Assessment of gender gap in Sudan

Working Paper Series

#2011-004

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UNU-MERIT Working Papers
ISSN 1871-9872

Maastricht Economic and social Research and training centre on Innovation and Technology, UNU-MERIT

UNU-MERIT Working Papers intend to disseminate preliminary results of research carried out at the Centre to stimulate discussion on the issues raised.

By Dr. Samia Satti Osman Mohamed Nour[1]

(January 2011)

Abstract

This paper examines the gender gap in education and investigates the related implications on labour market and returns to education in Sudan. Our results confirm two stylized facts: first, the incidence of significant gender gap in education in Sudan and second, the incidence of gender inequalities and gap in skill level, share of women in economic activities, labour force participation rate, employment and returns to education can be interpreted in relation to the incidence of gender gap in education. We fill the gap in the Sudanese literature by addressing the gender gap in education and related implications in labour market and returns 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 survey data at the micro level to show the gap and differences in returns to education and correlation between wage and education, experience and its square defined by gender in Sudan. Our findings at the micro level imply that the slightly gender gap or 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 facilitate improvement of return to education for women. We find that in general women are likely to be more unemployed than men. The major policy implications and recommendations from our analysis are that Sudan needs to reduce the gender gap in education and related implication in labour market. By investing large amount of resources in increasing women's educational attainment, improving economic participation, increasing employment opportunities and improving equal and fair returns to education for Sudanese women to better integrate Sudanese women into the economy to reap the benefits of investment in empowerment of women.

Keywords: Gender gap, education, labour market, returns to education, Sudan.

JEL classification: **J16, J31, I21**

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Assessment of Gender Gap in Sudan

1. Introduction:

Since long enhancing women empowerment is expressed in the international literature to overcome gender gap or gender-based inequality which is a wide spread phenomenon that influences the majority of the world's cultures, religions, nations and income groups. Yet gender discrepancies and their evolution over time manifested themselves in different ways. Hence, assessment of gender gap and development of framework for capturing the magnitude of these disparities are most important so as 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 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 women empowerment 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) on "Towards the Rise of Women in the Arab World," presents an in depth analysis of the problem of insufficient women 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. (see for instance, UNDP-AHDR, 2002, 2005)

In Sudan as in most Arab countries the gender gap and inequality is a wide spread phenomenon. This paper aims to examine the gender gap in Sudan as a case study of the Arab region. In particular, the aims is two-folds first to examine the status of women and gender gap in education and second to investigate the implications of that on skill level for women, the share of women in economic activities, labour force, employment and returns to education. We examine two stylized facts: (1) The incidence of significant gender gap in education in Sudan; (2) The incidence of gender inequalities and gap in skill level, share of women in economic activities, labour force participation rate, employment and returns to education can be interpreted in relation to the incidence of gender gap in education.

As for the relevance of this paper, the issues discussed in this paper 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 policy perspective this paper is useful to help generate some useful insights and policy recommendations to contribute to recent efforts aims at enhancing gender equality, empowerment of women and increasing employment opportunities for women to help reducing the poverty rates among women and so contribute to achievement of MDGs in Sudan. As for the importance and contribution of this paper, it aims to fill and close the gap in the Sudanese literature by addressing the gender gap in education and the consequent implications in labour market and returns 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 returns 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 than 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 most recent available data.

The rest of this paper will be organized in the following way: section two presents the conceptual framework and methodology, section three explains the gender development index and the gender gap in education in Sudan, section four examines the implications of the gender gap in education in labour market in Sudan, section five explains the gender gap and rate of returns to education in Sudan, finally section six provides the conclusions.

2. 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.

Since long the concept of gender gap or gender inequality has been widely used in the international literature. For instance, several studies in the international literature use some indicators and indices to define and measure the gender gap and 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) indicators on the Global Gender Gap Index provide useful indicators for measuring the gender gap. The recent

growing interest and increasing concern in 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 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 women empowerment is one of three main problems hindering human development in the Arab countries. (see for instance, UNDP-AHDR, 2002, 2005).[2]

For instance, with respect to gender the MDG assesses achievements in gender equality for all women and men by using the Gender-related development index, Gender empowerment measure, Gender inequality in education, Gender inequality in economic activity and Women's political participation. 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. 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 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. (see UND-HDR)

Moreover, the World Economic Forum (2007), the Global Gender Gap Report (2007) introduced and used by 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] There are three distinguishing features and basic concepts underlying the Global Gender Gap Index for measuring global gender gap. First, it focuses on measuring gaps rather than levels: as it is constructed to rank or measure the gender-based gaps in access to resources and opportunities in individual countries rather than the actual levels of the available resources and opportunities in those countries, independent of the level of development. Second, it captures gaps in outcome variables rather

[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)

than gaps in means or input variables; it provides a snapshot of where men and women stand with regards to some fundamental outcome variables related to basic rights such as health, education, economic participation and political empowerment, without considering variables related to country-specific policies, culture or customs—factors that are consider to be "input" or "means" variables". Third, it ranks countries according to their proximity to gender equality rather than women's empowerment, it focuses on whether the gap between women and men in the chosen variables has declined, rather than whether women are outperforming men in particular variables.[4]

