritrea, Nepal, Cambodia, Burundi, Guinea, Mozambique, Mali, Senegal, Gambia, Benin, Ethiopia, Pakistan, Mauritania, Bangladesh, Angola, Côte d'Ivoire, Morocco, Djibouti, Chad, Sudan, Togo, Yemen, India, Egypt, Malawi, G-Bissau, Haiti, Lao, Madagascar, Nigeria, Oman, Algeria and Uganda.

Female literacy rate was more than 75% in 30 countries. These countries were Bolivia, Mongolia, Malaysia, Indonesia, Mauritius, Zimbabwe, Jordan, Bahrain, South Africa, Peru, Brazil, Sri Lanka, Mexico, Ecuador, Jamaica, the People’s Democratic Republic of Korea, Panama, Venezuela, Paraguay, Viet Nam, Colombia, Thailand, Philippines, Costa Rica, Chile, Cuba, Argentina, Korea R, Guyana and Uruguay.

The mean for the female literacy in all countries was estimated to be 65.8%±22.3. The lower and upper limits of the 95% confidence interval for the mean were 55.7% and 73.8%.

In all adjusting countries the mean for the female literacy ratio was estimated at 58.7%±26.4, compared with 57.2%±25.2. The lower and upper limits of the 95%
confidence interval for the mean were 52.1% and 65.4% for adjusting countries versus 47.1% and 67.3% for non-adjusting countries. The difference in the female literacy rate between adjusting and non-adjusting countries was not statistically significant.

Stratifying the analysis by national income category showed that there was statistically significant difference between different category with respect to the female literacy ratio. However, there was no statistically significant differences between adjusting and non-adjusting countries in each national income category.

The aggregate female literacy rate for low income countries was estimated to be 44.3%±22.7, compared with 73.0±20.6 for lower middle income countries and 77.8±16.9 for upper middle income countries. The 95% confidence interval for the mean ranged between 37.8% and 50.9% in low income countries, between 64.5% and 81.5% in lower middle income countries and between 68.8% and 86.8% in upper middle income countries. The student t-test showed that these differences were statistically significant.

Adjusting low income countries had an aggregate mean of female literacy ratio of 45.5%±21.7 (96% CI, 38.4% - 52.6%), compared with 40.4±26.7 (95% CI, 22.5 - 58.3%) for non-adjusting low income countries. The estimates of the mean for
adjusting and non-adjusting countries in the lower middle income category were 76.0%±20.5 and 65.4%±20.2 respectively. The 95% confidence interval for the mean ranged between 65.8% and 86.2% in adjusting countries and between 46.7% and 84.1% in non-adjusting countries of this national income category. In the upper middle income category, adjusting countries had a mean female literacy rate of 86.1%±15.6 (95% CI, 71.79% - 100.0%), compared with 71.4%±15.8 (95% CI, 59.3% - 83.6%) for non-adjusting countries. The differences were no statistically significant.

Stratifying the analysis by region revealed that the female literacy ratio differed significantly between regions. However, it did not differ between adjusting and non-adjusting countries within each region. The regional aggregate mean was estimated to be 44.0±21.0 (95% CI, 37.2% - 50.8%) in sub-Saharan Africa, 51.0%±17.0 (95% CI, 41.2% - 60.8%) in the Middle East and North Africa, 66.3%±28.6 (95% CI, 51.1% - 81.6%) in the Asia and Pacific and 83.5%±14.7 (95% CI, 76.8% - 90.2%) in the Latin America.

In the sub-Saharan Africa, adjusting countries had a mean female literacy rate of 42.7%±18.4 (95% CI, 35.7 - 49.8), compared with 47.6%±28.1 (95% CI, 27.4 - 67.7) for non-adjusting countries. In the Middle East and North Africa, the mean female literacy ratio was estimated at 46.60%±19.6 (95% CI, 26.0 - 67.2) for adjusting countries and at 54.3%±15.2 (95% CI, 41.6 - 67.1) for non-adjusting
countries. The difference was not statistically significant. Adjusting countries in the Asia and Pacific had a mean female literacy ratio of 86.4%±9.9 (95% CI, 81.4 - 91.5), compared with a mean of 71.2%±25.8 (95% CI, 30.1 - 100) for non-adjusting countries in the region. Finally, the adjusting Latin American Countries had an average female literacy rate of 64.7%±29.3 (95% CI, 45.0 - 84.3), compared with an average of 69.9%±30.1 (95% CI, 32.5 - 100) for non-adjusting Latin American countries. The differences were statistically insignificant.

