Chapter 6
Overview of the Use of ICT and the Digital Divide in Sudan

6.1 Introduction

Chapter 5 uses the data and results of the university set out in Chap. 4 to examine from public-private perspective the research hypotheses on the public-private differential in the demand for ICT, trend and determinants in Sudanese universities. To complete our earlier analysis in Chap. 5, in this chapter we present an overview of the use of ICT and the digital divide in Sudan and we highlight the need for bridging the digital divide to enhance equality in the use of ICT in Sudan. This chapter uses the conceptual and theoretical frameworks presented in Chap. 3 and uses the most recent secondary data to discuss the use of ICT indicators (mobile, computer and Internet) at the macro level and the incidence of the digital divide in Sudan. Our analysis in this chapter differs in several ways from the several studies in the literature, which provides an interesting analysis of ICT indicators and performance in the Arab countries and Sudan.

Our findings are consistent with the findings in the international literature on the incidence and the main reasons for the incidence of the digital divide. First, different from the studies in the Arab literature (Nour 2002a, b, 2006) we provide significant contribution and a more in depth, comprehensive and up to date assessment of ICT indicator by focusing only on Sudan as a new case of the Arab countries. Secondly, we add to the existing studies in the international literature on the incidence and reasons for the incidence of the digital divide, we provide significant contribution and we extend our analysis to compare the digital divide for different modes of ICT in Sudan. Finally, different from the studies in the Sudanese literature (Nour 2013), a novel element in our analysis is that we fill the gap in the Sudanese literature we use recent secondary data at the macro level to discuss the use of ICT and the incidence of the digital divide in Sudan and we provide a more comprehensive analysis by investigating and comparing the digital divide for different modes of ICT in Sudan. Our results confirm the seventh hypothesis in Chap. 1 about the relationship between the uses of ICT (mobile, computer and

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Internet) and the occurrence of the digital divide for households and individuals in terms of ownership, use, spending, awareness and knowledge and purposes of uses of mobile, computer and Internet defined by region (geographic location), mode of living, gender, age and educational level in Sudan. Our results imply that the observed disparities in the use of ICT and digital divide implies that ICT adds a new dimension to the already existing and longstanding challenges of inequalities and disparities in Sudan that has been well-documented in the literature as we explained in Chap. 2. We investigate the use of ICT and occurrence of the digital divide according to the conceptual framework: subjects of connectivity (defined by households and individuals); characteristics or attributes of connectivity (defined by geographic location, mode of living, gender, education and age); means of connectivity (fixed telephone, mobile telephone, Internet, DSL/mDSL); and purposes of connectivity (connecting or not connecting) using (or not using) the Internet and ICT; and locations of connectivity. We are aware of the fact that it may be particularly important and interesting to explain the two interesting issues related to both the intensity of connectivity, or how sophisticated the usage and the dynamics or evolution, whether the gap increased or decreased in the past and whether the gap will increase or decrease in the future, but due to practical problems related to availability of adequate and reliable data, unfortunately it will not be possible to discuss these issues in this chapter, so we leave that for a more in depth analysis in our future research.

This chapter uses new secondary data at the macro level based on the National Telecommunication Corporation (2012) "Households and individuals ICT survey 2012" to test the seventh hypothesis in Chap. 1 about the relationship between the uses of ICT (mobile, computer and Internet) and the occurrence of the digital divide for households and individuals in terms of ownership, use, spending, awareness and knowledge and purposes of uses of mobile, computer and Internet defined by region (geographic location), mode of living, gender, age and educational level in Sudan. This is so we can help to improve understanding about the urgent need and necessity to stimulate ICT infrastructure development and support new policies that aim to enhance adequacy and equality of the use and utilization of ICT in Sudan and poor countries.

The rest of this chapter is organised as follows: Sect. 6.2 shows the use of mobile and digital divide in Sudan. Section 6.3 discusses the use of computer and digital divide in Sudan. Section 6.4 investigates the use of Internet and digital divide in Sudan. Section 6.5 examines the determinants of the digital divide that appears from the relationships between the use of ICT (mobile, computer and Internet) and age, educational and professional levels, and the use of ICT and per capita income, poverty and urbanization. Finally, Sect. 6.6 draws conclusions and proposes policies to bridge the digital divide and enhance adequacy and equality of the use and utilization of ICT in Sudan.

6.2 The Use of Mobile and Digital Divide in Sudan

This Sect. 6.2 examines the use of mobile and digital divide in Sudan and shows evidences on the incidence of the digital divide for households and individuals in terms of ownership, use, spending and purposes of use of mobile defined by mode of living, gender and region.

6.2.1 Ownership and Use of Mobile by Households

Concerning households' ownership and use of mobile, Table 6.1 and Fig. 6.1 explain households' ownership and use of mobile defined by region and mode of living. The regional disparities in ICT indicators appear from proportions of households' ownership of mobile defined by region and mode of living in Sudan. That implies that the proportions of households' ownership of mobile in urban (95.4 %) are higher than rural (88.5 %) and total Sudan (92.2 %). The regional distribution implies that the highest proportions of households ownership of mobile is reported in Northern region followed by Khartoum, Southern, Western, Central, all Sudan, and Eastern regions respectively.[1]

The regional disparities in ICT indicators appear from proportions of households' use of mobile defined by region and mode of living in Sudan. That implies that the proportions of households' use of mobile in urban (96.9 %) are higher than rural (93.5 %) and total Sudan (95.2 %). The regional distribution implies that the highest proportions of households use of mobile is reported in Southern region followed by Khartoum, Northern, Central, Western, all Sudan, and Eastern regions respectively.

6.2.2 Spending on Mobile Services and Fixed Telephone

Average spending of households on mobile services per month defined by region, mode of living and gender in Sudan implies that the average spending in urban (30 %) is equivalent to rural (30 %) and total Sudan (30 %), but the average spending for males (30 %) is higher than females (20 %). The regional use implies similar and equivalent average spending of households on mobile for all Sudan, Khartoum, Western, Eastern, Central and Southern regions, which are all higher than the Northern region[2] (see Table 6.2 and Fig. 6.2).[3]

The regional disparities in ICT indicators appear from households' average spending on fixed telephone per month defined by region and mode of living in

[1] As indicated by 98.6 %, 97.6 %, 95 %, 93.4 %, 92.7 %, 92.2 % and 79.5 % respectively.

[2] As indicated by 30 %, 30 %, 30 %, 30 %, 30 %, 30 % and 20 % respectively.

[3] As reported by 98.3 %, 98.1 %, 97.1 %, 95.7 %, 95.5 %, 95.2 % and 88.8 % respectively.

Table 6.1 The proportions of households owned or used mobile (% of the total population) defined by region and mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Proportions of households	Owned a mobile	Urban	100	82.5	97.9	97	97.6	95.6	95.4
		Rural	98.1	78	96.7	91.8	91	78.4	88.5
		Region	98.6	79.5	97.6	93.4	95	92.7	92.2
	Used a mobile	Urban	98.1	89.6	98.8	97.6	99.1	96.7	96.9
		Rural	96.8	88.4	97.5	95	97.2	89	93.5
		Region	97.1	88.8	98.1	95.7	98.3	95.5	95.2

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012," See Household of individuals ICT survey 2012, accessed on August 09, 2014: http://www.ntc.gov.sd/index.php/en/publications-eng/research-studies-eng/tech-stu-eng/14-ntc-departments/research-a-studies/248-communicationsurvey1

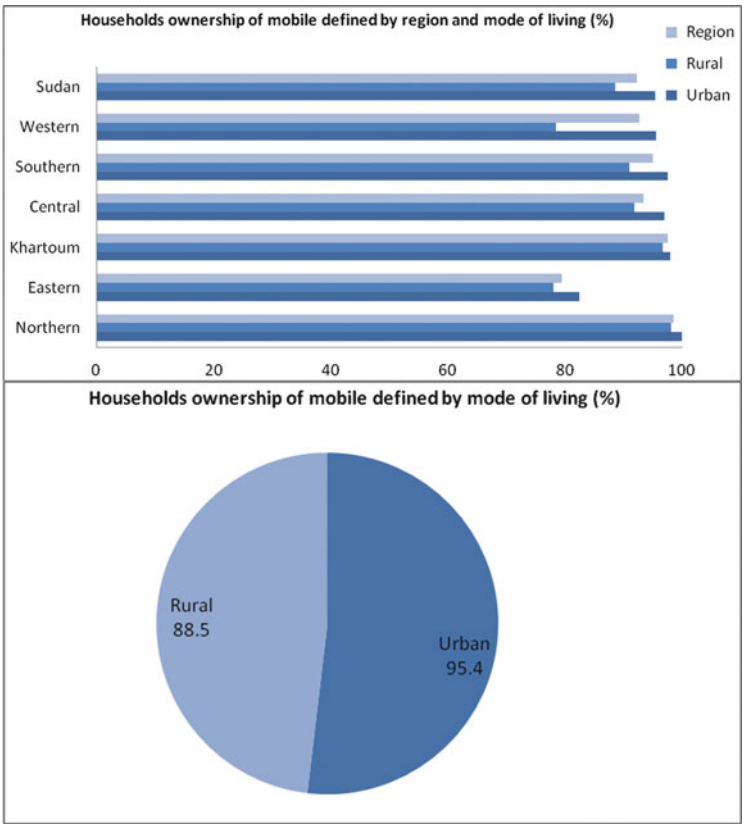

Fig. 6.1 Households use of ICT: mobile, computer and Internet defined by region and by mode of living in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

Sudan. That implies that average spending on fixed telephone per month in urban areas (20 %) is twice average spending in rural areas (10 %). The regional distribution implies that the highest households' average spending on fixed telephone per month is reported in Southern region followed by Central, Western, all Sudan, Khartoum, Eastern, and Northern regions respectively (see Table 6.2 and Fig. 6.2).[4]

[4] As indicated by 35.5 %, 25 %, 25 %, 20 %, 20.4 % and 20 % respectively.

