ASSESSMENT OF THE GENDER GAP IN SUDAN

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Abstract

Purpose: This paper examines the gender gap in education and investigates the related implications on the labour market and return to education in Sudan.

Design/methodology/approach: This paper uses primary and secondary data obtained from different sources. It uses new primary survey data at the micro level collected in Sudan in 2009, and uses the Ordinary Least Squares (OLS) method to estimate the Mincerian earning function and the rate of return to education defined by gender in Sudan (2009).

Findings: The findings confirm two stylized facts: first, the incidence of a significant gender gap in education in Sudan and second, the incidence of a gender gap in skill level, share of women in economic activities, labour force participation rate, employment and return to education in Sudan. The results imply that the slight gender difference in the rate of return to education in favour of women is only 0.2, which is not very noticeable. These findings indicate the importance of enhancing educational attainment for women to reduce the gender gap in education and employment and to facilitate improvement in the return to education for women in Sudan.

Originality/value: This paper is valuable because it fills the gap in the Sudanese literature by addressing the gender difference in education and related implications in the labour market and return to education, since these issues are not adequately discussed in the Sudanese literature. A novel element in this paper is that it uses new primary survey data at the micro level and it shows the difference in return to education defined by gender in Sudan, which is consistent with the findings in the international literature concerning the gender gap.

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INTRODUCTION

For a long time, the enhancement of women's empowerment has been expressed in the international literature in order to overcome the gender gap or gender-based inequality, which is a widespread phenomenon that influences the majority of the world's cultures, religions, nations and income groups. Yet gender discrepancies and their evolution over time have manifested themselves in different ways. Hence, assessment of the gender gap and the development of a framework for capturing the magnitude of these disparities are the most important priorities in order to design effective measures for reducing them.

The rationale for the recent growing interest and increasing concern in the international literature on reducing the gender gap and achieving gender equality is probably related to and consistent with the increasing commitment of the international community towards fulfilling the UN-UNDP-HDR-Millennium Development Goals (MDGs) including the achievement of gender equality between women and men and the empowerment of women.

The first report on the Arab Human Development Report series (UNDP-AHDR, 2002) on "Creating Opportunities for Future Generations", indicates some obstacles to Arab human development and recognizes that insufficient empowerment of women is one of three main limitations hindering human development in the Arab countries. The fourth report in the Arab Human Development Report (AHDR) series (UNDP-AHDR, 2005) "Towards the Rise of Women in the Arab World", presents an in-depth analysis of the problem of insufficient women's empowerment and examination of the status of Arab women and the problematic nature of the equality of their rights, capabilities and opportunities in the context of history, culture, religion, society and the political economy. It outlines a vision for the achievement of gender equality built on the assurance of full citizenship rights for all through the reform of Arab governance (cf. UNDP-AHDR, 2002, 2005).

In Sudan, as in most Arab countries, the gender gap and inequality is a widespread phenomenon. This paper aims to

examine the gender gap in Sudan as a case study of the Arab region. In particular, the aim is two-fold: first, to examine the status of women and the gender gap in education and second, to investigate the implications of that on skill levels for women, the share of women in economic activities, labour force, employment and return to education. We examine two stylized facts: (1) The incidence of a significant gender gap in education in Sudan; (2) The incidence of gender inequalities and gap in skill level, the share of women in economic activities, labour force participation rate, employment and return to education can be interpreted in relation to the incidence of a gender gap in education.

As for the relevance of this paper, the issues discussed are relevant and consistent with the recent growing interest in the literature, in particular, in view of the increasing commitment of the international community towards fulfilling the UN-UNDP-HDR-Millennium Development Goals (MDGs) including the achievement of gender equality between women and men and empowerment of women. Assessment of the gender gap in Sudan is particularly useful to attain two objectives: first, to create greater awareness among the public regarding the challenges posed by gender gaps and the opportunities created by reducing them and second, to serve as an instrument for change by providing policy-makers in Sudan with an overview of the gender gap and weaknesses of Sudan's performance compared to that of other countries. Therefore, from a policy perspective, this paper is useful to help generate some insights and policy recommendations to contribute to recent efforts aimed at enhancing gender equality, empowerment of women and increasing employment opportunities for women to help reduce the poverty rates among women and so contribute to the achievement of MDGs in Sudan. As for the importance and contribution of this paper, it aims to fill the gap in the Sudanese literature by addressing the gender gap in education and the consequent implications in the labour market and return to education, since these issues are not adequately discussed in the Sudanese literature. A novel element in our analysis is that we use new primary micro survey data at the micro level to show the gap and differences in return to education between men and women in Sudan. An interesting element in our analysis is that we use a more comprehensive set of indicators on gender gap that those often used in the literature, for instance, UNDP-HDR indicators on Gender-related Development Index (GDI), UNESCO Gender Parity Index (GPI), the share of males and females in enrolment in education, skill level,

economic activities, labour force, participation rates, employment and unemployment using the most recent data.

CONCEPTUAL FRAMEWORK AND METHODOLOGY

Based on the above background, this section presents the conceptual framework and methodology on gender gap and implications as discussed in the international literature.

For a long time, many studies in the international literature have used certain indicators to define the concept of gender gap or gender inequality. For instance, UNDP-HDR indicators on Gender-related Development Index (GDI), UNESCO indicator on Gender Parity Index (GPI), and the World Economic Forum (2007; Hausmann *et al.*, 2007) indicators on the Global Gender Gap Index provide useful indicators for measuring the gender gap. The recent growing interest and increasing concern regarding these concepts in the literature is consistent with the increasing commitment towards fulfilling the UN-UNDP-HDR-Millennium Development Goals (MDGs), including the achievement of gender equality between women and men and the empowerment of women. The various issues of the reports on the Arab Human Development Report series (UNDP-AHDR, 2002) discuss the problematic status of Arab women and recognize that insufficient empowerment of women is one of three main problems hindering human development in the Arab countries (see for instance, UNDP-AHDR, 2002, 2005; Benhabib and Spiegel, 1994).[2]

For instance, with respect to gender the MDG assesses achievements in gender equality for all women and men via the Gender-related

[2] The Millennium Development Goals are: (1) Eradicate extreme poverty and hunger: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day, and halve, between 1990 and 2015, the proportion of people who suffer from hunger. (2) Achieve universal primary education: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. (3) Promote gender equality and empower women: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015. (4) Reduce child mortality: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate. (5) Improve maternal health: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio. (6) Combat HIV/AIDS, malaria and other diseases. (7) Ensure environmental sustainability and (8) Develop a global partnership for development. (see UND-HDR)