To ascertain the dose response relationship between structural adjustment we examined the correlation and the association between the female literacy rate and the duration of structural adjustment implementation in years. The non-parametric Spearman correlation coefficient and the linear regression β coefficients were estimated at -0.019 and -0.001 respectively. Both coefficients were shown to be statistically insignificant (figure 242).

Figure 242. The Association between Female Literacy Ratio and the Duration of Structural Adjustment Implementation

Female combined gross enrolment ratio

The female combined gross enrolment is defined as the female enrolment in all levels of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education in give school-year. The female combined gross enrolment ratio is widely used to show the general level of participation in a given level of education. It indicates the capacity of the education system to enroll students of a particular age-group.
A high gross enrolment ratio generally indicates a high degree of participation, whether the pupils belong to the official age-group or not. A combined gross enrolment ratio value of 100 percent indicates that a country is, in principle, able to accommodate all of its school-age population, but it does not indicate the proportion already enrolled. The achievement of a combined gross enrolment ratio of 100 percent is therefore a necessary but not sufficient condition for enrolling all eligible children in school. When the GER exceeds 90 percent for a particular level of education, the aggregate number of places for pupils is approaching the number required for universal access of the official age-group. However, this is a meaningful interpretation only if one can expect the under-aged and over-aged enrolments to decline in the future to free places for pupils from the expected age-group.

The Female combined gross enrolment ratio in 1995 was shown to be correlated with the health status indicators in a statistically significant manner. It was shown to be directly related with the total population’s disability adjusted life expectancy at birth and inversely related with the infant mortality rate, the maternal mortality ratio and the proportion of population not expected to survive to age 40. The non-parametric spearman coefficients for these correlations were 0.6, -0.7, -0.8 and -0.7, respectively. These correlations are illustrated in figures 243 through 246.

Figure 243. The Association between Female's Combined Gross Enrolment Ratio and the Disability Adjusted Life Expectancy at Birth
Figure 244. The Association between Female's Combined Gross Enrolment Ratio and the Infant Mortality Rate

Female combined gross enrolment ratio (%) 1995

Figure 245. The Association between Female's Combined Gross Enrolment Ratio and the Maternal Mortality Ratio

Female combined gross enrolment ratio (%) 1995
The Female combined gross enrolment ratio ranged between a minimum of 10.7% in Niger and a maximum of 89.0 in Libya. The Female combined gross enrolment ratio was less than 50% in 32 countries. In an ascending order, these countries were Niger, Mali, Burkina Faso, Ethiopia, Guinea, Chad, Burundi, Mozambique, Central African Republic, Eritrea, Benin, Yemen, Pakistan, Angola, Senegal, Haiti, Sudan, G-Bissau, Côte d’Ivoire, Madagascar, Bangladesh, Tanzania, Congo D.R., Mauritania, Papua New Guinea, Gambia, Uganda, Comoros, Ghana, Morocco, Cameroon and Guatemala. The female combined gross enrolment ratio was more than 75% in 10 countries. These countries were the People’s Democratic Republic of Korea, Peru, Republic of Korea, Uruguay, Argentina, Philippines, South Africa, Namibia, Bahrain and Libya.

In all adjusting countries the mean for the Female combined gross enrolment ratio was estimated at 50.5%±19.6, compared with 53.5%±22.7. The lower and upper limits of the 95% confidence interval for the mean were 45.5% and 55.4% for adjusting countries versus 44.3% and 62.6% for non-adjusting countries. The difference in the Female combined gross enrolment ratio between adjusting and non-adjusting countries was not statistically significant.

Stratifying the analysis by national income category showed that there was statistically significant difference between different category with respect to the Female combined gross enrolment ratio. However, there was no statistically
significant differences between adjusting and non-adjusting countries in each national income category.