The Global Gender Gap Index (2007) examines the gap between men and women in four fundamental categories: economic participation and opportunity, educational attainment, political empowerment and health and survival. In the economic participation and opportunity category, the gap is captured through three concepts: the participation gap, the remuneration gap and the advancement gap. The participation gap is captured through the difference in labour force participation rates. The remuneration gap is captured through a hard data indicator (ratio of estimated female-to-male earned income). Finally, the gap between the advancement of women and men is captured through two hard data statistics (the ratio of women to men among legislators, senior officials and managers, and the ratio of women to men among technical and professional workers). In the educational attainment category the gap between women and men's current access to education is captured through ratios of women to men in primary- secondary- and tertiary-level of education. A longer-term view of the country's ability to educate women and men in equal numbers is captured through the ratio of the female literacy rate to the male literacy rate. The political empowerment category includes mainly measures of the gap between men and women in political decision-making at the highest levels. This concept is captured through the ratio of women to men in minister-level positions and the ratio of women to men in parliamentary positions. A clear drawback in this category is the absence of any variables capturing differences between the participation of women and men at local levels of government. The health and survival category attempts to provide an overview of the differences between women and men's health, using two variables. First, by using the gap between women and men's healthy life expectancy, this measure provides an estimate of the number of years that women and men can expect to live in good health, by taking into account the years lost to violence, disease, malnutrition or other relevant factors. The second variable included in this sub index is the sex ratio at birth. This variable aims specifically to capture the phenomenon of "missing women" prevalent in many countries with strong son preference.[5]

[3] See the Global Gender Gap Report: Measuring the Global Gender Gap 2007," World Economic Forum, 2007, pp. 3-18.
[4] See the Global Gender Gap Report: Measuring the Global Gender Gap 2007," World Economic Forum, 2007, pp. 3-18.
[5] See the Global Gender Gap Report: Measuring the Global Gender Gap 2007," World Economic Forum, 2007, pp. 3-18.

Since the case of Sudan is not covered in the World Economic Forum: Global Gender Gap Report (2007) that measures the Global Gender Gap for few Arab countries other than Sudan. Hence, in this paper we fill this gap by covering the case of Sudan after having adjusting and adapting 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 availability of most relevant up to date 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 below explains all the relevant indicators used 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.

Table 1- Structure of the Global Gender Gap Index

Sub index	Variables	Sources
Economic Participation and Opportunity	Female labour force participation rate and Female economic activity rate	United Nations Development Programe, Human Development Report 2007/2008; Arab Labour Organization (2007), Ministry of Labour and public service Migration and Labour Force Surveys 1990 and 1996
	Ratio of estimated female earned income over male value	United Nations Development Programme, Human Development Report 2007/2008
	Ratio of female unemployment	Arab Labour Organization (2007), Ministry of Labour and public service Migration and Labour Force Surveys 1990 and 1996
Educational Attainment	Ratio of female literacy rate over male value	United Nations Development Programe, Human Development Report 2007/2008; UNESCO Statistics Division, Education Indicators, 2006;
	GPI Ratio of female net primary level enrolment over male value	United Nations Development Programe, Human Development Report 2007/2008; UNESCO Statistics Division, Education Indicators, 2006; World bank, World Development Indicators Online, accessed June 2007; 2005 data or latest year available; Sudan Ministry of General Education
	GPI Ratio of female net secondary level enrolment over male value	United Nations Development Programe, Human Development Report 2007/2008; UNESCO Statistics Division, Education Indicators, 2006; World bank, World Development Indicators Online, accessed June 2007; 2005 data or latest year available; Sudan Ministry of General Education
	GPI Ratio of female gross tertiary level enrolment over male value	UNESCO Statistics Division, Education Indicators, 2005, 2006; World bank, World Development Indicators Online, accessed June 2007; 2005 data or latest year available; Sudan Ministry of High Education
Political Empowerment	Ratio of females with seats in parliament over male value	United Nations Development Programe, Human Development Report 2007/2008
Health and Survival	Ratio of female healthy life expectancy over male value	United Nations Development Programe, Human Development Report 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)

3. 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 the case of Sudan is high compared to other world regions. For instance, Table 2 below implies that in 2006 Sudan's performance falls below the developing countries and the world level in terms of (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 falls below Arab States, Sub Saharan Africa, low income and least developed countries.

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

	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.

Moreover, not only the rank and performance of Sudan are lagged behind compared to other world countries, but also have not shown remarkable progress or even worsen over time. For instance, data from UNDP-HDR (2007/2008) shows deterioration in terms of Sudan's rank in the Gender Development Index (GDI) compared to world countries during (2003-2006). It implies that in terms of GDI Sudan ranked at the bottom of all Arab countries and ranked 131 at the bottom out of 157 world countries. It also implies that despite the little progress in the value of the Gender Development Index (GDI) in Sudan over the period (2003-2006) from 0.495 in 2003 to 0.502 in 2005, but inequality between male and female still exist to hinder achieving equality between men and women.

We explain the evidences for the incidence of the gender difference, gap and inequality by interpreting the component of the Gender-related development index (GDI) using the female ratio and female/male ratio in Sudan, see Table 3 below. 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 evidences on the incidence of the gender gap in survival; as it implies that for all Sudan's population for all age groups the total number and hence probability of survival for male is relatively higher than the number and hence probability of survival for female. Except for the age group (20-39) as the total number and hence probability of survival for female is relatively higher than the number and hence probability of survival for male. Defined by geographical area, the total number and hence probability of survival for female in Northern Sudan is relatively higher than the total number and hence probability of survival for female

in Southern Sudan. This finding is reasonable and can be interpreted as implication of 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, Northern and Southern Sudan the total number and hence probability of survival for female for age 17 and above is relatively higher than the total number and hence probability of survival for female for age below 17 years (00-16), this result implies that probably, the probability of child mortality for female is relatively higher than the probability of child mortality for male. Further evidences on 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 evidences on gender gap can be realized in terms of economic participation, opportunity and empowerment measured by 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. 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 ratio or the ratio of females over males value in total seats in parliament. See Table 3 below.