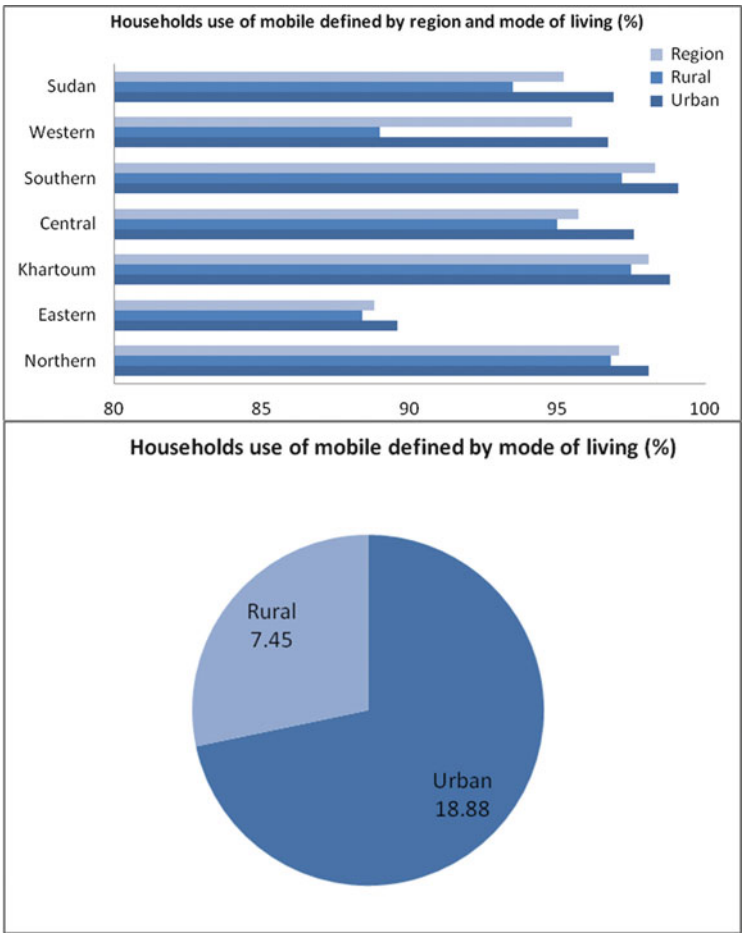

Fig. 6.1 (continued)

6.2.3 Ownership and Use of Mobile by Individuals

Concerning individual use of mobile, Tables 6.3 and 6.4 explains the discrepancies in terms of the proportions of individuals used mobile at least once during 2011 and purposes of the use of mobile, average number of Subscriber Identity Module or Subscriber Identification Module (SIM), or SIM card individuals owned, bought from companies or their agents or received from other sources, proportions of individuals with knowledge of mobile services prices, sources of knowledge of mobile services prices and cost of using mobile from the viewpoint of individuals defined by region, mode of living and gender.

The regional disparities in ICT indicators appear from proportions of individuals' ownership of mobile defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' ownership of mobile in urban

Table 6.2 Households average monthly spending on fixed telephone and mobile (in pounds) defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Average spending on fixed telephone		Urban	10.5	20	17.5	30	20	25	20
		Rural	0	60	20	17.5	50	10	10
		Region	0	20	20	25	35.5	25	20
Average spending on mobile	Mode of living	Urban	20	30	30	30	30	30	30
		Rural	20	30	30	30	30	30	30
	Gender	Males	25	35	40	30	40	30	30
		Females	15	20	30	20	20	24	20
	Region		20	30	30	30	30	30	30

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

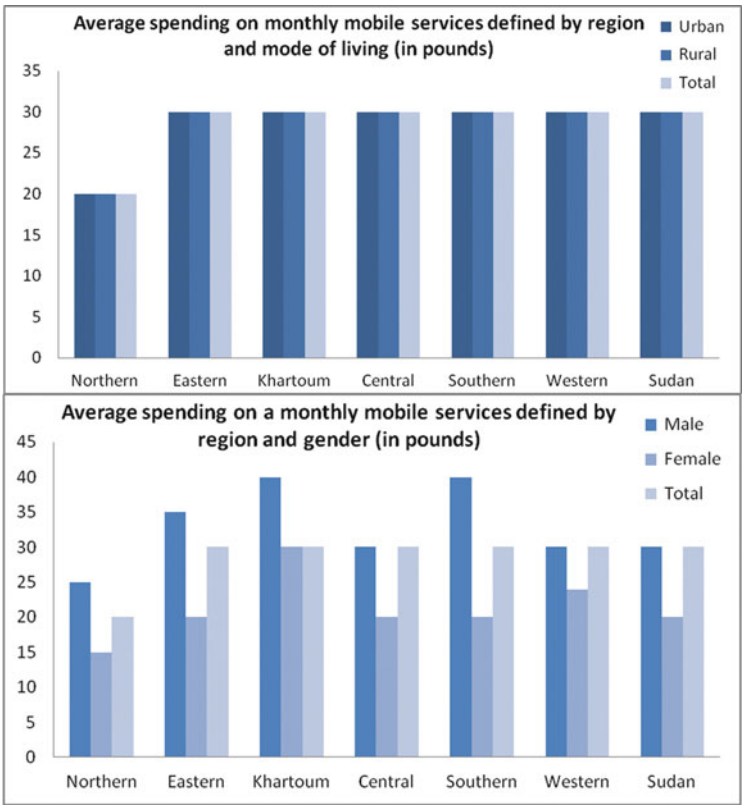

Fig. 6.2 Households average monthly spending on mobile and fixed telephone defined by region and mode of living in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

(71.6 %) are higher than rural (57.6 %) and for males (75.5 %) is higher than females (51.1 %) and total Sudan (63.1 %). The regional distribution implies that the highest proportions of individuals' ownership of mobile is reported in Khartoum followed by Northern, Central, all Sudan, Southern, Western, and Eastern regions respectively (see Table 6.3 and Fig. 6.3).[5]

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile at least once during the year 2011 defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile in urban (91.4 %) is higher than rural (84.3 %) and for males (92 %) is higher than females (82.3 %) and total Sudan (87.1 %). The regional distribution implies that the highest proportion of individuals' use of mobile is reported in

[5] As indicated by 83.3 %, 68 %, 64.9 %, 63.1 %, 62 %, 48.8 % and 46.8 % respectively.