The aggregate Female combined gross enrolment ratio for low income countries was estimated to be 38.3%±17.0, compared with 65.3±10.5 for lower middle income countries and 70.5%±10.0 for upper middle income countries. The 95% confidence interval for the mean ranged between 33.4% and 43.2% in low income countries, between 60.9% and 69.8% in lower middle income countries and between 65.2% and 75.9% in upper middle income countries. The student t-test showed that these differences were statistically significant.

Adjusting low income countries had an aggregate mean of Female combined gross enrolment ratio of 39.7%±17.2 (96% CI, 34.0% - 45.3%), compared with 33.4±16.5 (95% CI, 22.3 - 44.4%) for non-adjusting low income countries. The estimates of the mean for adjusting and non-adjusting countries in the lower middle income category were 65.0%±8.5 and 66.2%±16.2 respectively. The 95% confidence interval for the mean ranged between 60.8% and 69.3% in adjusting countries and between 49.2 and 83.2% in non-adjusting countries of this national income category. In the upper middle income category, adjusting countries had a mean Female combined gross enrolment ratio of 71.9%±7.2 (95% CI, 65.2% - 78.6%), compared with 69.5%±12.1 (95% CI, 60.2% - 78.8%) for non-adjusting countries. The differences were no statistically significant.

Figure 247. Female Combined Gross Enrolment Ratio in Adjusting and Non-adjusting Countries by National Income Category

![Bar graph showing female combined gross enrolment ratio by national income category for adjusting and non-adjusting countries.](image-url)
Stratifying the analysis by region revealed that the Female combined gross enrolment ratio differed significantly between regions. The regional aggregate mean was estimated to be 39.4±20.4 (95% CI, 32.7% - 46.1%) in sub-Saharan Africa, 56.3±19.6 (95% CI, 45.0% - 67.7%) in the Middle East and North Africa, 56.6±14.9 (95% CI, 48.6% - 64.6%) in the Asia and Pacific and 65.7±11.8 (95% CI, 60.3% - 71.0%) in the Latin America.

Within region comparison of the mean female combined gross enrolment ratio between adjusting and non-adjusting countries revealed that only in the Latin America the difference was statistically significant. In all other regions adjusting and non-adjusting countries had comparable means of female combined gross enrolment ratio. Furthermore, in Latin America the difference was in favor of adjusting countries, which had an average of 69.0±6.2 (95% CI, 65.8 - 72.2), compared with 51.3±19.7 (95% CI, 19.7 - 83.0).

In the sub-Saharan Africa, adjusting countries had a mean Female combined gross enrolment ratio of 37.4±16.9 (95% CI, 31.0 - 43.8), compared with 45.9±29.2 (95% CI, 23.4 - 68.3) for non-adjusting countries. In the Middle East and North Africa, the mean Female combined gross enrolment ratio was estimated at 54.2±16.5 (95% CI, 37.0 - 71.5) for adjusting countries and at 57.9±22.6 (95% CI, 35.7 - 79.9) for non-adjusting countries.
The difference was not statistically significant. Adjusting countries in the Asia and Pacific had a mean Female combined gross enrolment ratio of 54.3% ± 17.0 (95% CI, 42.9 - 65.8), compared with a mean of 61.7% ± 8.2 (95% CI, 51.4 - 71.9) for non-adjusting countries in the region. Finally, the adjusting Latin American Countries had an average Female combined gross enrolment ratio of 87.4% ± 9.5 (95% CI, 82.5 - 92.3), compared with an average of 74.2% ± 23.7 (95% CI, 36.5 - 100) for non-adjusting Latin American countries. The differences were statistically insignificant.

To ascertain the dose response relationship between structural adjustment we examined the correlation and the association between the Female combined gross enrolment ratio and the duration of structural adjustment implementation in years. The non-parametric Spearman correlation coefficient and the linear regression β coefficients were estimated at -0.07 and -0.09 respectively. Both coefficients were shown to be statistically insignificant (figure 249).
Female’s Years of Education

The female’s years of education is defined as the average number a female is expected to spend in the school, provided that the current enrollment and drop out rate were maintained. The female’s years of education is widely used to supplement the female illiteracy ratio and the female combined gross enrolment ratio with an insight about the duration of schooling females receive.