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

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

Further evidences on the gender differences appear in terms of educational attainment, measured by the ratio of female for primary, secondary and tertiary education and the GPI for enrolment ratios for gross primary level and gross secondary level enrolment. For instance, Table 4 below illustrates that both percentage of female students and gender parity index for enrolment ratio for all levels of education in Sudan are low compared to most other Arab countries. So, more efforts are required to improve the percentage of female students and gender parity index for enrolment ratio for all levels of education in Sudan and Arab countries. For Sudan, gender parity index and female enrolment in secondary education is

better than primary education, which implies that the gender gap in primary education is higher than in secondary education.

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

	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)

According to the World Bank (WDI 2001) among the gender disaggregated indicators Sudan shows to have an average gender gap in primary school enrollment, and has a wider gender gap when comparing literacy and the representation of women in parliament. According to MIC (2000) the net attendance rate by gender indicates gender disparity and GPI for primary and secondary education in Sudan in 2000 for the total, urban, rural, rich and poor groups of population- see Table 5 and Figures 1-6 below. It implies the presence of gender disparity in primary education as the net attendance rate (%) for female fall below the net attendance rate (%) of male in total, urban, rural and poor groups of population, except for the rich group of population, which indicates that the percentage of female is higher than male. For secondary education, gender disparity exists for rural and poor groups of population as the net attendance rate (%) for female fall behind the % of male, by contrast for total, urban and rich groups of population the net attendance rate (%) for female fall above the (%) of male. This implies that gender disparity and gap is more critical for rural and poor population groups, i.e. poor female and female living in rural areas are facing by serious situation of inequality and are suffering more in terms of net attendance or access to primary and secondary education in Sudan. Somewhat surprising the gender disparity is more serious in primary education compared to secondary education, especially for poor female, this is consistent with the findings based on the data from UNESCO (2006) which we presented in Table 4 above. This implies that, especially among the poor, economic reasons were considered to be the most important factor limiting girls' 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. It is clear from Table 5 that family economic problems impact more negatively on female than on male education. Likewise, families perceive educating

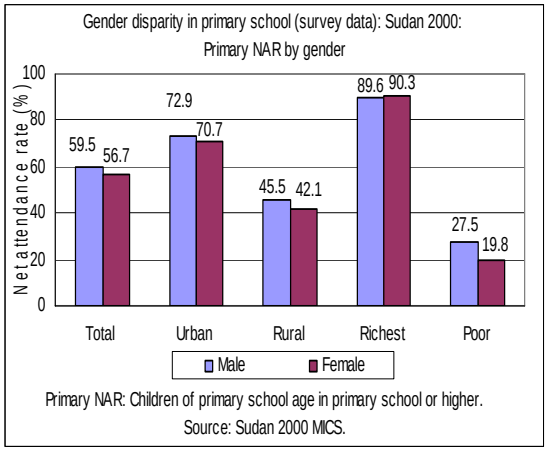
girls to be less important than schooling boys. It is the need to work that has the largest effect on the withdrawal of boys from school.

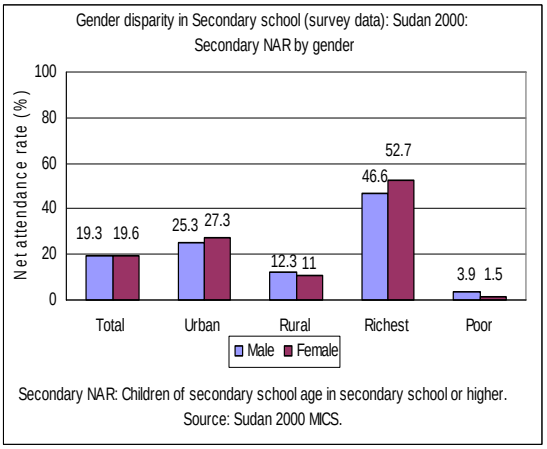
Table 5- Gender Gap (Disparity) in Primary and Secondary Education in Sudan (2000) (survey data)

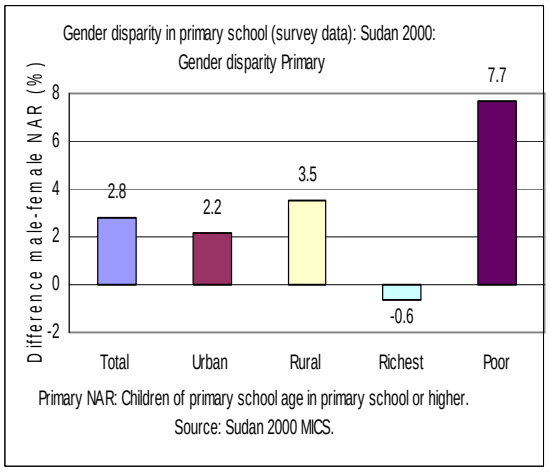
		Total	Urban	Rural	Richest	Poor
Net attendance rate by gender Primary (NAR) (%)	Male	59.5	72.9	45.5	89.6	27.5
	Female	56.7	70.7	42.1	90.3	19.8
Net attendance rate by gender Secondary (NAR) (%)	Male	19.3	25.3	12.3	46.6	3.9
	Female	19.6	27.3	11	52.7	1.5
Gender disparity Primary		2.8	2.2	3.5	-0.6	7.7
Gender 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

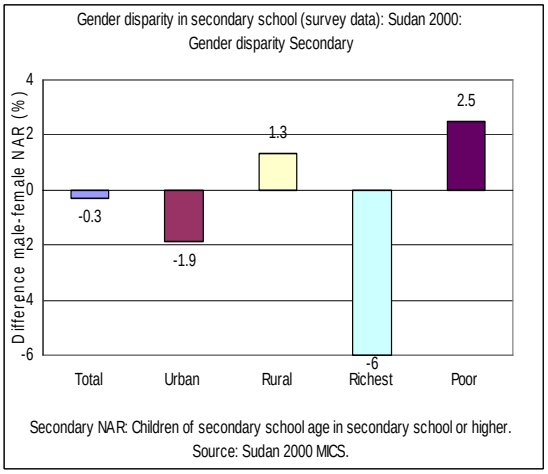
Source: Sudan 2000 MICS- Primary NAR: Children of primary school age in primary school or higher.