Development Index, Gender Empowerment Measure, gender inequality in education, gender inequality in economic activity and women's political participation. The Gender-related Development Index (GDI) is a composite index measuring average achievement in three basic dimensions captured in the human development index—a long and healthy life, access to knowledge and a decent standard of living—adjusted to account for inequalities between men and women. The Gender Empowerment Measure (GEM) is a composite index measuring gender inequality in three basic dimensions of empowerment—economic participation and decision-making, political participation, and decision-making and power over economic resources. Women's economic empowerment is measured by the ratio of estimated female earned income to estimated male earned income based on the ratio of the female nonagricultural wage to the male nonagricultural wage, the female and male shares of the economically active population, total female and male population and GDP per capita. Women empowerment in political participation is measured by seats in parliament held by women in a lower or single house or an upper house or senate (UND-HDR). Moreover, the World Economic Forum (2007), the Global Gender Gap Report (2007) introduced and used the Global Gender Gap Index as a framework and a tool for measuring, benchmarking and tracking global gender-based inequalities on economic, political, education and health-based criteria.[3]

The Global Gender Gap Index (2007) defined in Table 1 examines the gap between men and women in four fundamental categories: economic participation and opportunity, educational attainment, political empowerment and health and survival. Since Sudan is not covered in the World Economic Forum, the Global Gender Gap Report (2007) measures the Global Gender Gap for a few Arab countries other than Sudan. Hence, in this paper we fill this gap by covering the case of Sudan after having adjusted and adapted the framework used by the World Economic Forum (2007) to measure the Global Gender Gap Index. As for the method of analysis, we use the indicators of the World Economic Forum (2007) on Global Gender Gap Index, UNDP-HDR indicators on Gender-related Development Index (GDI) and UNESCO indicator on Gender Parity Index (GPI). Depending on the availability of the most relevant recent data and information from different local and international sources, we use the components incorporated in these indexes to fit with the purpose of our analysis in this paper. Table 1 explains all the relevant indicators used

[3] See the Global Gender Gap Report: Measuring the Global Gender Gap 2007, World Economic Forum, 2007, pp. 3–18.

Sub-index	Variables	Sources
Economic Participation and Opportunity	Female labour force participation rate and female economic activity rate	United Nations Development Programme, Human Development Report (UNDP-HDR) 2007/2008; Arab Labour Organization (ALO) (2007), Sudan Ministry of Labour and public service Migration and Labour Force Surveys (SMLPS-MLFS)1990 and 1996
	Ratio of estimated female earned income over male value	UNDP-HDR 2007/2008
	Ratio of female unemployment	ALO (2007), SMLPS-MLFS 1990 and 1996
Educational Attainment	Ratio of female literacy rate over male value	UNDP-HDR 2007/2008; UNESCO-UIS, Education Indicators, 2006; the World Bank- World Development Indicators (2007-2005), Sudan Ministry of General Education and Sudan Ministry of High Education
	GPI Ratio of female net primary level enrolment over male value	
	GPI Ratio of female net secondary level enrolment over male value	
	GPI Ratio of female gross tertiary level enrolment over male value	
Political Empowerment	Ratio of females with seats in parliament over male value	
Health and Survival	Ratio of female healthy life expectancy over male value	UNDP-HDR 2007/2008; World Health Organization, 'World Health Statistics 2007' and 'The World Health Report 2007'
	Sex ratio at birth (converted to female-over-male ratio)	Sudan Central Bureau of Statistics (2009)

Source: Adapted from the framework of the World Economic Forum: Global Gender Gap Report (2007)

Table 1. Structure of the Global Gender Gap Index

in our analysis. As for the methodology, we use a combination of primary and secondary quantitative and qualitative data and use the descriptive method of analysis.

GENDER DEVELOPMENT INDEX (GDI) AND GENDER GAP IN EDUCATION IN SUDAN

Based on the above background and before we discuss the implications of the incidence of gender gap in education, in this section, it is useful

to begin with a brief explanation and assessment of both the Gender Development Index and the gender gap in education in Sudan.

Recent data and information from UNDP-HDR (2007/2008) indicates that the gender gap indicators estimated for Sudan are high compared to other world regions. For instance, Table 2 implies that in 2006 Sudan's performance fell below the developing countries and the world level in terms of the Gender Development Index (GDI), adult literacy, MDG: youth literacy, gross primary enrolment, gross secondary enrolment, female economic activity rate (% ages 15 and above and % of male rate ages 15 and above). Moreover, Sudan's performance in terms of female/male rate in adult literacy rate, gross primary enrolment and female economic activity rate fell below Arab States, Sub-Saharan Africa, low income and least developed countries.

Moreover, not only does the rank and performance of Sudan lag behind compared to other world countries, but Sudan has not shown remarkable progress and has even worsened over time. For instance, data from UNDP-HDR (2007/2008) shows deterioration in terms of Sudan's rank in the GDI compared to world countries during 2003–2006. It implies that in terms of GDI, Sudan ranked 131 at the bottom out of 157 world countries and at the bottom of the Arab countries. It also implies that despite the little progress in the value of the GDI in Sudan over the period 2003–2006, from 0.495 in 2003 to 0.502 in 2005, inequality between male and female still exists to hinder the achievement of gender equality.

We explain the evidence for the incidence of the gender difference and gap by interpreting the component of the GDI using the female ratio and female/male ratio in Sudan (see Table 3). For instance, beginning with the gender difference in health and survival, data from the UNDP-HDR (2007/2008) shows the gender gap in health and implies that the value of female healthy life expectancy is slightly higher than the value of male healthy life expectancy. However, in contrast to this result, recent data from Sudan Central Bureau of Statistics (2009) provides evidence on the incidence of the gender gap in survival, as it implies that for Sudan's entire population for all age groups, the total number and hence probability of survival for males is relatively higher than the number and hence probability of survival for females. Except for the age group 20–39, where the total number and hence probability of survival for females is relatively higher than the number and hence probability of survival for males. Defined by geographical area, the total number and hence

	Adult literacy (% aged 15 and older) (1995-2005)		MDG						Female economic activity rate (%ages 15 and above) (2005)	
			Youth literacy(%aged 15-24) (1995-2005)		Gross primary enrolment (2005)		Gross secondary enrolment (2005)			
	Female rate (%)	Female/ male rate (%)	Female rate (%)	Female/ male rate (%)	Female rate (%)	Female/ male rate (%)	Female rate (%)	Female/ male rate (%)	Female rate (%)	Female/ male rate (%)
Sudan	51.8	0.73	71.4	0.84	56	0.87	33	0.94	23.7	33
Developing countries	69.9	0.91	81.4	0.91	104	0.94	58	0.93	52.4	64
Least developed countries	44.3	0.80	58.0	0.80	90	0.89	28	0.81	61.8	72
Arab States	59.4	0.88	79.5	0.88	88	0.90	65	0.92	26.7	34
Sub-Saharan Africa	51.2	0.84	65.1	0.84	92	0.89	28	0.79	62.6	73
Middle income	86.5	0.99	96.2	0.99	110	0.97	78	1.01	57.0	72
Low income	48.8	0.82	65.8	0.82	99	0.91	41	0.82	45.7	55
World	72.7	0.92	82.5	0.92	104	0.95	64	0.94	52.5	67

Source: UNDP, HDR 2007/2008, Table 28: 326-329, Table 30: 334-337, Table 31: 338-341.