The female’s years of education in 1995 were shown to be correlated with the health status indicators in a statistically significant manner. It was shown to be directly related with the total population’s disability adjusted life expectancy at birth and inversely related with the infant mortality rate, the maternal mortality ratio and the proportion of population not expected to survive to age 40. The non-parametric spearman coefficients for these correlations were 0.8, -0.8, -0.8 and -0.8, respectively. These correlations are illustrated in figures 250 through 253.

Figure 250. The Association between Female’s Years of Education and the Disability Adjusted Life Expectancy at Birth
Figure 251. Association between Female's Years of Education and the Infant Mortality Rate

Figure 252. Association between Female's Years of Education and the Maternal Mortality Ratio
The Female's years of education ranged between a minimum of 0 years in Niger, Nepal, and Mali and a maximum of 8 years in Panama, Argentina, and the Republic of Korea. The Female's duration of schooling was less than 3 years in 27 countries. In an ascending order, these countries were Niger, Nepal, Mali, Mozambique, Gambia, Sudan, Benin, Uganda, Pakistan, Bangladesh, Papua New Guinea, Senegal, Togo, the Democratic Republic of Congo, Haiti, Ghana, Malawi, Cameroon, Zimbabwe, Kenya, Algeria, Tunisia, Guatemala, India, Egypt, Iran, and Botswana. In 18 countries the average duration of schooling was 5 years or higher. These countries were Colombia, Paraguay, Jamaica, Venezuela, Thailand, Peru, Sri Lanka, Costa Rica, Ecuador, Guyana, Mexico, Chile, Cuba, Philippines, Uruguay, Panama, Argentina, and Republic of Korea.

Seventeen countries had an average duration of female schooling between 3 and 4. These countries were Zambia, Congo, Syria, El Salvador, Nicaragua, Indonesia, Bolivia, China, Brazil, Honduras, Lesotho, Jordan, Bahrain, S. Africa, Mauritius and Malaysia. Data were not available for 29 countries.

In all adjusting countries the mean for the Female's years of education was estimated at 3.3±2.2 years, compared with 3.0±1.8 years for non-adjusting countries. The lower and upper limits of the 95% confidence interval for the mean were 2.7 years and 4 years for adjusting countries versus 2.1 years and 4 years for non-
adjusting countries. The difference in the Female’s years of education between adjusting and non-adjusting countries was not statistically significant.

Stratifying the analysis by national income category showed that there was statistically significant difference between different category with respect to the Female’s years of education. The aggregate female’s years of education for low income countries was estimated to be 1.9±1.6 year, compared with 4.1±1.5 year for lower middle income countries and 5.2±1.7 year for upper middle income countries. The 95% confidence interval for the mean ranged between 1.3 and 2.5 years in low income countries, between 3.4 and 4.8 years in lower middle income countries and between 4.1 and 6.4 years in upper middle income countries. The student t-test showed that these differences were statistically significant.

Comparing the female’s years of education between adjusting and non-adjusting countries in each national income category yielded statistically significant difference in the upper middle income category. In this income category, adjusting countries had a mean female’s years of education of 6.2±1.6 (95% CI, 4.5 - 7.9) years, compared with 4.1±1.0 (95% CI, 2.9 - 5.2) for non-adjusting countries. The difference indicates better performance in adjusting countries than in non-adjusting countries with respect to the duration of female schooling.

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**Figure 254. Female’s Years of Education in Adjusting and Non-adjusting Countries by National Income Category**

<table>
<thead>
<tr>
<th>Country income category</th>
<th>Years of education for female &gt;25 Years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0</td>
</tr>
<tr>
<td>Lower Middle</td>
<td>2</td>
</tr>
<tr>
<td>Upper Middle</td>
<td>6</td>
</tr>
</tbody>
</table>

- **non-adjusting**
- **adjusting**
In the low and the lower middle income groups there was no statistically significant difference between adjusting and non-adjusting countries. Adjusting low income countries had an aggregate mean of Female’s years of education of 2.0±1.8 (95% CI, 1.3 – 2.7) years, compared with 1.4±1.2 (95% CI, 0.0 – 2.9) years for non-adjusting low income countries. The estimates of the mean for adjusting and non-adjusting countries in the lower middle income category were 4.2±1.4 years and 3.6±1.8 years respectively. The 95% confidence interval for the mean ranged between 3.5 and 5.0 years in adjusting countries and between 1.4 and 5.8 years in non-adjusting countries of this national income category.