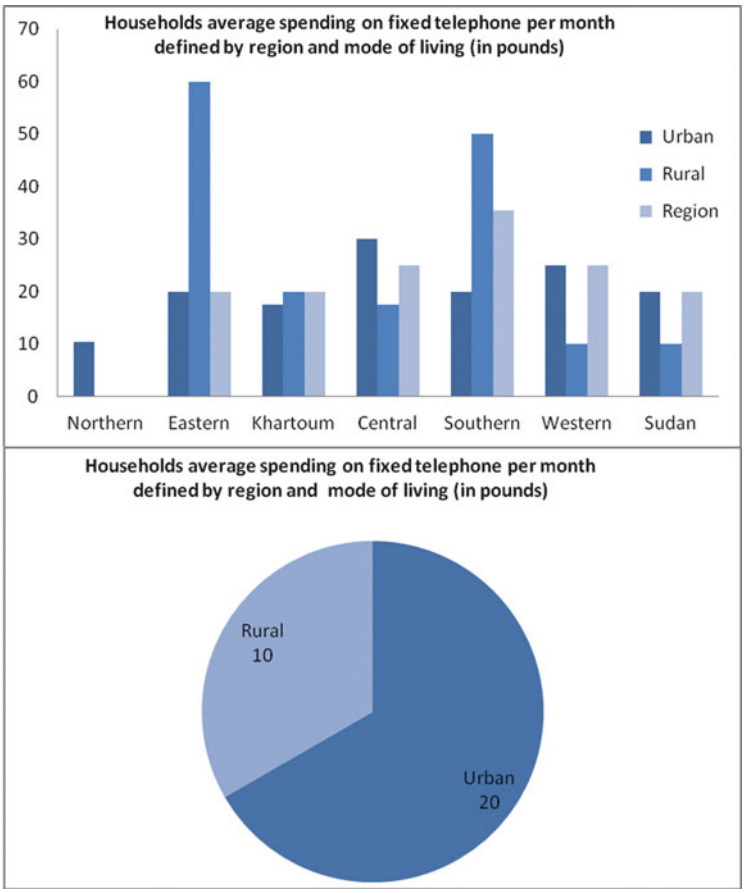

Fig. 6.2 (continued)

Khartoum followed by Northern, Southern, all Sudan, Western, Central, and Eastern regions respectively (see Table 6.3 and Fig. 6.3).[6]

6.2.4 Purposes of the Use of Mobile

From the viewpoint of individuals in Sudan mobile is widely used for several purposes, notably, it is widely used to make phone calls, send and receive messages, entertainment, transfer money, use the Internet, other purposes and to buy a service respectively.[7] The gender gap between males and females appear from several

[6] As indicated by 93 %, 90.7 %, 90.2 %, 87.9 %, 87.1 %, 85.7 % and 77.4 % respectively.

[7] As reported by 99.1 %, 60 %, 30.5 %, 23.3 %, 15.7 %, 8.7 % and 4.4 % respectively for the total Sudan.

Table 6.3 Proportions of individuals owned or used mobile at least once during the year 2011 (% of the total population) defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Proportion of individuals who owned a mobile	Mode of living	Urban	67.5	54.6	85.2	75.8	74.2	36.1	71.6
		Rural	68.2	42.2	74.1	61.3	57.1	53.3	57.6
	Gender	Males	83.2	60.6	89	79.2	79.9	61.2	75.5
		Females	53.3	31.6	76.7	52.9	45.7	37.3	51.1
	Region		68	46.8	83.3	64.9	62	48.8	63.1
Used mobile at least once during 2011	Mode of living	Urban	88	83.4	93.7	89.9	96.8	93.5	91.4
		Rural	91.7	73.8	89.2	84.3	87.6	85.9	84.3
	Gender	Males	94.8	86.1	95.2	91.1	94.6	92.7	92
		Females	86.7	67.8	90.4	81.1	86.2	83.4	82.3
	Region		90.7	77.4	93	85.7	90.2	87.9	87.1

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

Table 6.4 Purposes of the use of mobile defined by region, mode of living and gender in Sudan during 2011

Proportion of individuals who used mobile to			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
To make phone calls	Mode of living	Urban	98.2	99	99.2	99.4	98.8	99.2	99.2
		Rural	99	98.6	99.5	99.2	99.6	98.8	99.1
	Gender	Males	98.9	99	99.3	99.4	99.3	99.1	99.2
		Females	98.7	98.3	99.2	99.1	99.4	98.7	98.9
	Region	Total	98.8	98.7	99.3	99.2	99.3	98.9	99.1
To send and receive messages	Mode of living	Urban	53.6	63.6	71.6	67	64.3	68	68.1
		Rural	56.4	37.8	69.8	59.9	57.3	48.2	54.3
	Gender	Males	60	52.4	74.8	67.6	69	56.9	64.6
		Females	51.1	42.2	67	56.2	49.8	50.3	54.9
	Region	Total	55.7	48.1	71.3	61.7	59.4	53.6	60
To use the internet	Mode of living	Urban	9.3	16.4	29.9	21.1	20.5	13.5	23
		Rural	8	5.8	19	14.2	16.6	3.7	10.5
	Gender	Males	10	12.7	31.9	21.3	26.7	8.6	19.7
		Females	6.5	6.3	23.5	11	8.9	4.2	11.3
	Region	Total	8.3	10	28.1	16	17.7	6.4	15.7
To transfer money	Mode of living	Urban	16.5	28.1	18.2	36.8	29.8	22.2	24.1
		Rural	15	18.9	16.8	36.3	39.3	1.7	22.7
	Gender	Males	19.5	29.3	21.5	45	48	9.8	28.8
		Females	10.9	13.2	13.6	28.2	25	4.8	17.3
	Region	Total	15.3	22.6	17.9	36.4	36.5	7.3	23.3
To buy a service	Mode of living	Urban	11.9	11.2	7.4	2.3	0.5	8.9	6.9
		Rural	12.1	2.2	5	1.7	0.3	0.5	2.5
	Gender	Males	13.4	6.8	7.7	2.3	0.4	3.4	5.1
		Females	10.6	4.4	6.2	1.4	0.3	2.3	3.5
	Region	Total	12.1	5.8	7	1.9	0.4	2.8	4.4

(continued)

Table 6.4 (continued)

Proportion of individuals who used mobile to			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
For entertainment	Mode of living	Urban	30.2	32.7	34.2	34.1	44.1	33.1	34.2
		Rural	23	16.3	37.8	32.9	42.6	20.5	27.9
	Gender	Males	27.7	25.5	35	36.7	50	24.3	32.5
		Females	21.7	19.3	34.6	29.9	36.2	23.6	28.3
	Region		24.8	22.9	34.8	33.2	43.1	24	30.5
For other purposes	Mode of living	Urban	4.2	7.6	6.7	11.1	17.7	7.5	8.2
		Rural	4.5	3.8	4.5	12.3	23.5	4.6	9
	Gender	Males	4.1	6.3	6	13.9	26	5.9	9.5
		Females	4.7	4.1	6.6	10.2	17.5	4.8	7.8
	Region		4.4	5.4	6.3	12	21.8	5.4	8.7

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

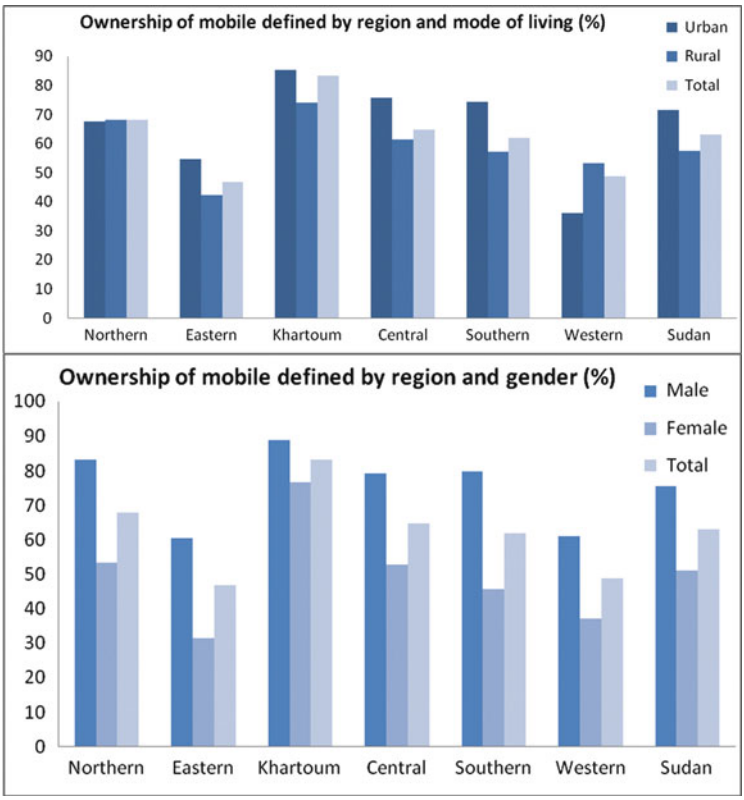

Fig. 6.3 The ownership and use of mobile defined by regions, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

purposes of using mobile defined by gender that implies that for males and females mobile is widely used to make phone calls, send and receive messages, entertainment, transfer money, use the Internet, other purposes and to buy a service for males and females respectively (see Table 6.4 and Fig. 6.4).[8,9]

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile to make phone calls of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile to make phone calls of total mobile users in urban (99.2 %) is slightly higher than rural ((99.1 %) and for males (99.2 %) is slightly higher than females (98.9 %) and total Sudan (99.1 %). The regional distribution implies that the highest proportions of individuals use of mobile to make phone calls of total

[8] As indicated by 99.2 %, 64.6 %, 32.5 %, 28.8 %, 19.7 %, 9.5 % and 5.1 % respectively for males.

[9] As reported by 98.9 %, 54.9 %, 28.3 %, 17.3 %, 11.3 %, 7.8 %, and 3.5 % respectively for females.