Table 2.
Gender-related development index in Sudan compared to world region 2006

probability of survival for females in Northern Sudan is relatively higher than the total number and hence probability of survival for females in Southern Sudan. This finding is reasonable and can be interpreted as an indication of the displacement of women due to the incidence of conflict, civil war and lack of security in Southern Sudan compared to Northern Sudan. Moreover, defined by different age groups in all Sudan, both (Northern and Southern), the total number and hence probability of survival for females of age 17 and above is relatively higher than the total number and hence probability of survival for females below the age of 17 years (00-16). This result implies that the probability of child mortality for females is relatively higher than that for males. Further evidence of the gender differences appear in terms of educational attainment, for instance, measured by the ratio of female literacy rate over male value (measured in terms of adult literacy rate (% aged 15 and older), youth literacy, and gender inequality in education (combined gross enrolment ratio for primary, secondary and tertiary education, measured by Gender Parity Index [GPI] GPI ratio of female net primary level enrolment over male value, GPI ratio of female net secondary level enrolment over male value and GPI ratio of female gross tertiary level enrolment over male value). Further evidence of the gender gap can be realized in terms of economic participation, opportunity and empowerment measured by the female labour force participation rate and female economic activity rate (% ages 15 and above) (% of male rate) and the ratio of estimated female earned income over male value (Psacharopoulos, 1994). Moreover, the gender difference in political participation and political empowerment can be observed from UNDP-HDR (2007) figures for the period (2003–2006), which implies little progress from 9.7% to 16.8% in terms of political participation measured by the women's ratio or the ratio of females over males value in total seats in parliament (Table 3).

Further evidence on the gender differences appear in terms of educational attainment, measured by the ratio of females in primary, secondary and tertiary education and the GPI for enrolment ratios for gross primary level and gross secondary level enrolment. For instance, Table 4 illustrates that both the percentage of female students and the Gender Parity Index for enrolment ratio for all levels of education in Sudan are low compared to most Arab countries. For Sudan, somewhat surprisingly, the gender parity index and female enrolment in secondary education is better than primary education, which implies that the gender gap in primary education is more serious and higher than in secondary education (see also Sudan ministry of education and

The components of Gender-related Development Index (GDI) (2005–2006)	Female	Male	Female rate (%)	Ratio of Female rate to male rate
Life expectancy at birth years (2005)	59.3	56.4		
Adult literacy rate (% aged 15 and older) 1995–2005	51.8	71.1	51.8(1)	0.73(1)
Youth literacy			71.4(1)	0.84(1)
Combined gross enrolment ratio for primary, secondary and tertiary education	37.6	42.2		
Gross primary enrolment			56(1)	0.87(1)
Gross secondary enrolment			33(1)	0.94(1)
Female economic activity rate (% ages 15 and above)			23.7(1)	33(1)
Estimated earned income (PPP US$)	756	2,999		0.25
Seats in parliament held by women (% of total)			16.8	

Source: UNDP, HDR 2007/2008, Table 28: 326-329, Table 29: 330-333, Table 30: 334-337, Table 31: 338-341. Note (1) data refers to 2005

Table 3. Gender-related development index in Sudan (2005–2006)

ministry of higher education, the World Bank (WDI 2001), UNESCO (2006) and AHDR 2004).[4]

Table 5 implies that, especially among the poor, family economic reasons were considered to be the most important factor negatively limiting girls' more than boys' potential to complete their primary (basic) and secondary school education and that the factors preventing males from completing their education differ from those hampering females. Likewise, families perceive educating girls to be less important than schooling boys. It is the need to work that has the largest effect on the withdrawal of boys from school. The percentage share of female enrolment in most educational levels declined and this implies that the gender gap shows an increasing trend over the period 2004–2007. The incidence of gender gap in tertiary education as measured by percentage share of female student enrolled in tertiary education in governmental and public higher education institutes is higher than that for private and foreign higher education institutes for the year 2005. The high percentage share of female students compared to male students in tertiary education can be interpreted in relation to the

[4] See for instance, AHDR, 2004: pp. 73–74.

observation from the findings of the Sudan Central Bureau of Statistics on Sudan's fifth population census, which indicate that the structure of Sudan's total population according to different age groups implies that for the age group 20–39, the total number of females is slightly higher than the total number of males. Another justification is probably because a large percentage of Sudan's males study abroad.

> "[In Sudan and Arab countries] despite the increase in female enrolment in university education, women are still concentrated in specializations such as literature, the humanities and the social sciences, where they constitute the majority, which are not in high demand in the job market. Enrolment rates for females are noticeably lower in the fields of engineering and industry. This trend is due also to women's orientation towards jobs that permit part-time work and that do not contravene the traditional view of their reproductive role or the division of work in the house and the raising of a family. Examples are education and part-time jobs as civil servants. Even so, the region has witnessed a shift as more girls have moved towards scientific and high-tech fields. Discrepancies still exist, however, in terms of the areas of focus towards which girls are oriented within individual scientific fields. For example, most women who study engineering specialise in architecture or chemical engineering, whereas men lean towards mechanical or electrical engineering. In medicine, men gravitate towards surgery and other specialist areas whereas women take up gynaecology, paediatrics and dentistry" UNDP-AHDR 2004.

IMPLICATIONS OF GENDER GAP IN EDUCATION IN LABOUR MARKET IN SUDAN

Based on the above findings on the incidence of the gender gap in education, it will be useful to examine the related implications in the labour market. In this section we argue that the incidence of the gender gap in the labour market can be interpreted in relation to the gender gap in education.