Stratifying the analysis by region revealed that the Female’s years of education differed significantly between regions. The regional aggregate mean was estimated to be 1.8±1.3 (95% CI, 1.2 – 2.4) years in sub-Saharan Africa, 2.3±1.2 (95% CI, 1.4 – 3.3) years in the Middle East and North Africa, 3.7±2.4 (95% CI, 2.1 – 5.3) years in the Asia and Pacific and 4.8±1.7 (95% CI, 4.0 – 5.5) years in the Latin America.

Within region comparison of the mean female’s years of education between adjusting and non-adjusting countries revealed that the differences were not statistically significant in all regions.
In the sub-Saharan Africa, adjusting countries had a mean Female's years of education of 1.6±1.0 (95% CI, 1.0 - 2.1) years, compared with 2.6±1.8 (95% CI, 0.8 - 4.8) years for non-adjusting countries. In the Middle East and North Africa, the mean Female's years of education was estimated at 2.2±1.0 (95% CI, 0.9 - 3.5) years for adjusting countries and at 2.5±1.5 (95% CI, 0.09 - 5.0) years for non-adjusting countries. Adjusting countries in the Asia and Pacific had a mean Female's years of education of 3.6±2.7 (95% CI, 1.6 - 5.7), compared with a mean of 3.9±0.7 (95% CI, 0.0 - 10.3) for non-adjusting countries in the region. Finally, the adjusting Latin American Countries had an average Female's years of education of 5.0±1.5 (95% CI, 4.2 - 5.8) years, compared with an average of 3.7±2.4 (95% CI, 0.06 - 7.4) for non-adjusting Latin American countries. The differences were statistically insignificant.

To ascertain the dose response relationship we examined the correlation and the association between the female's years of education and the duration of structural adjustment implementation in years. The non-parametric Spearman correlation coefficient and the linear regression β coefficients were estimated at -0.03 and 0.03 respectively. Both coefficients were shown to be statistically insignificant (figure 256).

Figure 256. Association between Female's Years of Education and the Duration of Structural Adjustment Implementation
Discussion and Conclusion

Adjustment programs have incited strong debate since their inception. The effects of adjustment on education depend on the external environment as well as on conditions within the country and within the sector before the adjustment period. Sahn [1989] suggests that the variability in performance and outcomes observed in adjusting countries largely reflects: 1) external and domestic circumstances that precipitated the need for such change (inefficient domestic policies, external shocks, the debt crisis) and under which reform programs are applied; 2) the character of the policy package (macro versus sector-specific measures); 3) the degree and pace of implementation; and 4) the choice of the year as the starting point for "adjustment."

Most critics argue that adjustment negatively affects incomes and living conditions of the poor. Evidence to support these arguments is not conclusive. Although critics say little about education directly, their arguments do apply indirectly to education: deteriorating incomes and living conditions may reduce demand for education, while improved education may help improve incomes and living conditions. One argument is that adjustment programs stem from a strictly economic outlook that considers recurrent expenditures on education to be the same as any other recurrent spending. Thus education is simply one more source of public spending that aggravates budgetary disequilibrium.

However, human capital theory views recurrent education spending as a productivity-raising investment in human resources. Therefore, changes in recurrent spending that alter the output and quality of education affect the productivity of human resources, and in turn affect national income and growth over the long term. Adjustment policies that reduce education spending may reduce investment in human capital if spending does not become more efficient, and may have long-term costs that outweigh short-term cost savings. In fact, many Bank-funded adjustment program explicitly protect real education expenditures, particularly at the primary level, and focus on ways to increase the efficiency of resource use in the sector.