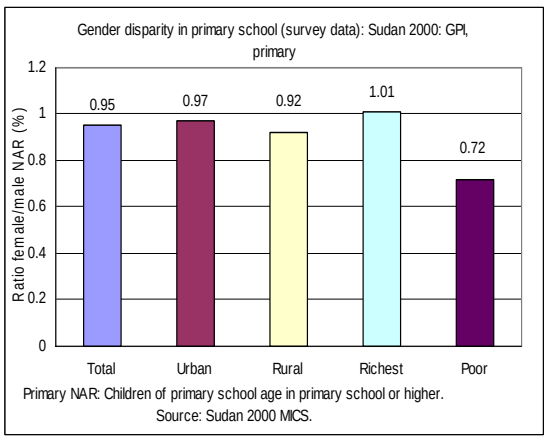
Figure 1-6: Gender Gap (Disparity) in Primary and Secondary Education in Sudan (2000)

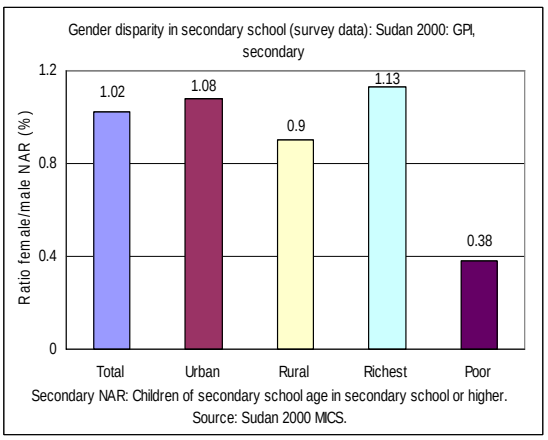












It is worth noting that despite the tremendous spread of girls' education in the last five decades, Sudanese women remains poorly prepared to participate effectively and fruitfully in public life by acquiring knowledge through education. This is most clearly manifested in the extent to which girls and women are still deprived of education and knowledge, especially those forms of knowledge that bring high social returns. Sudan has one of the world's lowest rates of female enrolment opportunities at all levels of education, especially that of higher education. Female access to all levels of education remaining below that of males implies further evidence on the incidence of relatively higher deprivation of girls in terms of educational opportunities at all levels in Sudan. Sudan has one of the highest rates of illiteracy approximately near to one half of females are illiterate compared to only one third of males. [6]

Moreover, data and information from Sudan ministry of education and ministry of higher education provide further evidences for the incidence of gender gap in education as measured by enrolment of students in primary (basic), secondary and tertiary education (measured by students nominated and admitted for governmental, private and foreign higher education institutes) by gender over the period (2004-2007). For instance, the gender gap for basic (primary) education is higher than for secondary and tertiary education. 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 or admitted for tertiary education at the diploma level in governmental public higher education institutes and private and foreign higher education institutes is higher than that for the B.Sc. level (2005-2006). The incidence of gender gap in tertiary education as measured by percentage share of female student enrolled in or admitted for 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 observation from the preliminary findings of the Sudan central bureau of statistics on Sudan's fifth population census which indicate that the structure of Sudan total population according to different age groups implies that for the age group (20-39) the total number of female is slightly higher than the total number of male. Another justification is probably because of large share of Sudan's male study abroad.

It is worth noting that the assessment of the incidence of the gender gap and the percentage share of female student enrolled in or admitted for tertiary education based on data and statistics from local sources is somewhat different and inconsistent with the international sources (e.g. World Bank, UNESCO, and UNDP-HDR). For example, local sources of data indicate high (%) of female compared to low (%) of female based on international sources.

[6] See for instance, AHDR, 2004: pp. 73-74.

For instance, AHDR (2004) indicates low (%) of female enrolment in Sudan, it indicates that in general, the lowest female enrolment rates in the Sudan did not exceed 10 percent. Despite the increase in female enrolment in university education, women are still concentrated in specialisations 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 parttime 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).

4. Implications of gender gap in education in labour market in Sudan:

Based on the above findings on the incidence of gender gap in education, it will be useful to examine the related implications in labour market. In this section we argue that the incidence of the gender gap in 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 women in labour force (31.1%) is less than Sudanese men (72.2%) and total Sudanese labour force (52.4%). In active population for Sudanese women (38.65%) is less than Sudanese men (45.24%) and less than the total Sudanese (46%). The participation rate (for 15-24 years old) for Sudanese women (6.08%) is less than that of Sudanese men (15%), less than total Sudanese participation rate (10.08%). Demographic structure for the case of Sudan indicates continuous and rapid increase in total population in working age (man power or labour force) from 16.5 in 1998 to 21.5 in 2006. Both crude and adjusted participation rates show continuous rapid increase in the period 1990-1996 in Sudan. Both crude and adjusted labour force participation rates in economic activities defined by location (degree of urbanization) and gender, indicate that the participation rates are higher for people living in rural compared to people living in urban areas and participation rates for women are less than men, 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. Over the period 1990-1996-

total, urban, rural women have less participation rates than men and total, crude participation rates for women living in rural areas are higher than women living in urban areas 1990 and the opposite is true for 1996, adjusted participation rates for women living in rural areas are higher than women living in urban areas over the period 1990-1996.