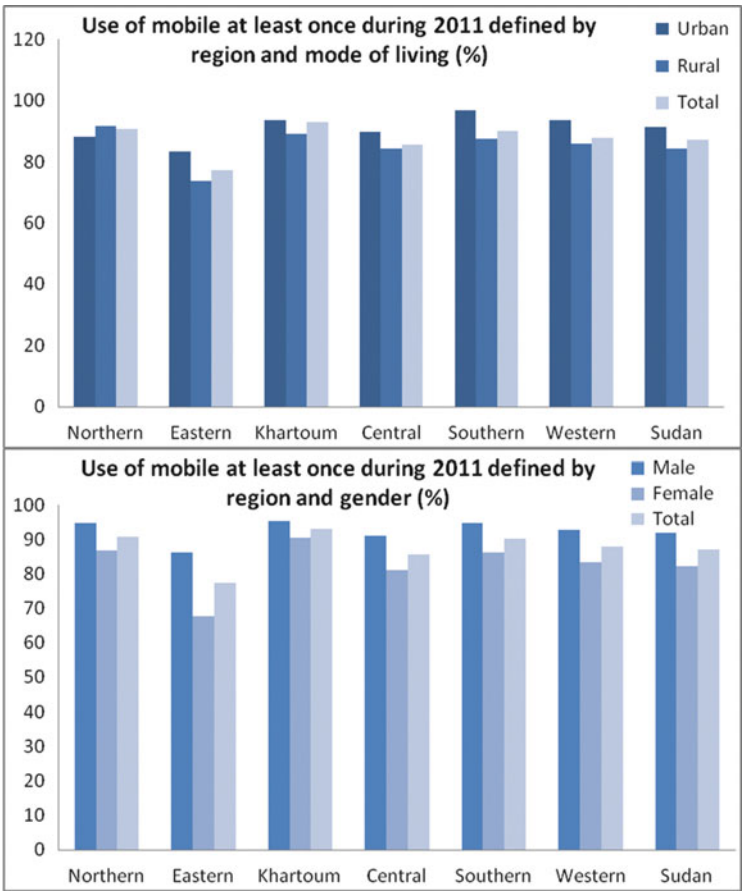

Fig. 6.3 (continued)

mobile users is reported in Khartoum followed by Southern, Central, all Sudan, Western, Northern, and Eastern regions respectively.[10]

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile to send and receive messages of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile to send and receive messages of total mobile users in urban (68.1 %) is higher than rural (54.3 %) and for males (64.6 %) is higher than females (54.9 %) and total Sudan (60 %). The regional distribution implies that the highest proportions of individuals use of mobile to send and receive messages of total mobile users is reported in Khartoum followed by Central, all Sudan, Northern, Southern, Western, and Eastern regions respectively.[11]

[10] As indicated by 99.3 %, 99.3 %, 99.2 %, 99.1 %, 98.9 %, 98.8 % and 98.7 % respectively.

[11] As indicated by 71.3 %, 61.7 %, 60 %, 53.6 % and 48.1 %, respectively.

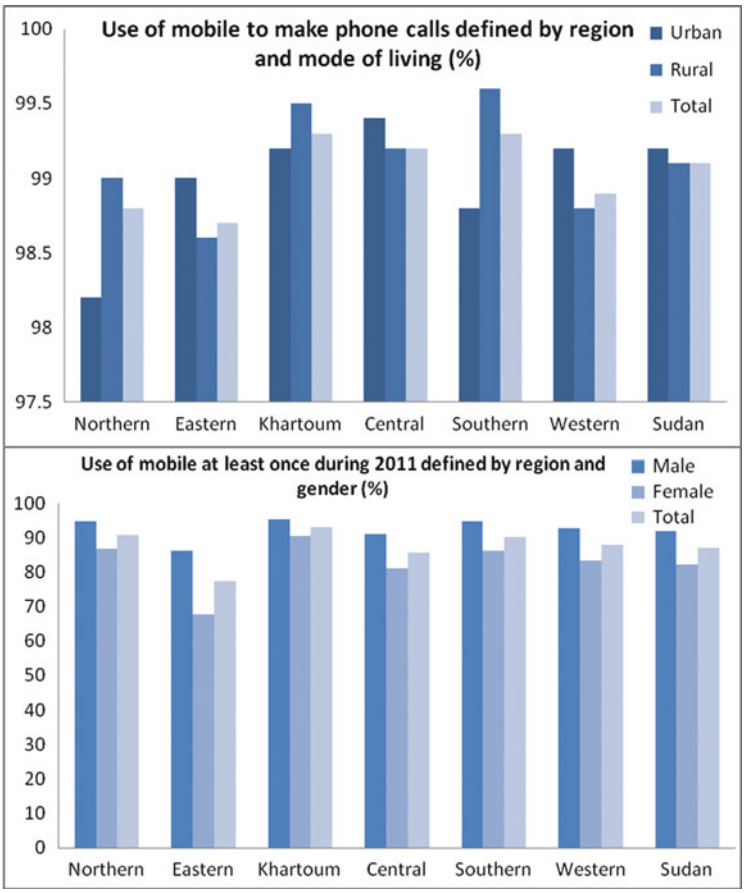

Fig. 6.4 Purposes of the use of mobile defined by regions, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile to use the Internet of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile to use the Internet of total mobile users in urban (23 %) is more than twice higher than rural (10.5 %) and for males (19.7 %) is near to twice higher than females (11.3 %) and total Sudan (15.7 %). The regional distribution implies that the highest proportions of individuals use of mobile to use the Internet of total mobile users is reported in Khartoum followed by Southern, Central, all Sudan, Eastern, Northern, and Western regions respectively.[12] The proportion of

[12] As indicated by 28.1 %, 17.7 %, 16 %, 15.7 %, 10 %, 8.3 % and 6.4 % respectively.

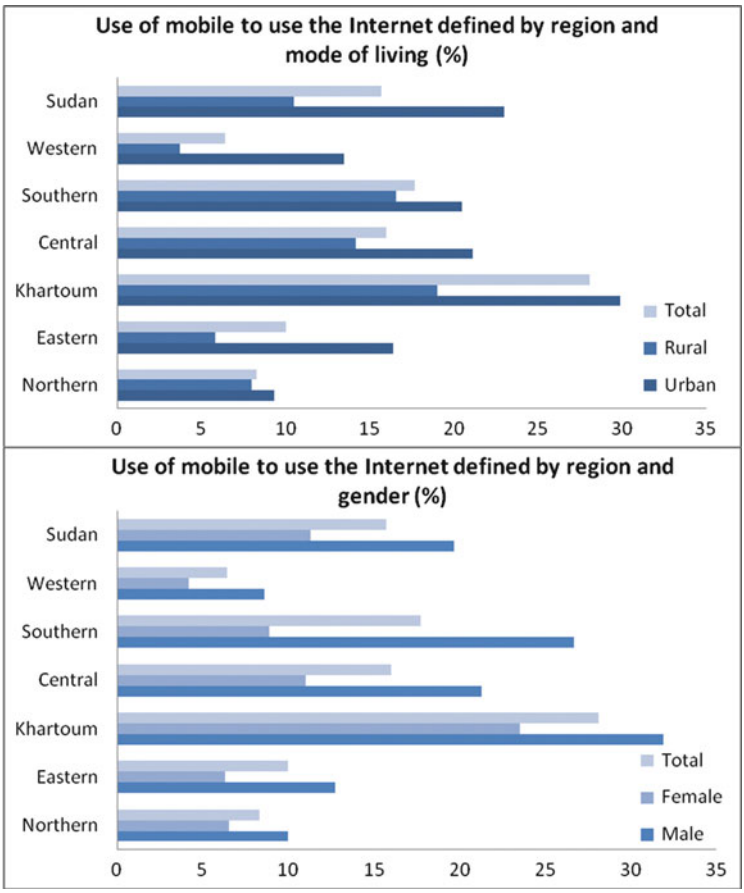

Fig. 6.4 (continued)

individuals use of mobile to use the Internet of total mobile users in Khartoum (28.1 %) is more than four time higher than that in Western region (6.4 %).

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile to transfer money of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile to transfer money of total mobile users in urban (24.1 %) is higher than rural (22.7 %) and for males (28.8 %) is higher than females (17.3 %) and total Sudan (23.3 %). The regional distribution implies that the highest proportions of individuals use of mobile to transfer money of total mobile users is reported in Southern region followed by Central, all Sudan, Eastern, Khartoum, Northern, and Western regions respectively.[13] The proportion of individuals use of mobile to

[13] As indicated by 36.5 %, 36.4 %, 23.3 %, 22.6 %, 17.9 %, 15.3 %, and 7.3 % respectively.