For instance, data from Arab Labour Organization and Sudan Ministry of Labour and Public Service Migration and Labour Force Surveys 1990 and 1996 shows that the demographic structure and labour force (15 years and above) in Sudan, implies that the share of Sudanese

	Percentage of female students			Gender parity index for enrolment ratio	
	Primary	Secondary	Total tertiary	Gross primary	Gross secondary
Mauritania	50	45	26	1.05	0.86
Jordan	49	49	52	1.02	1.03
Palestinian Autonomous Territories	49	50	54	1.00	1.06
Oman	49	48	50	1.01	0.96
Qatar	49	49	67	0.99	0.97
Bahrain	49	50	68	1.00	1.04
Kuwait	49	50	65	0.99	1.05
Saudi Arabia	n.a.	n.a.	58		
United Arab Emirates	49	49	n.a	0.99	1.02
Lebanon	48	52	53	0.97	1.10
Syrian Arab Republic	48	48	n.a.	0.96	0.95
Tunisia	48	51	58	0.97	1.
Libyan Arab Jamahiriya	48	53	n.a.	0.95	1.17
Egypt	47	n.a.	n.a.	0.94	
Algeria	47	n.a.	55	0.93	
Morocco	46	n.a.	45	0.89	
Sudan	46	48	n.a.	0.87	0.96
Djibouti	44	40	40	0.81	0.67
Yemen	n.a.	n.a.	26		

Source: UNESCO/UIS- Global Education Digest (2005–2006)

Table 4.
Percentage of female students and Gender parity index for enrolment ratio for all levels of education in the Arab countries 2006

women in the labour force (31.1%) is less than Sudanese men (72.2%) and the total Sudanese labour force (52.4%). The participation rate (for 15–24 years old) for Sudanese women (6.08%) is less than that of Sudanese men (15%), less than the total Sudanese participation rate (10.08%) and, moreover, participation rates for men and women living in rural areas are higher than in men and women living in urban areas over the period 1990–1996.

One stylized fact on the structure of the labour market in Sudan is the inconsistent distribution of the economically active population

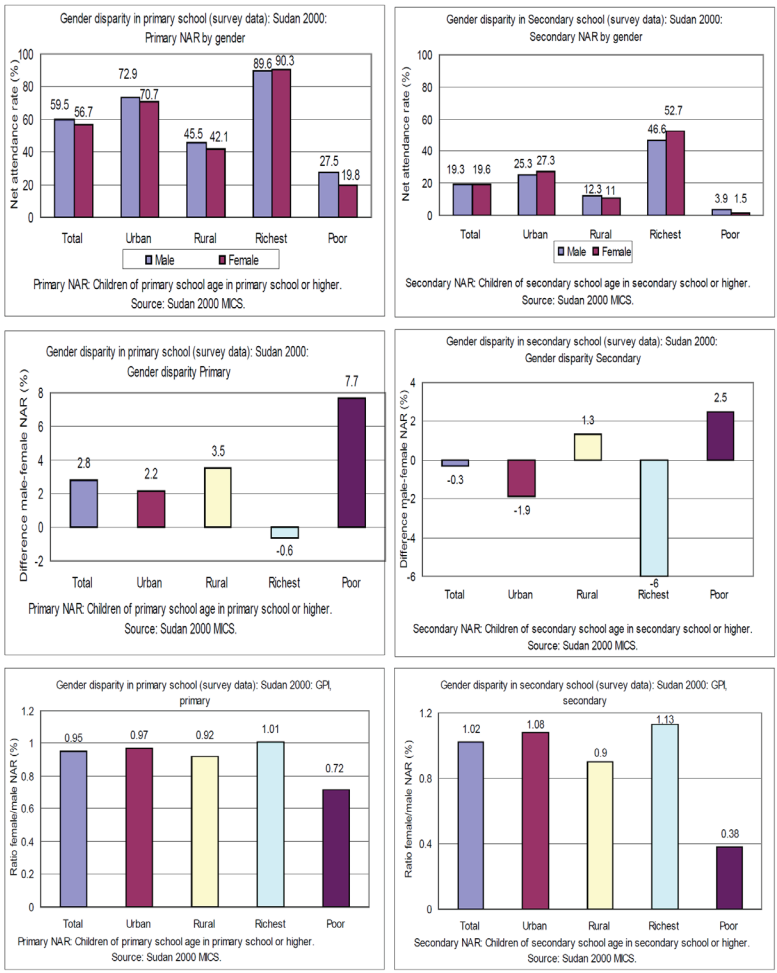
Table 5. Gender Gap (Disparity) in Primary and Secondary Education in Sudan (2000) (survey data)

		Total	Urban	Rural	Richest	Poor
Net attendance rate by gender Primary (NAR) (%)	Male	59.5	72.9	45.5	89.6	27.5
	Female	56.7	70.7	42.1	90.3	19.8
Net attendance rate by gender Secondary (NAR) (%)	Male	19.3	25.3	12.3	46.6	3.9
	Female	19.6	27.3	11	52.7	1.5
Gender disparity Primary		2.8	2.2	3.5	-0.6	7.7
Gender disparity Secondary		-0.3	-1.9	1.3	-6	2.5
Gender Parity Index (GPI) Primary		0.95	0.97	0.92	1.01	0.72
Gender Parity Index (GPI) Secondary		1.02	1.08	0.9	1.13	0.38

Source: Sudan 2000 MICS- Primary NAR: Children of primary school age in primary school or higher.

according to major economic sectors defined by gender in Sudan. For example, according to Arab Labour Organization (2007) data for 2004, the majority of Sudanese women are employed in the agriculture sector (66%), followed by the services sector (27%), industry (4%) and other activities (2%), while the majority of Sudanese men are employed in the services sector (40%), followed by agriculture (37%), industry (17%) and other activities (1%). Employed Sudanese men constitute the majority of total employment in all sectors (76%), whereas employed Sudanese women constitute the minority of total employment in all sectors (24%). The proportion of Sudanese men employed in the agriculture, services and industry sectors (28%, 34% and 13% respectively) is higher than Sudanese women employed in these sectors (16%, 7% and 1% respectively). This implies that Sudanese men employed in the agriculture, services and industry sectors are nearly twice, nearly five times, and nearly thirteen times the number of Sudanese women employed in these sectors respectively.

Another stylized fact on the structure of the labour market in Sudan can be observed from the international definition of major occupational groups classification by gender in Sudan. For example, according to the Arab Labour Organization (2007), data for 2004 indicates that the majority of Sudanese economically active population or workers are medium and low skilled (86%) and a minority (14%) are high skilled. Only 14% of men are highly skilled and 86% are medium and low skilled, only 15% of women are highly skilled and 85% are medium and low skilled, women are slightly



Figures 1-6: Gender Gap (Disparity) in Primary and Secondary Education in Sudan (2000)

more skilled than men. The majority of Sudanese workers are employed in blue collar occupations (70%), while the minority is employed in white collar occupations (30%). Only 33% of men are employed in white collar occupations, while 67% of men are employed in blue collar occupations. Only 24% of women are employed in white collar occupations, while 76% of women are employed in blue collar occupations.