One stylized fact on the structure of labour market in Sudan is the inconsistent distribution of the economically active population according to major economic activities (sectoral classification) and employment status defined by gender in Sudan. For example, according to Arab Labour Organization (2007) data for 2004 indicates that the majority of Sudanese are employed in agriculture, fishing and forest activities (44%), followed by services sector (41%,), industry (14%) and finally few are employed in other activities (1%). The majority of Sudanese women are employed in the agriculture sector (66%), followed by 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%). Sudanese men employed in agriculture, fishing and forest activities, services and industry sectors (28%, 34% and 13% respectively) are higher than Sudanese women employed in these sectors (16%, 7% and 1% respectively). This implies that Sudanese men employed in agriculture, fishing and forest activities, services and industry sectors are near to twice, near to five times, and near to thirteen times Sudanese women employed in these sectors respectively.

Another stylized fact on the structure of labour market in Sudan can be observed from the international definition of major occupational groups classification by gender in Sudan. For example, according to 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 minority (14%) are high skilled. Only 14% of men are high skilled and 86% are medium and low skilled, only 15% of women are high skilled and 85% are medium and low skilled, women are slightly more skilled than men. The majority of Sudanese workers are employed in blue collar occupation (70%), while the minority are employed in white collar occupation (30%). Only 33% of men are employed in white collar occupation, while 67% of men are employed in blue collar occupation, only 24% of women are employed in white collar occupation, while 76% of women are employed in blue collar occupation.

Sudan like many other typically developing countries not only suffered from high annual population growth rate, high unemployment rate, but also population structure with high percentage of the youth which makes the situation of unemployment even more worse and 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 in total unemployment (15-24 years old) among Sudanese women (62.3%) is less than youth unemployment among Sudanese men (66.35%), but is higher than total Sudanese youth unemployment (59.53%). 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%).

Data from Sudan Ministry of Labour and Public Service Migration and Labour Force Surveys 1990 and 1996 shows the presence of persistent unemployment crisis in Sudan amongst total population men and women since 1979, and rising trends of unemployment rates according to age, gender, location, regions, educational level, skill level, regions and employment status. As for the incidence of unemployment according to age groups in 1996, one should realize that for all population the highest rate of unemployment is reported amongst the youth population (15-24) it was estimated at 28.4% and for youth 15 years and over, it was estimated at 15.1%, it followed by age group (25-54) estimated at 12.1%, followed by age group above 64 estimated at 11.4%, followed by age group (55-64) estimated at 10.3%. 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 age group above 64, estimated at 11.9%, followed by 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 15 years and over, it was estimated at 23.4%, it followed by age group (25-54) estimated at 16.9%, followed by age group (55-64) estimated at 11.2%, followed by 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 youth population, notably, youth women were likely to be more unemployed compared to youth men. Youth unemployment was high in 1997/1998; it increased from 29.0 in 1997 to 30.8 in 1998. The distribution of unemployment according to education level indicates that for total population, unemployment is high for primary education (33.8%), followed by illiterate (29.9%), illiterate/basic (21.6%), secondary (11.2%) and above secondary (3.5%). 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%). Data for 1996 on unemployment indicate that according to all educational level the structural distribution of unemployment for women is slightly different from men that coincided with the total population, in general women were likely to be more unemployed than men.

One should observe the structural change in the demand or changing trends in the share of employment over the period 1988/1989 and 2006. In particular, on average demand or priority in employment was concentrated among high secondary schools graduates over the period 1988/1989- 1996, but the trend changes and on average priorities in employment was turned to be concentrated in applied science colleges followed by social science and art colleges and finally higher institute diploma over the period 2001-2006. This can be attributed to changing trends and priorities from hiring high secondary school graduates to hiring university graduates, especially applied science college graduates, due to changes in higher educational policies, in particular, the higher education revolution lead to expansion in higher educational institutions and student enrollment and graduation during and after 1990s. This can be interpreted as structural change in the demand for youth labour in favor of university graduates due to structural change in higher educational policies. However, the structural change in the demand for youth labour in favor of increasing employment for university graduates should not hide the fact that unemployment among university graduates is surprisingly high and continue to increase. Somewhat surprisingly unemployment crisis was persistent especially among all youth graduates women and men in different field of specializations, even among graduates of applied science colleges. The majority of employment was for graduates in applied science colleges, followed by graduates in social science and art colleges and finally the minority for graduates of higher institute diploma. In general, men were likely to be more employed than women and women were likely to be more unemployed than men.