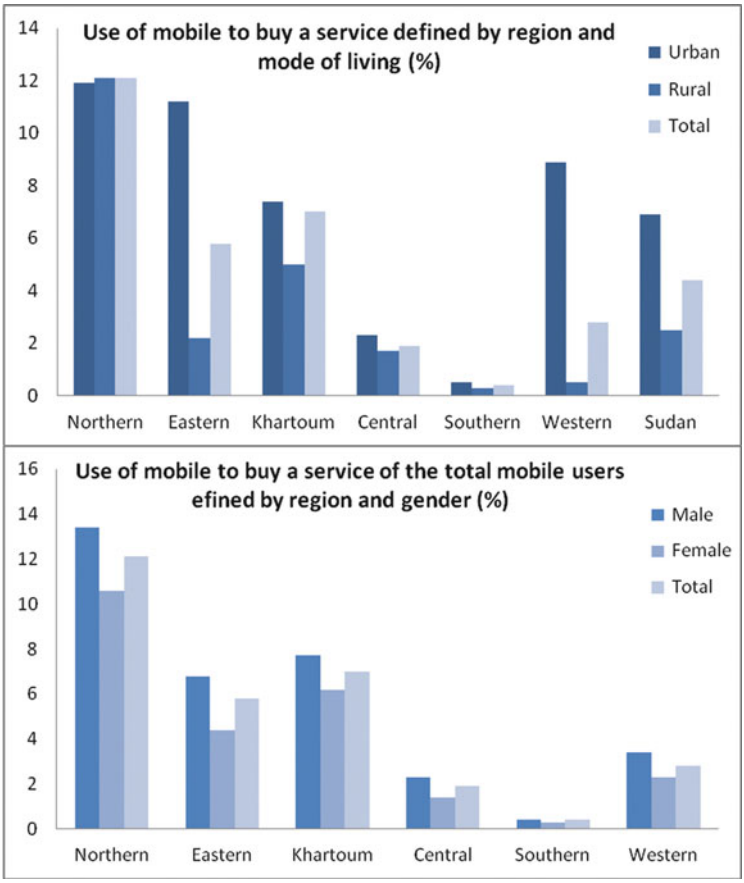

Fig. 6.4 (continued)

transfer money of total mobile users in Central region (36.4 %) is more than twice higher than that in Northern region (15.3 %).

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile to buy a service of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile to buy a service of total mobile users in urban (6.9 %) is more than double/higher than rural (2.5 %) and for males (5.1 %) is higher than females (3.5 %) and total Sudan (4.4 %). The regional distribution implies that the highest proportions of individuals use of mobile to buy a service of total mobile users is reported in Northern region followed by Khartoum, Eastern, all Sudan, Western, Central, and Southern regions respectively.[14] The proportion of individuals' use of mobile to

[14] As indicated by 12.1 %, 7 %, 5.8 %, 4.4 %, 2.8 %, 1.9 % and 0.4 % respectively.

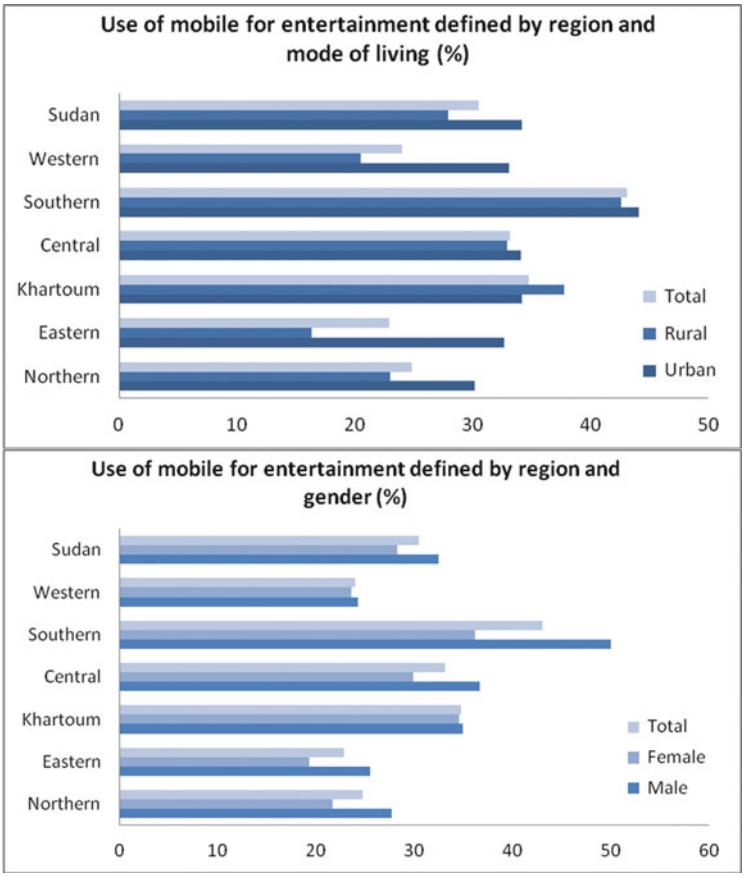

Fig. 6.4 (continued)

buy a service of total mobile users in Northern region (12.1 %) is more than 30 times higher than that in Southern region (0.4 %).

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile for entertainment of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile for entertainment of total mobile users in urban (34.2 %) is higher than rural (27.9 %) and for males (32.5 %) is higher than females (28.3 %) and total Sudan (30.5 %). The regional distribution implies that the highest proportions of individuals use of mobile for entertainment of total mobile users is reported in Southern region followed by Khartoum, Central, all Sudan, Northern, Western, and Eastern regions respectively.[15]

[15] As indicated by 43.1 %, 34.8 %, 33.2 %, 30.5 %, 24.8 %, 24 % and 22.9 % respectively.

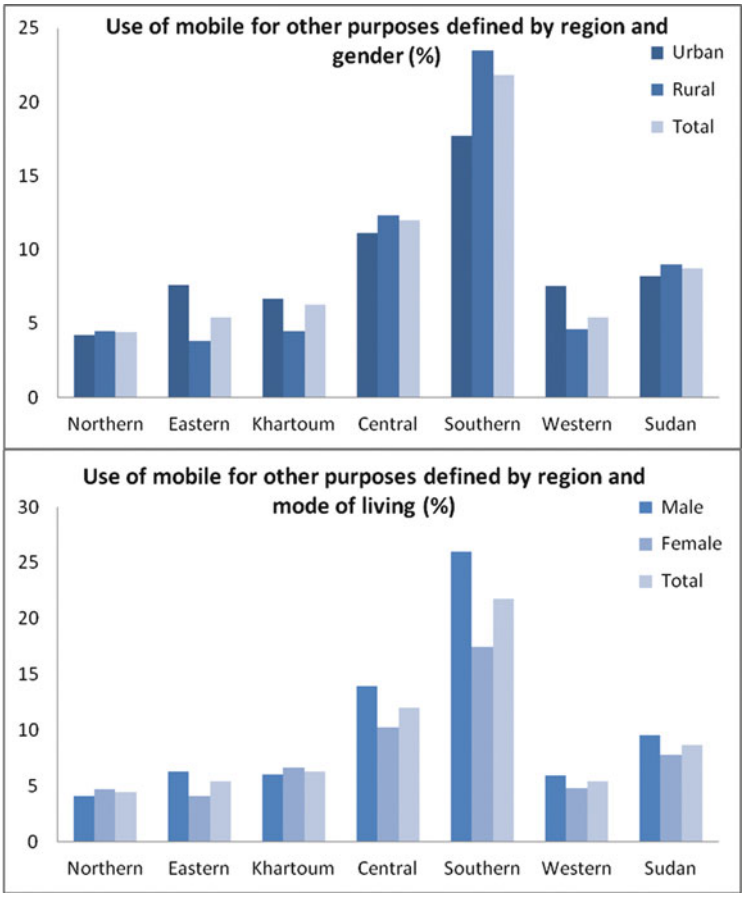

Fig. 6.4 (continued)

The regional disparities in ICT indicators appear from proportions of individuals' use of mobile for other purposes of total mobile users defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' use of mobile for other purposes of total mobile users in rural (9 %) is slightly higher than urban (8.2 %) and for males (9.5 %) is higher than females (7.8 %) and total Sudan (8.7 %). The regional distribution implies that the highest proportions of individuals use of mobile for other purposes of total mobile users is reported in Southern region, followed by Central, all Sudan, Khartoum, Western, Eastern, and Northern regions respectively.[16]

[16] As indicated by 21.8 %, 12 %, 8.7 %, 6.3 %, 5.4 %, 5.4 % and 4.4 % respectively.