Another important argument is that in practice policy changes under adjustment are guided by political rather than efficiency considerations. This argument addresses the implementation rather than the design of adjustment programs. Nevertheless, changes in program design may alleviate some implementation obstacles. Serageldin [1989] asserts that a common tendency is to cut back on social spending at basic levels (primary education) in favor of areas where political constituencies are more powerful (universities). Experton [1988] concurs that governments find it easier to avoid increasing access to primary education than to impose structural reforms to reduce demand for higher education. The result is that resources increasingly favor higher levels of education, particularly at the expense of rural and marginalized populations, the ones least likely to react negatively to these austerity measures.
Furthermore, Gallagher [1990] states that for political reasons, direct hardships to employees and immediate costs to society or policymakers are avoided. Amadeo and Camargo [1989] also argue that tight budgets result in spending cuts to those items easiest to cut (supplies, infrastructure) rather than those making the most sense from an efficiency viewpoint (salaries, jobs). Contractionary budgets therefore tend to be accompanied by allocative efficiency although the goal is to improve efficiency.

Although adjustment policies do have certain direct and indirect implications for education, current trends often have their roots in pre-adjustment mismanagement or economic recession. Most critics of adjustment programs do not distinguish the effects of international recession, fiscal constraints, or structural problems from the effects of programs or policies designed to offset them. Some recognize that recession and the debt crisis produced severe fiscal imbalances that require adjustment of some form [Knight, 1989], but others imply that countries would make no policy changes to improve the situation in the absence of Bank lending, although policies are often unsustainable [Michalopoulos, 1987]. Adjustment is an essential and continuous process for every country that vis-à-vis its economy to grow. Countries must continuously adapt to changing international economic conditions, particularly external shocks such as increases in the price of oil, world recession, and changing terms of trade. Many countries that do not adjust quickly enough face serious difficulties, including unsustainable fiscal and trade deficits, large debts, unrealistic exchange rates, inappropriate tax and price structures, and inefficient public sector management. Non-adjustment results in distortions and inefficiency at the macroeconomic and sector levels that are exacerbated while resources decline and economic growth stagnates, and is likely to have serious detrimental effects on education.

Structural adjustment programs are claimed to affect education through changes at the macro and micro levels of the economy. Adjustment at the macro level often implies a combination of budget containment measures for the public education system, limited access to post-primary public education, and higher user fees for education services at the secondary and tertiary levels. At the micro level, changes in household incomes and prices (user fees, reduced student subsidies) directly influence the demand for education by altering the opportunity cost of attending school [UNDP, 1989].

Household incomes also affect health and nutrition status, and thus indirectly influence attendance and learning ability. Finally, adjustment affects education through changes in markets and infrastructure (resulting from currency devaluation, fiscal and monetary restraint, and price liberalization) that affect the supply of education services and the opportunity cost of attending school [World Bank, 1990b]. More specifically, adjustment policy effects on education supply and demand are described below.
Education Supply: The most obvious impacts of adjustment policies on education are short-term changes in public expenditures. Education supply need not decline if private resources replace public resources. But in most countries, education is primarily funded by the public sector. Because structural adjustment loans focus on correcting imbalances in the economy and laying the foundations for growth rather than on equity, the particular forms taken by cuts in subsidies, real wages, and real education expenditures have high social costs, at least until the economy begins to grow [Cornia, et.al., 1987]. Griffin and Knight [1989] argue that in many Third World countries human development programs are "savagely" cut, and long-term prospects for development diminish while inequality and poverty increase. The most sophisticated analysis available [Kakwani, Makonnen and van der Gaag, 1990] associates adjustment lending with declining trends in public education financing and gross primary enrollment rates. Lower public education expenditures may result in lower quality and quantity of education services, fewer amenities (school lunches), or higher user fees. Furthermore, any change in civil service wages or employment has particularly strong effects on the labor-intensive education sector. Lower wages may reduce the short-term efforts of teachers, if not cause an exodus of experienced teachers [UNDP, 1989]. Even if adjustment policies do not cause deteriorations in social conditions directly, they are criticized for not reversing declining trends.