In 2000 unemployment was persistent among all graduates women and men in different fields of specializations. For all graduates all field of specialization only 35% of graduates were employed and 65% were unemployed, in particular, only 29% of women were employed, but 71% of women were unemployed, only 42.5% of men were employed, but 57.5% of men were unemployed, women are likely to be more unemployed than men. For applied science colleges 56% of women were employed, but 44% of women were unemployed, 64.5% of men were employed, but 35.5% of men were unemployed, women are

likely to be more unemployed than men. For social science and art colleges, only 6% of women were employed, but 94% of women were unemployed, only 8% of men were employed, but 92% of men were unemployed, women are likely to be more unemployed than men. For higher institutes (diploma) only 7% of women were employed, but 93% of women were unemployed, only 18% of men were employed, but 82% of men were unemployed, women are likely to be more unemployed than men. Over the period 2000-2006, majority of employment was for graduates in applied science colleges (89.9%, 78.9%, 78%, 88% and 76%), followed by graduates in social science and art colleges (8.6%, 20.7%,11.3%, 6.4% and 14.7%), followed by expertise (0%, 0%, 6.1%, 1.1% and 1.1%), followed by the secondary school graduates (0%, 0%, 4.1%, 4.3% and 5.3%) and finally minority for graduates of higher institutes (diploma) (1.5%, 0.4%, 0.3%, 0% and 2.3%) in 2000, 2001, 2004, 2005 and 2006 respectively. In 2000, for applied science colleges 60.4% of graduates were employed but 40% of graduates were unemployed, for social science and art colleges only 7% of graduates were employed, but 93% of graduates were unemployed and for higher institutes (diploma) only 12% of graduates were employed but 88% of graduates were unemployed. This implies that unemployment–namely for women-is high among the graduates of social science and art colleges and higher institutes (diploma).[7]

Over the period 2000-2006, the distribution of employment for graduates of all fields of specializations indicates that men are likely to be more employed than women, for instance, the distribution of employment for graduates of all fields of specializations for men (42%, 53%, 51%, 42% and 55%) and for women (58%, 47%, 49%, 58% and 45%) in 2000, 2001, 2004, 2005 and 2006 respectively. Over the period 2000-2006, the distribution of employment for graduates of applied science colleges and fields of specializations indicates that men are likely to be more employed than women, for instance, the distribution of employment for graduates of applied science colleges and fields of specializations for men (53%, 55%, 52%, 41% and 48%) and for women (47%, 45%, 52%, 59%, and 52%) in 2000, 2001, 2004, 2005 and 2006 respectively. Over the period 2000-2006, the distribution of employment for graduates of art and social sciences colleges and fields of specializations indicates that men are likely to be more employed than women, for instance, the distribution of employment for graduates of art and social sciences colleges and fields of specializations for men (39%, 46%, 61%, 43% and 80%) and for women (61%, 54%, 39%, 57% and 20%) in 2000, 2001, 2004, 2005 and 2006 respectively. Over the period 2000-2006, the distribution of employment for graduates of high institutes (diploma) indicates that men are likely to be more employed than women, for instance, the distribution of employment for graduates of high institutes (diploma) for men (65%, 58%, 73%, and 85%) and for women (35%, 42%, 27% and 15%) in 2000, 2001, 2004 and 2006 respectively. Over the period 2004-2006, the

[7] See Sudan federal public service recruitment board- Statistics and Research Administration

distribution of employment for graduates of expertise indicates that men are likely to be more employed than women, for instance, the distribution of employment for graduates of expertise for men (54%, 52% and 61%) and for women (46%, 48% and 39%) in 2004, 2005 and 2006 respectively. Over the period 2000-2006, the distribution of employment for graduates of secondary school indicates that men are likely to be more employed than women, for instance, the distribution of employment 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. [8]

5. Gender gap and rate of returns to education in Sudan:

Based on the above findings on the incidence of gender gap in education and related implications in labour market, it is useful in this section to examine the related implications regarding the returns to education in Sudan. This section estimates the rate of return to education in Sudan, based on the theoretical literature, namely Mincerian earning function.[9, 10]

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 expressed differently when considering the effect of other factors. For instance, the disaggregated rates of return to education 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 returns 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 human capital in Sudan using Migration and Labour Survey (1996) conducted by Sudan Ministry of Labour covering 16 States of Northern Sudan. Ali (2006) estimates the Mincer's Equation for Sudan and shows that the rate of return to investment in human capital is about 6.1 % for the Sudan as a whole, about 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 about 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 about 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

[8] See Sudan federal public service recruitment board- Statistics and Research Administration.
[9] For more and detailed information about the theoretical and empirical literature on the estimation of the rate of returns to education, see for instance, Benhabib and Spiegel (1994), Mincer (1974; 1984; 1989) and Psacharopoulos (1994).

males and 17.3 % for females, with a margin of 2.5 percentage points in favor of educating females. The results discussed in Ali (2006) indicate very low rates of return 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 point much lower than that expected from world patterns. Our analysis in this paper is different from Ali (2006) estimation of return to human capital in Sudan based on secondary data at the macro level obtained from the Migration and Labour Survey (1996) conducted by Sudan Ministry of Labour covering 16 States of Northern Sudan defined by gender and educational level. Our estimation is different from Ali 92006), since we focus on estimation of the rate of return to education using more recent, update and new primary data at the micro level based on the Survey of Nour (2009), we estimate the rate of return to education defined by gender in Sudan for relatively small sample of 100 persons. Despite the relatively small sample size that may constitute a limitation for making some generalization from our results, but our analysis remain useful to improve understanding and provide useful insights from both analytical and policy perspectives.