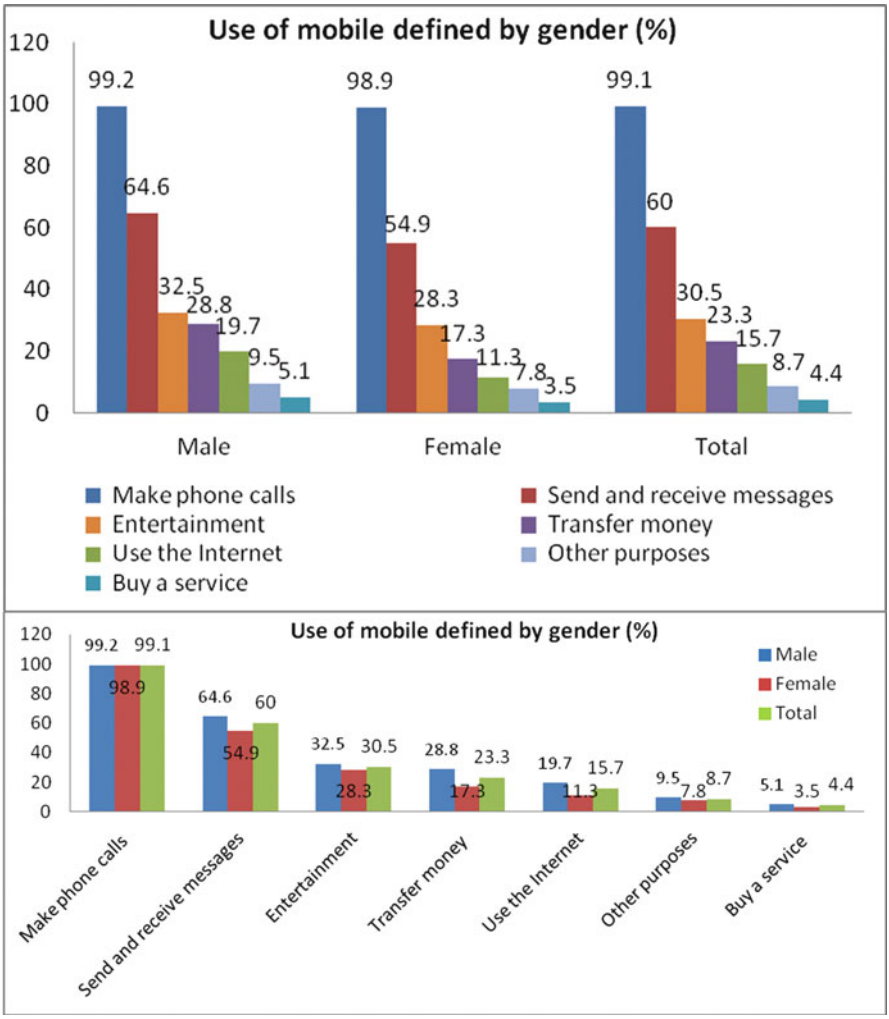

Fig. 6.4 (continued)

6.2.5 Knowledge of the Use of Mobile

We observe some exceptional similarity concerning the average number of SIM owned by individual, as it is similar and equivalent to one for all regions, for both urban and rural areas and for males and females in Sudan. On the one hand, the proportions of individuals bought SIM directly from companies or their agents defined by region, gender and mode of living implies that the proportions of individuals bought SIM directly from companies or their agents in urban areas (65.5 %) are higher than rural areas (50.2 %) and for males (64.5 %) is higher than females (47.8 %) and total Sudan (56.5 %). The highest proportions of individuals

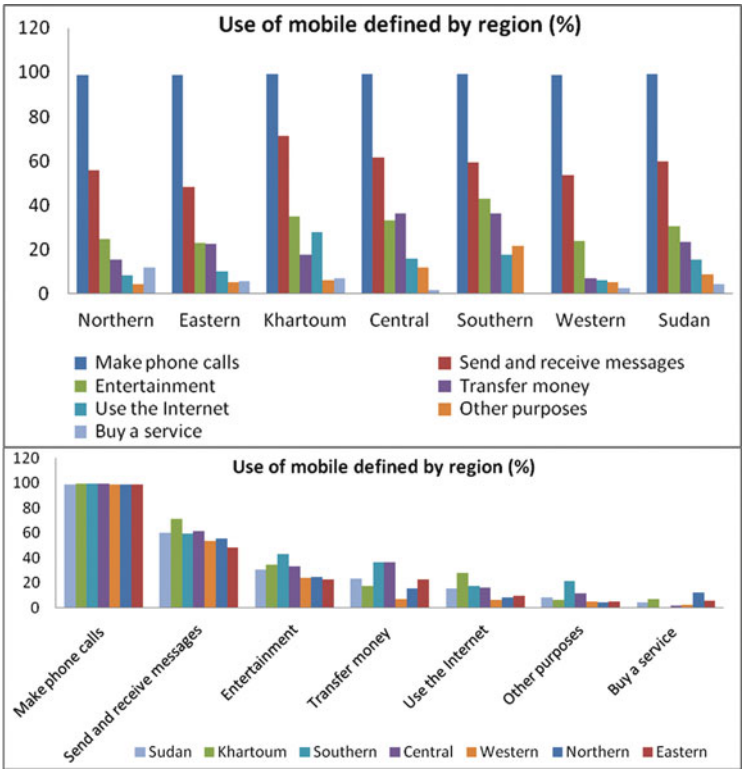

Fig. 6.4 (continued)

bought SIM directly from companies or their agents is reported in Khartoum followed by Central, Northern, all Sudan, Southern, Eastern, and Western regions respectively.[17] On the other hand, the proportions of individuals received SIM from other sources defined by region, gender and mode of living implies that the proportions of individuals received SIM from other sources in rural areas (22.8 %) is higher than urban areas (17.4 %) and for males (23.8 %) is higher than females (17.1 %) and total Sudan (20.6 %). The highest proportions of individuals received SIM from other sources is reported in Western region followed by Southern, Eastern, all Sudan, Northern, Khartoum and Central regions respectively (see Table 6.5 and Fig. 6.5).[18]

The regional disparities in ICT indicators appear from individuals' awareness defined by proportions of individuals' with knowledge of the terms of contract to buy SIM defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' with knowledge of the terms of contract to buy SIM

[17] As reported by 76.1 %, 62.8 %, 61.1 %, 56.5 %, 48.6 %, 43.1 % and 33.5 % respectively.

[18] As indicated by 26.9 %, 26.5 %, 22.1 %, 20.8 %, 20.6 %, 17.3 % and 17 % respectively.

Table 6.5 The average number of SIM card individual owned and proportions of individuals who bought SIM from companies or their agents or received SMI from other sources defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Average number of SIM card owned by individual	Mode of living	Urban	1	1	1	2	2	1	1
		Rural	1	1	1	1	1	1	1
	Gender	Males	1	1	1	2	2	1	1
		Females	1	1	1	1	1	1	1
	Region	Total	1	1	1	1	1	1	1
SIM bought directly from companies or their agents	Mode of living	Urban	71.6	53.9	77.3	71.6	56.3	27.5	65.5
		Rural	57.6	35.9	70.5	59.7	45.3	35.8	50.2
	Gender	Males	72.8	50.8	80.8	72.5	60.6	40.8	64.5
		Females	48.5	32.4	70.6	53.6	36.8	26	47.8
	Region	Total	61.1	43.1	76.1	62.8	48.6	33.5	56.5
SIM received from other sources	Mode of living	Urban	12.9	19.1	17.1	17.7	28.5	13.2	17.4
		Rural	23.5	24	18.2	16.8	25.6	32.1	22.8
	Gender	Males	24.8	25.1	17.3	20.5	33.9	32	23.8
		Females	16.6	17.8	17.3	13.8	19.1	21.6	17.1
	Region	Total	20.8	22.1	17.3	17	26.5	26.9	20.6
Knowledge of terms of contract of purchasing SIM card	Mode of living	Urban	51.3	36.2	63.2	50.6	34.8	22.6	50.2
		Rural	40.9	14.5	52.4	38.8	26.5	32.9	34.3
	Gender	Males	50.8	27.5	67	49.1	35.2	37.7	47.3
		Females	35.7	17.3	54.6	35	22.9	22.2	33.9
	Region	Total	43.5	23.2	61.4	41.9	29	30.1	40.8