On the other hand, Kakwani, et. al. [1990] suggest that the need to cut expenditures provides an opportunity to increase efficiency and equity i.e. the use of resources. Serageldin [1989] notes that the Bank increasingly supports specific measures to protect vulnerable groups, for example by shielding public expenditures on key education and basic welfare services, by reviewing the composition of education expenditures and reorienting government spending in the sector, and through compensatory actions and transitional arrangements. Berg [1989] emphasizes that measures to reduce secondary and higher education's budget share; over time release resources that can be reallocated to primary education. Costs can be reduced by improving the efficiency and cost-effectiveness of all public expenditures. The Bank hopes that by giving the social impacts of adjustment programs earlier and more serious attention, the adverse impacts of adjustment can be reduced [Ribe, et.al., 1990]. For example, education expenditures can target those most in need, while the burden is placed on the relatively wealthy who have access to private education facilities and are able to pay higher fees [Demery and Addison, 1987]. The need to restructure the public budget under adjustment is an opportunity for governments to evaluate social programs. If these measures are effective, the quantity and quality of education services could improve during the adjustment period, even when sector resources decline. Guaranteeing access to education services protects the human capital of the poor, but will often require additional public resources. The World Bank [1989e] explicitly recommends that governments in Africa commit additional resources to the social sectors, with an overall objective of 8-10 percent of GDP to be spent on human resource development.
The major demand effect is likely to be short-term reductions in income that lower demand for schooling. Declining household incomes, higher unemployment levels, and changes in relative prices raise the opportunity cost of time spent in school, relative to time spent in economic or household activities. Demand for education also decline if poor health and nutrition reduce attendance and the capacity to gain from education. Finally, demand responds to changes in supply such as lower quality and higher user fees.

Demand effects of adjustment policies are also positive. Children have less attractive labor market options, the opportunity cost of attending school declines. Demand also increases in response to more attractive labor market options: adjustment in the long term increases the expected private rate of return to education in response to expected improvements in the long-term prospects of the economy if the adjustment program is successful [UNDP, 1989]. Overall impacts on demand vary by level of education because of differences in social and private rates of return to education investment. The social rate of return from primary education, and the private rate of return from tertiary education, are relatively high. Therefore, reductions in public education expenditures win affect sub-sectors differently, depending on how the cuts are implemented. Cuts at the primary level tend to reduce demand, whereas cuts at the tertiary level are more likely to induce private expenditures, and demand is less likely to decline. For this reason, many adjustment programs include reallocations from tertiary to primary education.

World Bank analysts continue to argue that some short-term social costs are inevitable when an economy has to adjust to adverse external shocks or to the effects of previous policy mismanagement. Even a well-designed adjustment program harms some groups, while the majority benefit, since adjustment usually involves changing relative prices and reducing government expenditures. But Nicholas [1988] proposes that the transitional costs of orderly adjustment are smaller, particularly under recent adjustment programs that include conditions for maintaining social sector expenditures, and the long-term benefits larger, than with ad hoc adjustment.

The long-term effects depend very much on whether the adjustment policy is successful (economic growth resumes, employment increases, and wages rise). If it is, then as compared with the situation that would have prevailed without the adjustment program the private returns to education and the supply of resources for education will probably be greater. However, the opportunity cost of time spent in education rather than in productive activities is also likely to be greater. Generally the former effect is expected to dominate, though it is far from obvious that it will in all cases [UNDP, 1989]. According to Turok [1989], "education is a slow process requiring sustained effort which cannot be made up for by crash-courses when funds once more become available." Likewise, Simai [1986] warns that unavoidable cuts in social expenditures should be made with extreme caution and with a long-
term policy view, since losses in these areas cannot be easily recouped and long-term damages, even of shorter-term measures, may be excessively high. Not investing in human capital threatens the country's future development potential.

Our empirical analysis of the literacy level, accessibility and attainment of education indicators show that claims that structural adjustment have had negative influence on education and literacy that might have detrimental impact on health status are baseless. Adjusting countries were shown to have levels of adult literacy, school enrolment, female education and duration of female schooling comparable to non-adjusting countries. The statistical insignificant difference was obtained even when the influence of national income category and region were held constant.