Sudan, like many other typically developing countries, not only suffers from high annual population growth rate, high unemployment rate, but also a population structure with a high percentage of youth which makes

the situation of unemployment even worse, and particularly difficult for this category of young people, as most of the population is under 25 years of age. For example, according to Arab Labour Organization (2007), data for 2004 indicates that the share of youth unemployment among Sudanese women (43.3%) is higher than the share of youth unemployment among Sudanese men (36.6%) and total Sudanese youth unemployment (41.3%).[5] Over the period 2000–2006, the distribution of employment for graduates of all fields of specialization indicates that men are more likely to be employed than women. For instance, the distribution of employment for graduates of all fields of specialization for men (42%, 53%, 51%, 42% and 55%) and for women (58%, 47%, 49%, 58% and 45%); for graduates of applied science colleges and fields of

[5] Data from Sudan Ministry of Labour and Public Service Migration and Labour Force Surveys 1990 and 1996 shows the incidence of unemployment according to age groups in 1996, for men the highest rate of unemployment is reported amongst the youth population (15–24) it was estimated at 22%, followed by age group 55–64, it was estimated at 12.3%, followed by the age group above 64, estimated at 11.9%, followed by the age group 25–54 estimated at 7.5%, followed by 15 years and over estimated at 0.2%. For women the highest rate of unemployment is reported amongst the youth population (15–24) it was estimated at 37.6% and for youth at 15 years and over, it was estimated at 23.4%, it followed by age group (25–54) estimated at 16.9%, followed by the age group (55–64) estimated at 11.2%, followed by the age group above 64 estimated at 6.7%. Therefore, data for 1996 implies that except for the age group 55–64 for all other age groups, open unemployment amongst women exceeded men, the data also indicates that the incidence of open unemployment according to age and gender was higher among the youth population, notably, young women were likely to be more unemployed compared to young men. The distribution of unemployment according to education level indicates that for men unemployment is high for primary education (33.6%), followed by illiterate/basic (26.3%), illiterate (24.1%), secondary (11.4%) and above secondary (4.4%). The distribution of unemployment according to education level indicates that for women unemployment is high for primary education (33.9%), followed by illiterate (33%), illiterate/basic (17.3%), secondary (10.9%) and above secondary (2.8%). The unemployment rate according to education level indicates that for all youth total unemployment (28.3%) is high for above secondary (48.7%), followed by secondary (35.6%), primary (34.6%), illiterate/basic (25.59%) and illiterate (23.4%). The unemployment rate according to education level indicates that for men unemployment (33.2%) is high for above secondary (43.2%), followed by secondary (24.4%), primary (22.1%), illiterate/basic (21.4%) and illiterate (20.6%). The unemployment rate according to education level indicates that for women unemployment (37.6%) is high for primary (67.2%) followed by above secondary (59.5%), secondary (43.6%), illiterate/basic (36.3%) and illiterate (25.5%). Previous and recent data on unemployment indicate that women were more likely to be unemployed than men.

specialization for men (53%, 55%, 52%, 41% and 48%) and for women (47%, 45%, 52%, 59%, and 52%); for graduates of art and social sciences colleges and fields of specialization for men (39%, 46%, 61%, 43% and 80%) and for women (61%, 54%, 39%, 57% and 20%); for graduates of high institutes (diploma) for men (65%, 58%, 73%, 0%% and 85%) and for women (35%, 42%, 27%, 0% and 15%) and for graduates of secondary school for men (42%, 53%, 51%, 58% and 55%) and for women (58%, 47%, 49%, 58% and 45%)in 2000, 2001, 2004, 2005 and 2006 respectively.[6]

GENDER GAP AND RATE OF RETURN TO EDUCATION IN SUDAN

Based on the above findings on the incidence of the gender gap in education and related implications in the labour market, it is useful in this section to examine the related implications regarding the return to education in Sudan. This section estimates the rate of return to education in Sudan, based on the theoretical literature, namely Mincerian earning function.[7, 8]

As for the rate of return to education, it is worth noting that the general aggregated rate of return to education discussed in the literature is expressed differently when considering the effect of other factors. For instance, the disaggregated rates of return to education is expected to vary with different characteristics across different population groups due to differences in gender (male–female), region (rural–urban), sector (public–private), educational level (primary–secondary–higher education) and nationality (national–foreign). Due to practical limitation regarding the availability of data defined by educational level, in this paper we limit our analysis to estimate the rate of return to education in Sudan defined by gender based on Mincerian earning function.

Few studies in the literature discuss the rate of return to education in Sudan. For instance, Ali (2006) estimates the rate of return to

[6] See Sudan federal public service recruitment board: Statistics and Research Administration.

[7] For more detailed information about the theoretical and empirical literature on the estimation of the rate of return to education, see for instance, Benhabib and Spiegel (1994), Mincer (1974; 1984; 1989) and Psacharopoulos (1994).

[8] The Mincer earning function is defined by: $\log y_i = \alpha + \beta s_i + \gamma x_i - \delta x^2_i + \mu_i$ and the extended Mincer earning function is defined by: $y_i = \alpha + \sum \beta_k D_{ki} + \gamma x_i - \delta x^2_i + v_i$

human capital in Sudan using the data for 16 States of Northern Sudan obtained from the Migration and Labour Survey (1996). Ali (2006) estimates the Mincer equation for Sudan and shows that the rate of return to investment in human capital is 6.1% for Sudan as a whole, 6% for males and 6.3% for females. Ali (2006) also estimates the extended Mincer equation for Sudan where he used dummies for four levels of education: literate, primary, secondary and tertiary with the illiterate category used as a reference category. For primary education the rate of return is 4.4% for the country as a whole: 4.2% for males and 4.7% for females. For secondary education the rate of return is 1.3% for males and 3.1% for females. The rate of return to higher education is 15% for the country as a whole: 14.8% for males and 17.3% for females, with a margin of 2.5 percentage points in favour of educating females. The results discussed in Ali (2006) indicate very low rates of return that are different from the world pattern. The difference in the rates of return between males and females is not very striking and amounts to about 0.3 percentage points—much lower than that expected from world patterns. Our analysis in this paper is different from Ali's (2006) estimation of the return to human capital in Sudan based on secondary data at the macro level for 16 States of Northern Sudan defined by gender and educational level obtained from the Migration and Labour Survey (1996). Our estimation differs from that of Ali (2006), since we focus on estimation of the rate of return to education using more recent and new primary data at the micro level based on the University Survey (2009), and we estimate the rate of return to education defined by gender in Sudan for a relatively small sample of 100 people. Despite the relatively small sample size that may constitute a limitation for making some generalizations from our results, our analyses remain useful for improving understanding and provide useful insights from both analytical and policy perspectives.