Our analysis in this paper utilizes the primary data based on the results obtained from the university survey of Nour (2009) and the questionnaire on "The use and Economic Impacts of Information and Communication Technology (ICT) in Sudanese universities". In particular, 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.[11]

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[10] 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: $\log y_i = \alpha + \sum \beta_k D_{ki} + \gamma x_i - \delta x^2_i + v_i$

[11] 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 selection and focus of our analysis on Khartoum state was partly because of universities concentration and hence high potential use of ICT and partly because of easy access to data facilitated by the Department of Economics, Faculty of Economic and Social Studies, University of Khartoum, Sudan. 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 university survey includes students, academic teaching and support staff affiliated to ten public and private universities. The five public universities included in the survey are: Khartoum University, Sudan University of Science and Technology, Juba University, Al-zaim Al-azhari University and Omdurman Islamic University. The five private universities included in the survey are: Computerman University, University of Medical Sciences and Technology, Sudan International University, Sudan Academy for Banking and Financial Studies and Ahfad University for Women. The selection of the sample was quite representative for the population. Since the population in Khartoum state is around 10,000,000 and applying the standard WDI measure (2003) concerning the use of Internet per 1,000 population and use of mobile phone per 1,000 population in Sudan which is accounted for 10 per 1000 and 20 per 1000 respectively, that indicates 1 per 100 population using Internet and 2 per 100 population using mobile phone, i.e. the use of mobile phone double or twice the use of Internet. The selection of the individuals was based on a random basis, the coverage of individual 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 of Nour (2009), the questionnaire in the

We examine the rate of return to education in Sudan defined by gender using primary data based on the preliminary results from the survey of Nour (2009) and using the Ordinary Least Squares (OLS) method and Mincerian earning function. We show the correlation between wages (log), education, experience and its square defined by gender in Sudan (2009). Our results show the differences defined by gender and imply that the correlation between wage and education, experience and its square for women are relatively higher than men. Our findings reported in Table 6 below show positive sign and hence correlation between wages as independent variable and both education and experience but negative sign and hence correlation between wages as independent variable and squared year of experience as 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.

Our findings reported in Table (6) below indicate that the rate of return to education for all the sample tends to explain only 16% of the change in wage, compared to 41% for all men and 45% for all women. We find that the rate of return to education and experience together for all the sample tend to explain only 48% of the change in wage, 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 all the sample tend to explain only 53% of the change in wage, compared to 56% for all men and 72% for all women. These results imply that the over whole significance on the rate of return to education tends to increase when adding experience as explanatory variable next to education as explanatory variable and show further increase when adding squared years of experience explanatory variable next to education and experience as explanatory variables. These results imply that the correlation becomes more significant when adding the variable experience, and further when adding squared years of experience and imply the importance of all the variables of education; experience and its

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). Section 2 examined the pattern and importance of the use of ICT. It assessed the pattern of ICT demand across different individuals. Section 3 requested quantitative data on the value and trend of total expenditure on the use of ICT, this section also requested qualitative data and it also examined the trend of ICT spending and income and price effects related to ICT spending. Section 4 inquired into the difficulties on the supply and demand sides related to the use of ICT. Section 5 investigated the relative importance of the characteristics of the use of ICT. Section 6 inquired the relevant policies for encouraging and supporting the use of ICT. Section 7 sought information to examine the impacts of ICT on labour market. Section 8 examined the impacts and advantages of the use of Internet in facilitating creation and transfer of knowledge. Section 9 investigated the impacts of the difficulties and problems for the use of Internet in creation and transfer of knowledge. The last two sections explained the factors hindering and other contribute toward promoting the use of ICT to enhance the creation and transfer of knowledge in Sudanese universities. Finally, section 10 requested further recommendations for promoting the use of ICT to enhance connection and transformation in Sudanese universities. 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 few part-time workers defined as postgraduate students registered for M.Sc. degree, we exclude the observations of all undergraduate students registered for B.Sc. and Intermediate Diploma degrees.

square. This also implies that the importance of the rate of return to education in determining or affecting wage tends to decline when adding the variables experience and its square.[12]

When examining the coefficients of the years of education our findings presented in Table 6 below imply that the rate of return to education is about 10.9 percent for all the sample, about 7.9 percent for all men and about 9.6 percent for all women. When including the year of experience we find that the rate of return to education declined to about 3.8 percent for all the sample, about 4.6 percent for all men and about 5.1 percent 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 percent for all the sample, about 2.0 percent for all men and about 2.2 percent for all women. Our findings imply the 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 different from the world pattern. Our findings imply that the slightly 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 point much lower than that expected from world patterns.

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

	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

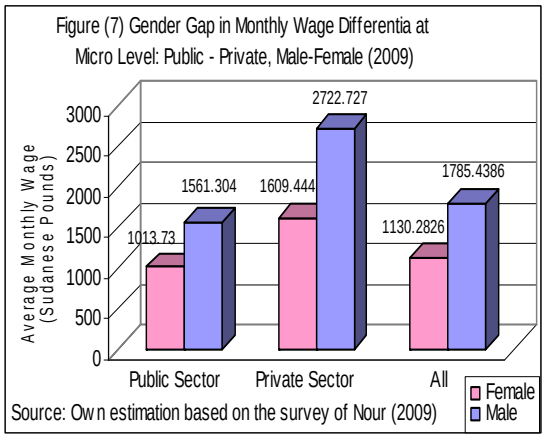
Correlation is significant * at the 0.05 level (one-tailed) ** at the 0.01 level (one-tailed)
Source: Own estimation based on the survey of Nour (2009). Note (1) estimation is based on linear equation.