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

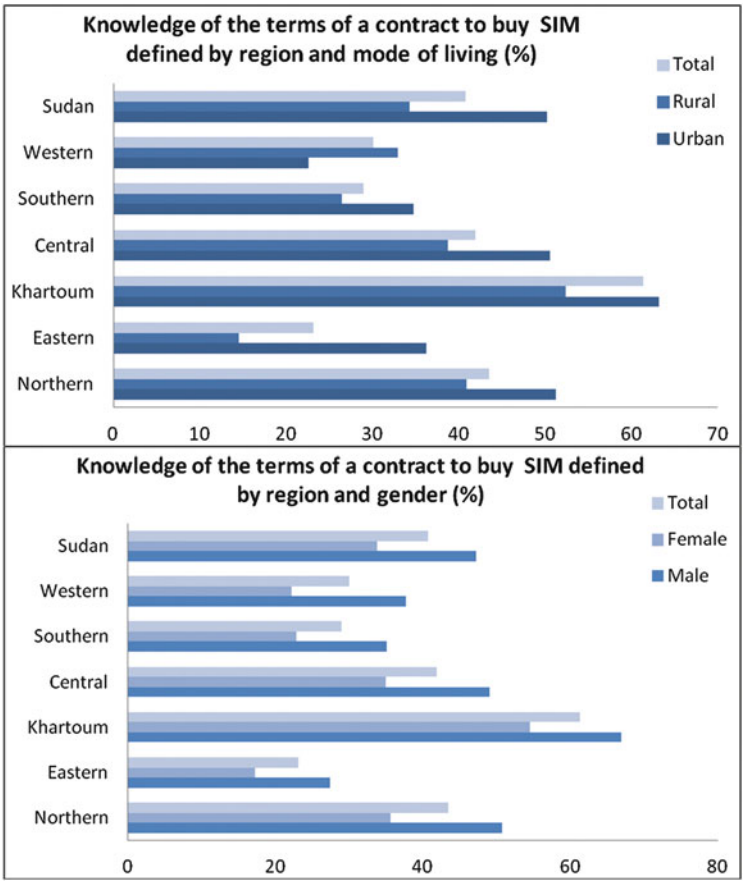

Fig. 6.5 Knowledge of terms of contract of purchasing SIM card defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

in urban (50.2 %) is higher than rural (34.3 %) and for males (47.3 %) is higher than females (33.9 %) and total Sudan (40.8 %). The regional distribution implies that the highest proportions of individuals with knowledge of the terms of contract to buy SIM is reported in Khartoum followed by Northern, Central, all Sudan, Western, Southern, and Eastern regions respectively.[19] The proportion of individuals with knowledge of the terms of contract to buy SIM in Khartoum (61.4 %) is more than twice higher than that in Eastern region (23.2 %) (see Table 6.5 and Fig. 6.5).

[19] As reported by 61.4 %, 43.5 %, 41.9 %, 40.8 %, 30.1 %, 29 % and 23.2 % respectively.

6.2.6 *Prices and Costs of the Uses of Mobile*

The regional disparities in ICT indicators appear from individuals' awareness defined by the proportions of individuals with knowledge of mobile services prices defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals with knowledge of mobile services prices in urban (52.5 %) is higher than rural (41.7 %) and for males (49 %) is higher than females (31.7 %) and total Sudan (40.2 %). The regional distribution implies that the highest proportion of individuals with knowledge of mobile services prices is reported in Khartoum followed by Southern, Central, all Sudan, Northern, Western, and Eastern regions respectively (see Table 6.6 and Fig. 6.6).[20]

The regional disparities in ICT indicators appear from sources of knowledge of mobile services prices defined by region, mode of living and gender in Sudan. That implies that with exception of Western region, the majority in other regions and in all Sudan find information from companies followed by media and other sources (people) respectively.[21] The majority of individuals find information from companies as reported in Khartoum followed by Northern, all Sudan, Central, Southern, Eastern, and Western regions respectively.[22] Some individual find information from media as reported in Western region followed by Southern, all Sudan, Central, Eastern, Northern, and Khartoum, respectively.[23] Few individuals find information from other sources (people) as reported in Eastern region followed by Northern, Central, all Sudan, Khartoum, Southern, and Western regions respectively (see Table 6.6 and Fig. 6.6).[24]

The regional disparities in ICT indicators appear from individuals' viewpoint concerning the cost of using mobile defined by region, mode of living and gender in Sudan. That implies that with exception of Central region, the viewpoint of the majority in other region and all Sudan implies that the cost of using mobile is high followed by reasonable and low respectively.[25] From the viewpoint of the majority of individuals the high cost of using mobile is reported in Western region followed by Southern, Eastern, Khartoum, all Sudan, Northern, and Central regions respectively.[26] From the viewpoint of some people the reasonable cost of using mobile is reported in Central region followed by Northern, all Sudan, Khartoum, Eastern, Southern, and Western regions respectively.[27] From the viewpoint of few people

[20] As reported by 58.3 %, 44.1 %, 41.2 %, 40.2 %, 37.9 %, 31.7 % and 22.4 % respectively.

[21] As indicated by 59.5 %, 33.1 %, and 7.5 % respectively.

[22] As reported by 71.5 %, 63.1 %, 59.5 %, 58.2 %, 55.9 %, 50.2 %, and 43.3 % respectively.

[23] As indicated by 54 %, 39 %, 33.1 %, 32.9 %, 32 %, 24.8 %, and 23.4 % respectively.

[24] As reported by 17.8 %, 12.1 %, 8.9 %, 7.5 %, 5.1 %, 5.1 %, and 2.8 % respectively.

[25] As indicated by 55.9 %, 41.7 %, and 2.3 % respectively.

[26] As reported by 74 %, 63.5 %, 57.5 %, 56.8 %, 55.9 %, 48.2 %, and 46.7 % respectively.

[27] As indicated by 51.3 %, 48.1 %, 41.7 %, 41.5 %, 39.8 %, 31.6 %, and 23.8 % respectively.

Table 6.6 The proportions of individuals with knowledge of mobile services prices and sources of knowledge of mobile services prices and the cost of using mobile from the viewpoint of individuals defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Have knowledge of mobile services prices	Mode of living	Urban	48.8	37.8	63.9	55.3	56.5	22.4	52.5
		Rural	39.5	23.1	56.8	45.4	45.6	41.3	41.7
	Gender	Males	49.3	29.5	64.7	50.2	57.3	41.2	49
		Females	26.8	14.7	50.9	33.5	32.3	22.9	31.7
	Region	Total	37.9	22.4	58.3	41.2	44.1	31.7	40.2
Source of knowledge by region and gender	Males	Companies	50.6	51.2	71.1	57.8	58.1	44.6	59.4
		Media	35.4	29.8	24.2	33.4	37.2	53	33.1
		Other (people)	14	19.1	4.8	8.8	4.7	2.4	7.6
	Females	Companies	68.2	48	72.2	58.6	52.4	41	59.6
		Media	20.5	36.9	22.3	32.3	42	55.6	33
		Other (people)	11.4	15.1	5.6	9.1	5.6	3.4	7.4
	Total	Companies	63.1	50.2	71.5	58.2	55.9	43.3	59.5
		Media	24.8	32	23.4	32.9	39	54	33.1
		Other (people)	12.1	17.8	5.1	8.9	5.1	2.8	7.5
		Total	100	100	100	100	100	100	100
Source of knowledge by region and mode of living	Urban	Companies	50.6	53.2	53.2	71.2	53.3	56.6	63.3
		Media	35.4	34.7	34.7	23.6	36.4	36.3	29.4
		Other (people)	14	12.1	12.1	5.2	10.4	7.2	7.4
	Rural	Companies	68.2	46.8	46.8	73.1	60.3	40.5	56.1
		Media	20.5	29	29	22.3	31.4	57.6	36.3
		Other (people)	11.4	24.2	24.2	4.6	8.3	1.9	7.6
	Total	Companies	63.1	50.2	50.2	71.5	58.2	43.3	59.5
		Media	24.8	32	32	23.4	32.9	54	33.1
		Other (people)	12.1	17.8	17.8	5.1	8.9	2.8	7.5
		Total	100	100	100	100	100	100	100

(continued)

Table 6.6 (continued)

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
The cost of using mobile from the viewpoint of individuals by region and gender	Males	High	47.6	61.2	57.4	50.2	66.5	74.5	58.1
		Reasonable	47.6	36.5	41.2	57.4	28.9	23.2	39.7
		Low	4.8	2.2	1.4	41.2	4.6	2.3	2.2
	Females	High	49.1	49.8	55.9	42.4	58.9	73.3	52.8
		Reasonable	48.8	46.5	42	55.2	35.7	24.6	44.6
		Low	2.1	3.7	2.1	2.5	5.3	2.1	2.6
	Total	High	48.2	57.5	56.8	46.7	63.5	74	55.9
		Reasonable	48.1	39.8	41.5	51.3	31.6	23.8	41.7
		Low	3.8	2.7	1.7	2	4.9	2.2	2.3
		Total	100	100	100	100	100	100	100
The cost of using mobile from the viewpoint of individuals by region and mode of living	Urban	High	38.7	51	57.2	39.8	54.8	71.4	52.8
		Reasonable	50	46.4	41	57.6	41.1	25.6	44.5
		Low	11.3	2.7	1.9	2.6	4.1	3	2.7
	Rural	High	51.4	62.6	54.6	49.6	68	74.6	58.4
		Reasonable	47.4	34.7	44.7	48.7	26.7	23.3	39.5
		Low	1.2	2.7	0.8	1.7	5.3	2.1	2.1
	Total	High	48.2	57.5	56.8	46.7	63.5	74	55.9
		Reasonable	48.1	39.8	41.5	51.3	31.6	23.8	41.7
		Low	3.8	2.7	1.7	2	4.9	2.2	2.3
		Total	100	100	100	100	100	100	100