Our analysis in this paper utilizes primary data based on the results obtained from the University Survey (2009) and the questionnaire on "The use and Economic Impacts of Information and Communication Technology (ICT) in Sudanese universities". Specifically, we utilize the general background information presented in Section 1 of the survey questionnaire, which focuses on the general characteristics of individuals covered in the survey. This includes, for instance, quantitative personal data to measure human capital/skill level indicators, defined by educational attainment

(average year of schooling and average years of experience) and average wages (monthly income) for 100 of the respondents.[9]

We examine the rate of return to education in Sudan defined by gender using primary data based on the preliminary results from the University Survey (2009) and using the Ordinary Least Squares (OLS) method and Mincerian earning function defined by gender in Sudan (2009). Our results

[9] The field research to collect our primary data was held in the period from March to April, 2009 in Sudan. As for the selection of the sample and composition of the survey, the survey covered ten of the public and private Sudanese universities located in Khartoum State; the sample in the university survey was drawn from the population affiliated to these ten universities in Khartoum state. The questionnaire was distributed randomly and circulated amongst 131 of the individuals: academic teaching staff, support staff and students in the selected ten (five public and five private) Sudanese universities located in Khartoum. The selection of the individuals was based on a random basis; the coverage of individuals in the survey is more comprehensive and includes both males (50%) and females (50%) whose age's limit is 20–70 years old. Since ICT is widely used amongst the youth population, the coverage in the university survey was focused on the youth population. The survey aimed to collect micro qualitative and quantitative data to reflect the opinions of academic teaching staff, support staff and students with respect to assessment of the demand for ICT and the role of ICT in the creation and transfer of knowledge. It was also intended to provide insights to help to generate policies to enhance the role of ICT in the creation and transfer of knowledge. The composition of the university survey indicates a total response rate of 85% for all the survey including all academic teaching staff, support staff and students. The response rate varied according to institutions and individuals covered in the survey. For the academic teaching staff the total response rate was 81% and the weighted response rates by sector was 82% and 77% for public and private sectors universities respectively. The shares of public and private universities are quite representative and yield different response rate. As for the structure of the questionnaire in the university survey (2009), the questionnaire in the university survey was composed of nine sections; each of the nine sections in the university survey aimed to request particular information. Section 1 requested general background information about the characteristics of the individuals covered in the survey, individuals also requested quantitative data to measure human capital/skill indicators, defined by skill level or the educational attainment (average year of schooling and average years of experience) and average wages (monthly income). For the purpose of this paper we use the information and data presented in section 1 of the survey questionnaire. For the purpose of this paper, in our estimation of the rate of return to education and the correlation between wages, education, experience and its square, we use the observations for 100 persons, including academic teaching staff, support staff and a few part-time workers defined as postgraduate students registered for MSc degree, we exclude the observations of all undergraduate students registered for BSc and intermediate diploma degrees.

show the differences defined by gender and imply that the correlation between wage (log), and education, experience and its square for women is relatively higher than for men. Our findings reported in Table 6 show a positive sign and hence correlation between wages as an independent variable and both education and experience, but a negative sign and hence correlation between wages as an independent variable and squared year of experience as an explanatory variable. Our results with respect to correlation between wage, education, experience and its square imply that the sign of all these explanatory variables used in our analysis are quite consistent with the findings based on Mincerian earning function and the theoretical and empirical literature on the rate of return to education.

	Coefficient (t-value)		
	All sample(1)	**Males**	**Females**
(1) Correlation between wages, and education			
Years of Schooling/ Education	0.109 ** (4.370)	0.079** (6.123)	0.096** (6.039)
R- Squared	0.160	0.410	0.452
F - Statistics	19.098	37.490	36.473
Number of Observations	100	55	43
(2) Correlation between wages, education and experience			
Years of Schooling/ Education	0.038* (1.751)	0.046** (2.795)	0.051** (2.925)
Years of Experience	0.060 ** (7.735)	0.009** (2.826)	0.023** (4.175)
R- Squared	0.481	0.483	0.624
F - Statistics	44.886	23.827	34.089
Number of Observations	99	53	43
(3) Correlation between wages, education, experience and its square			
Years of Schooling/ Education	0.021 (0.958)	0.020 (1.114)	0.022 (1.305)
Years of Experience	0.135 ** (5.306)	0.041** (3.519)	0.082** (4. 849)
Squared Years of Experience	-0.002** (3.088)	-0.001** (-2.833)	-0.002** (-3.616)
R- Squared	0.528	0.555	0.717
F - Statistics	35.734	20.750	33.776
Number of Observations	99	53	43

Correlation is significant * at the 0.05 level (one-tailed) ** at the 0.01 level (one-tailed)

Source: Own estimation based on the University Survey (2009). Note (1) estimation is based on linear equation.

Table 6.
Correlation between wages, education and experience defined by gender in Sudan (2009)

Our findings reported in Table 6 indicate that the rate of return to education for the sample tends to explain only 16% of the change in wages, compared to 41% for all men and 45% for all women. We find that the rate of return to education and experience together for the entire sample tends to explain only 48% of the change in wages, compared to 48% for all men and 62% for all women. We find that the rate of return to education, experience and its square together for the entire sample tends to explain only 53% of the change in wages, compared to 56% for all men and 72% for all women. These results imply that the overall significance of the rate of return to education tends to increase when adding experience as an explanatory variable next to education as an explanatory variable and shows further increase when adding a squared years of experience explanatory variable next to education and experience. These results imply that the correlation becomes more significant when adding the variable experience, and further when adding squared years of experience and underlines the importance of all the variables of education, experience and its square. This also implies that the importance of the rate of return to education in determining or affecting wages tends to decline when adding the variables experience and its square.[10]

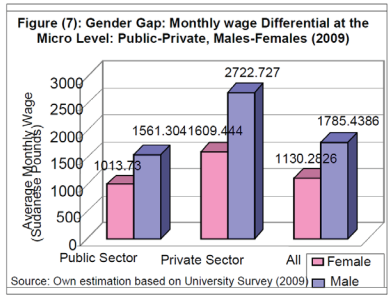
When examining the coefficients of the years of education, our findings presented in Table 6 imply that the rate of return to education is about 10.9 per cent for the whole sample, about 7.9 per cent for all men and about 9.6 per cent for all women. When including the years of experience, we find that the rate of return to education declined to about 3.8 per cent for the whole sample, about 4.6 per cent for all men and about 5.1 per cent for all women. When including the years of experience and its square, we find that the rate of return to education declined further to about 2.1 per cent for the whole sample, about 2.0 per cent for all men and about 2.2 per cent for all women. Our findings imply a very low rate of return to education for all the sample, men and women. Our findings at the micro level seem consistent with the results at the macro level discussed in Ali (2006), which indicate very low rates of return, in contrast to the world pattern. Our findings imply that the slight gender gap or difference in the rate of return to education in favour of women is only 0.2, which is not very noticeable.