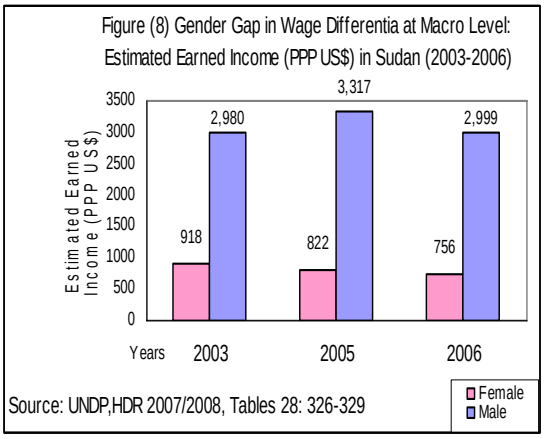
Next to estimating the related implication of the incidence of gender gap in education in the rate of return to education, it is useful to examine the differences in wage at the macro and micro levels. The above findings on the incidence of gender gap in education probably imply related implications in wage differential. For instance, Figures (7-10) below show the wage

[12] For all the sample when using the log of wage, our results seems 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

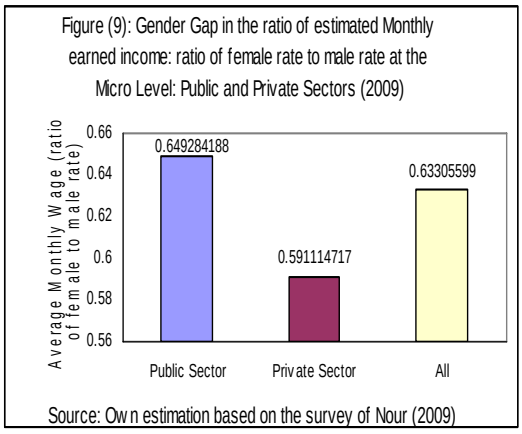
differential between male and female in Sudan at micro and macro levels (2003-2009) and support our argument that the incidence of the gender gap in return to education can be interpreted in relation to gender gap in education and labour market in Sudan. Figures (9-10) imply that estimated earned income ratio of female to male rate implies significant gender gap and wage differential between males and females in Sudan at the macro and micro 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 declining from estimated earned income ratio of female to male rate from 31% in 2003 to 25% in 2006. Moreover, at the micro level, the estimated earned income ratio of female to male rate implies the significant and 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 from 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.

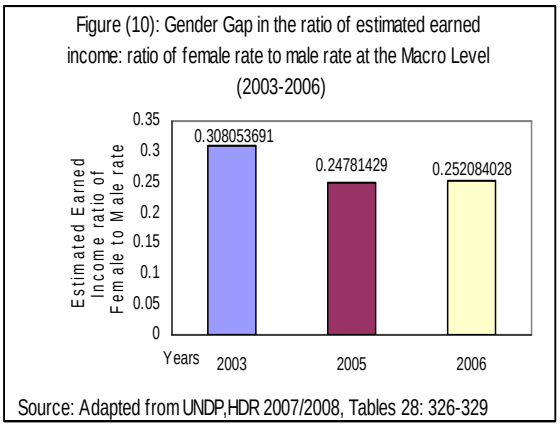
Figures (7-8) - Gender Gap: Wage Differential between Male and Female in Sudan at Micro and Macro Levels (2003-2009)





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





linear estimation that is relatively consistent with our findings defined by gender for each group of male and female separately.

6. Conclusion

This paper examines the status of women and gender gap in education and investigates the related implications on labour market and returns to education in Sudan. Our results confirm two stylized facts: first, the incidence of significant gender gap in education in Sudan and second, the incidence of gender inequalities and gap in skill level, share of women in economic activities, labour force participation rate, employment and returns to education can be interpreted in relation to the incidence of gender gap in education. Our paper is relevant and consistent with the recent growing interest in the international literature to confirm the 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. Our assessment of the 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 achievement of MDGs in Sudan. We fill the gap in the Sudanese literature by addressing the gender gap in education and the related implications in labour market and returns 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 returns to education between men and women in Sudan. We use a combination of primary and secondary quantitative and qualitative data and use the descriptive method of analysis. Using primary data based on the preliminary results from the survey of Nour (2009) and using the Ordinary Least Squares (OLS) method, we estimate the Mincerian earning function and the rate of return to education defined by gender in Sudan (2009). Our results show the differences in the correlation between wage and education, experience and its square defined by gender. Our findings imply the 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 different from the world pattern. Our findings imply that the slightly 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 point much lower than that expected from world patterns.

These findings indicate the importance of enhancing educational attainment for women to facilitate improvement of return to education for women. We find that in general women are likely to be more unemployed than men. The major policy implications and

recommendations from our analysis are that Sudan needs to reduce the gender gap in education and related implication in labor market. By investing large amount of resources in increasing and improving women's educational attainment, improving economic participation and increasing employment opportunities and improving and enhancing equal and fair returns to education for Sudanese women to better integrate Sudanese women into the economy to reap the benefits of investment in empowerment of women.

Using primary data based on the preliminary results from the survey of Nour (2009) and using the Ordinary Least Squares (OLS) method and Mincerian earning function we show the correlation between wages (log), education and experience defined by gender in Sudan (2009). Our results show the differences defined by gender and imply that the correlation between wage and education, experience and its square for women are relatively higher than men. These findings indicate the importance of enhancing educational attainment for women to facilitate improvement of return to education for women**.**

Our analysis in this paper is based on statistical data obtained from different sources such as UNESCO, UNDP and other related sources from Sudan. The major limitation of our analysis in this paper is related to the lack of update and accurate data, inconsistency between local and international sources of data. We are aware of the fact that the statistical information about education in Sudan and the Arab region is probably estimated and to some extent not completely reliable. This may constitute a limitation in our analysis when using these datasets that are not quite consistent and dependable, but we used these datasets only due to a lack of data from other 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 to improve understanding of the problem and provides insights for enhancing women 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 for improving women empowerment for all 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 labor market by improving educational attainment for Sudanese females and improve economic participation for Sudanese women by increasing employment opportunities, improving the returns to education and enhancing equal returns to education for Sudanese men and women. Over the next years, Sudan needs to invest large amount of resources in increasing women's educational attainment and needs to better integrate Sudanese women into the economy to reap the benefits of this investment.

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Annex

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 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)

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	
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

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