[10] For all the sample when using the log of wages, our results seem to be somewhat inconsistent with our findings reported in Table 6 defined by gender for each group of male and female separately. Therefore, our estimation for all the sample is based on linear estimation that is relatively consistent with our findings defined by gender for each group of male and female separately.

Our findings at the micro level seem consistent with the results at the macro level discussed in Ali (2006), which indicate that the difference in the rates of return between males and females is not very striking and amounts to about 0.3 percentage points—much lower than that expected from world patterns.

Next to estimating the related implication of the incidence of gender gap in education in the rate of return to education, it is useful to examine the differences in wages at the macro and micro levels. The above findings on the incidence of gender gap in education probably imply related implications in wage differential. For instance, Figures 7–10 show the wage differential between males and females in Sudan at micro and macro levels (2003–2009) and support our argument that the incidence of the gender gap in return to education can be interpreted in relation to the gender gap in education and the labour market in Sudan.

Figures 9–10 imply that estimated earned income ratio of the female to male rate implies a significant gender gap and wage differential between males and females in Sudan at the macro and micro levels (2003–2009).



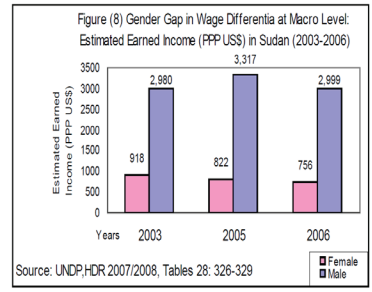
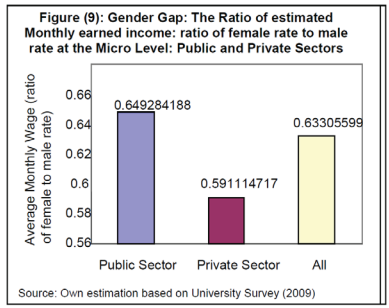
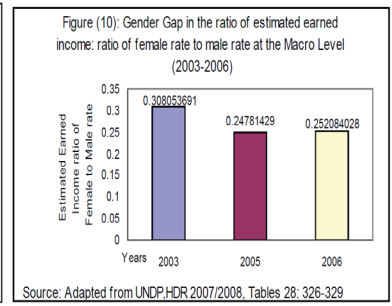


Figure (7–8): Gender Gap: Wage Differential between Male and Female in Sudan at Micro and Macro Levels (2003–2009)





Figures (9–10) Gender Gap: Estimated Earned Income Ratio of female to male rate in Sudan at Micro-Macro Levels (2003–2009)

For instance, at the macro level the estimated earned income ratio of female to male rate implies significant and increasing gender gap and wage differential between males and females, which is realized from the decline in estimated earned income ratio of the female to male rate from 31% in 2003 to 25% in 2006. Moreover, at the micro level, the estimated earned income ratio of the female to male rate implies that significant differences in gender gap and wage differential between males and females in the public is lower than private sectors and all the sample, which is realized from the estimated earned income ratio of female to male, which is about 63%, 65% and 59% for all the sample, public sector and private sector respectively.

CONCLUSION

This paper examines the gender gap in education and investigates the related implications on labour market and return to education in Sudan. Our paper is relevant and consistent with recent growing interest in the international literature to confirm commitment of the international community towards fulfilling UN-MDGs, including achievement of gender equality and empowerment of women. Our assessment of gender gap in Sudan is particularly useful to help to create greater awareness regarding the challenges posed by gender gaps and the opportunities created by reducing them and is useful from policy perspective to help generate some useful insights and policy recommendations to contribute to recent efforts aims at enhancing gender equality, empowerment of women and so contribute to the achievement of MDGs in Sudan. Our results confirm two stylized facts: first, the incidence of a significant gender gap in education in Sudan and second, the incidence of gender inequalities and a gap in skill level, share of women in economic activities, labour force participation rate, employment and return to education can be interpreted in relation to the incidence of a gender gap in education.

We fill the gap in the Sudanese literature by addressing the gender gap in education and related implications in the labour market and return to education, since these issues are not adequately discussed elsewhere. A novel element in our analysis is that we use new primary survey data at the micro level and the Ordinary Least Squares method, we estimate the Mincerian earning function and the rate of return to education defined by gender in Sudan (2009) and we show the gap and differences in return to education defined by gender in

Sudan and find that the slight gender gap or difference in the rate of return to education in favour of women is only 0.2, which is not very noticeable. Our findings at the micro level seem consistent with the results at the macro level discussed in Ali (2006), which indicate that the difference in the rates of return between males and females is not very striking and amounts to about 0.3 percentage points, which is much lower than that expected from world patterns. We find that in general, women are likely to be more unemployed than men. These findings indicate the importance of enhancing educational attainment for women to reduce the gender gap in education and employment and to facilitate improvement of return to education for women in Sudan.

Our analyses in this paper use primary and secondary data obtained from different sources. We are aware of the fact that in view of the observed high diversity, disparity and imbalanced development between different regions in Sudan, it is somewhat difficult to present an analysis to enable generalization and aggregation of the results for all Sudan. Despite this limitation our paper is useful in order to improve the understanding of the problem and provides insights for the enhancement of women's empowerment. It is hoped that our future studies will present a more in-depth analysis to reflect the observed high diversity, disparity and imbalanced development between different regions in Sudan and to enable generalization and aggregation of conclusive results in order to improve women's empowerment for all of Sudan.

Finally, the major policy implications and recommendations from our analysis are that Sudan needs to reduce the gender gap in education and related implication in the labour market by improving educational attainment for Sudanese females and improve economic participation for Sudanese women by increasing employment opportunities, improving the return to education and enhancing equal and fair return to education for Sudanese men and women. Over the next years, Sudan needs to increase investment to increase women's educational attainment to better integrate Sudanese women into the economy and to reap the benefits of this investment.

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APPENDIX

Table 4. Gender Survival: Sudan Population Distribution by Main Geographical Areas, Age and Gender (2008)

Age Groups	Female	Male	Total	Female (%)	Female/ Male (%)
All Sudan					
All Ages	19,080,513	20,073,977	39,154,490	0.4873135	0.9505099
0 to 4	2,840,245	3,005,746	5,845,991	0.4858449	0.9449385
5 to 9	2,778,173	3,023,603	5,801,776	0.4788487	0.9188286
10 to 14	2,346,411	2,689,626	5,036,037	0.4659241	0.872393
15 to 19	2,024,954	2,151,401	4,176,355	0.4848616	0.9412257
20 to 24	1,796,936	1,740,076	3,537,012	0.5080379	1.0326767
25 to 29	1,648,548	1,466,418	3,114,966	0.5292347	1.1242006
30 to 34	1,295,976	1,207,987	2,503,963	0.5175699	1.0728394
35 to 39	1,180,296	1,134,069	2,314,365	0.509987	1.0407621
40 to 44	868,298	905,533	1,773,831	0.4895044	0.9588806
45 to 49	614,447	689,233	1,303,680	0.4713173	0.8914939
50 to 54	513,515	581,191	1,094,706	0.4690894	0.8835564
55 to 59	285,760	350,041	635,801	0.4494488	0.8163615
60 to 64	310,256	380,847	691,103	0.4489287	0.8146474
65 to 69	168,614	227,674	396,288	0.4254835	0.740594
70 to 74	185,942	229,753	415,695	0.4473039	0.8093126
75 to 79	81,003	112,065	193,068	0.4195568	0.7228216
80 to 84	81,434	97,556	178,990	0.454964	0.8347411
85 to 89	26,731	38,504	65,235	0.4097647	0.6942396
90 to 94	18,018	23,528	41,546	0.433688	0.7658109
95 and over	14,956	19,126	34,082	0.438824	0.7819722
Main Geographical Areas					
Total					
All Sudan	19,080,513	20,073,977	39,154,490	0.4873135	0.9505099
Northern Sudan	15,107,323	15,786,677	30,894,000	0.4890051	0.9569666
Southern Sudan	3,973,190	4,287,300	8,260,490	0.4809872	0.9267348
00 – 16					
All Sudan	8,807,980	9,654,379	18,462,359	0.4770777	0.91233
Northern Sudan	6,909,161	7,505,749	14,414,910	0.4793066	0.9205159
Southern Sudan	1,898,819	2,148,630	4,047,449	0.4691397	0.8837348
17 and above					
All Sudan	10,272,533	10,419,598	20,692,131	0.4964464	0.9858857
Northern Sudan	8,198,162	8,280,928	16,479,090	0.4974888	0.9900052
Southern Sudan	2,074,371	2,138,670	4,213,041	0.4923691	0.9699351

Source: Adapted from Central Bureau of Statistics (2009) Preliminary results: Sudan 5th Population and Housing Census (2008)

Table 4. Gender Survival: Sudan Population Distribution by Main Geographical Areas, Age and Gender (2008)

Levels/Year	Gender	2004	2005	2006	2007
(A) Enrolment of Students in Primary (Basic), Secondary and Tertiary education a					
All Sudan (all level of pre-university education)	F	2641668	3179488	3004644	
	M	3174809	3236604	3324142	
	T	5816477	6416092	6328786	
	% F	0.4541698	0.495549004	0.4747584	
	%F/M	0.8320715	0.9823531	0.9038856	
Pre-School	F	221188	248267	251677	
	M	228944	257004	254331	
	T	450132	505271	506008	
	% F	0.4913847	0.491354145	0.4973775	
	%F/M	0.9661227	0.9660044	0.9895648	
Basic Education	F	1967125	2163161	2175843	
	M	2332612	2550220	2610109	
	T	4299737	4713381	4785952	
	% F	0.4574989	0.458940408	0.4546312	
	%F/M	0.8433143	0.8482253	0.8336215	
Academic Secondary Education	F	305395	283400	302907	
	M	306184	286335	300005	
	T	611579	569735	602912	
	% F	0.4993549	0.497424241	0.5024067	
	%F/M	0.9974231	0.9897498	1.0096732	
Technical Secondary Education	F	8003	20655	6384	
	M	18230	23473	24755	
	T	26233	44128	31139	
	% F	0.3050738	0.46807016	0.2050162	
	%F/M	0.4390016	0.8799472	0.2578873	
Literacy and adult Education	F	130627	331737	192075	
	M	49784	90839	96181	
	T	180411	422576	288256	
	% F	0.7240523	0.785035118	0.6663348	
	%F/M	2.6238751	3.6519226	1.997016	
Islamic Studies Secondary Education.	F			60	
	M			2045	
	T			2105	
	% F			0.0285036	
	%F/M			0.0293399	

Table 7. Gender Gap in Education 2004–2007: Enrolment of Students in Primary (Basic), Secondary and Tertiary education (Nominees Students Admitted for Governmental, Private and Foreign Higher Education Institutes) by Sex (2004–2007)

Special Education	F	14059		
	M	10607		
	T	24666		
	% F	0.5699749		
	%F/M	1.3254455		
(B) Enrolment in Tertiary education (Nominees Students Admitted For Governmental, Private and Foreign Higher Education Institutes)b				
(a) Governmental, Education Institutes				
Diploma	F	11979		
	M	12719		
	T	24698		
	% F	0.485019		
	%F/M	0.9418193		
B.Sc.	F	28771		
	M	25123		
	T	53894		
	% F	0.5338442		
	%F/M	1.1452056		
Grand Total	F	40750		
	M	37842		
	T	78592		
	% F	0.5185006		
	%F/M	1.0768458		
(b) Private and Foreign Higher Education Institutes				
Diploma	F	897	1174	2361
	M	909	1209	2843
	T	1806	2383	5204
	% F	0.4966777	0.492656316	0.4536895
	%F/M	0.9867987	0.9710505	0.8304608
B.Sc.	F	2803	3576	7452
	M	2209	3132	9385
	T	5012	6708	16837
	% F	0.5592578	0.533094812	0.4425967
	%F/M	1.2689	1.1417625	0.794033
Grand Total	F	3700	4750	9813
	M	3118	4341	12228
	T	6818	9091	22041
	% F	0.5426811	0.522494775	0.4452157
	%F/M	1.1866581	1.0942179	0.8025025

Sources: Adapted from (a) Sudan Ministry of General Education (b) Sudan Ministry of High Education

Table 7. Gender Gap in Education 2004–2007: Enrolment of Students in Primary (Basic), Secondary and Tertiary education (Nominees Students Admitted for Governmental, Private and Foreign Higher Education Institutes) by Sex (2004–2007)

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