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

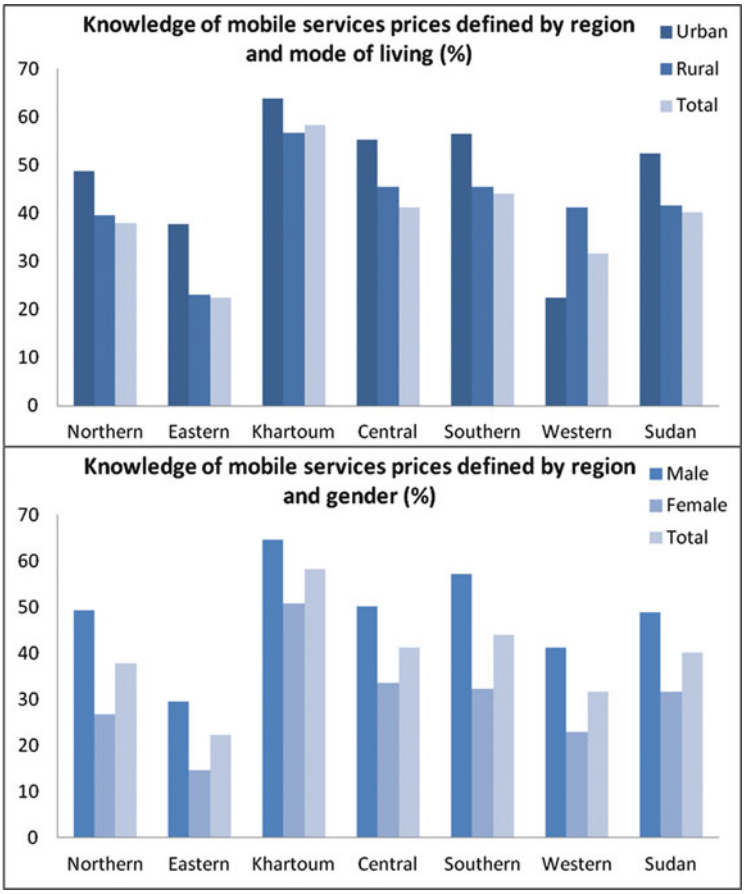

Fig. 6.6 Knowledge of mobile services price, sources of individuals knowledge and the cost of using mobile from the view point of individuals defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

the low cost of using mobile is reported in Southern region followed by Northern, Eastern, all Sudan, Western, Central, and Khartoum regions respectively (see Table 6.6 and Fig. 6.6).[28]

[28] As reported by 4.9 %, 3.8 %, 2.7 %, 2.3 %, 2.2 %, 2 %, and 1.7 % respectively.

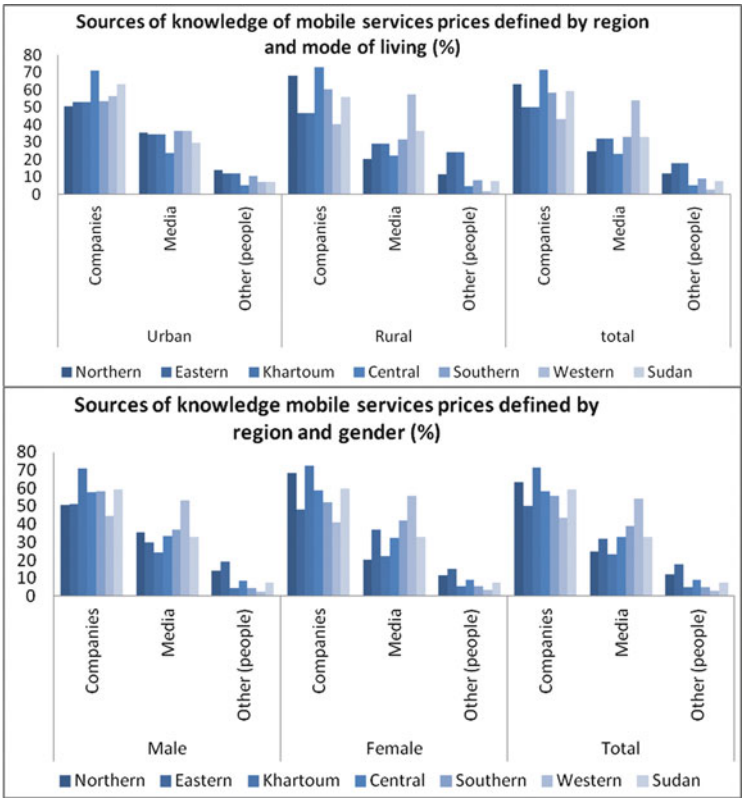

Fig. 6.6 (continued)

6.3 The Use of Computer and Digital Divide in Sudan

This section discusses the use of computer and digital divide in Sudan and explains evidences on the occurrence of the digital divide for households and individuals in terms of ownership, use and purposes of use of computer defined by mode of living, gender and region.

6.3.1 Ownership and Use of Computer by Households

Concerning households' ownership and use of computer, Table 6.7 explains the proportions of households owned or used computer defined by region and mode of living.

The regional disparities in ICT indicators appear from the proportions of households' ownership of computer defined by region and mode of living in Sudan. That implies that the proportions of households' ownership of computer in urban areas

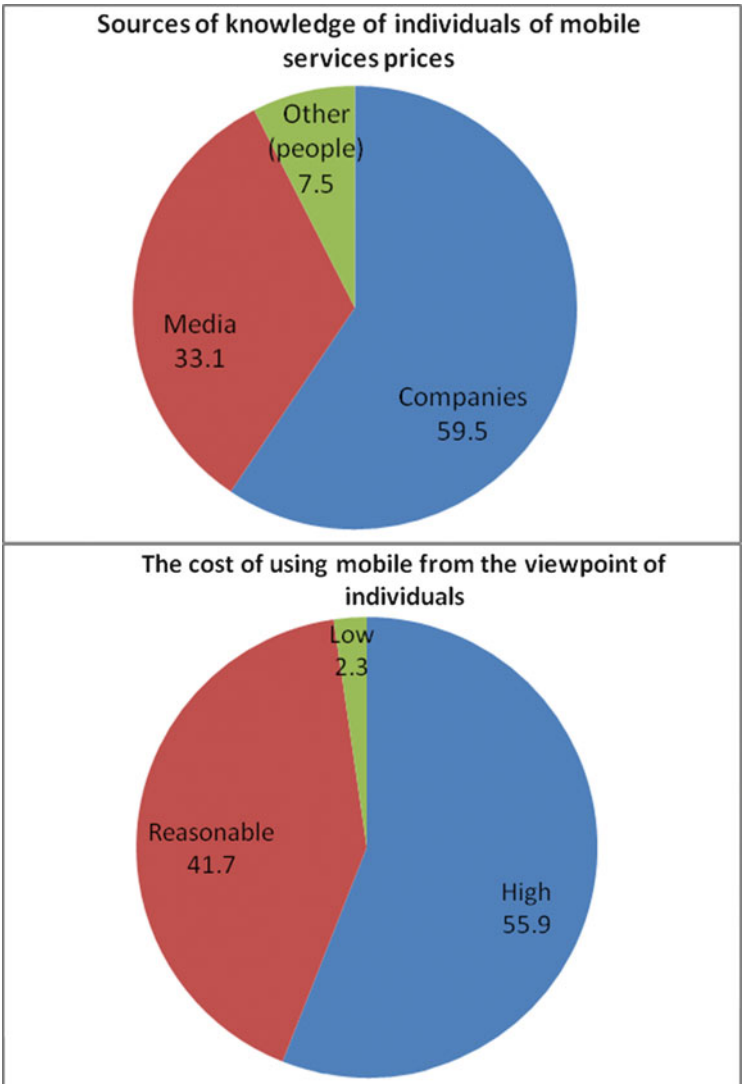

Fig. 6.6 (continued)

(18.9 %) are more than twice higher than rural areas (7.5 %) and total Sudan (14 %). The regional distribution implies that the highest proportions of households ownership of computer is reported in Khartoum followed by Southern, Central, Western, Northern, all Sudan, and Eastern regions respectively.[29] The proportion of

[29] As indicated by 12.8 %, 12 %, 10.4 %, 8.8 %, 14 % and 5.4 % respectively.

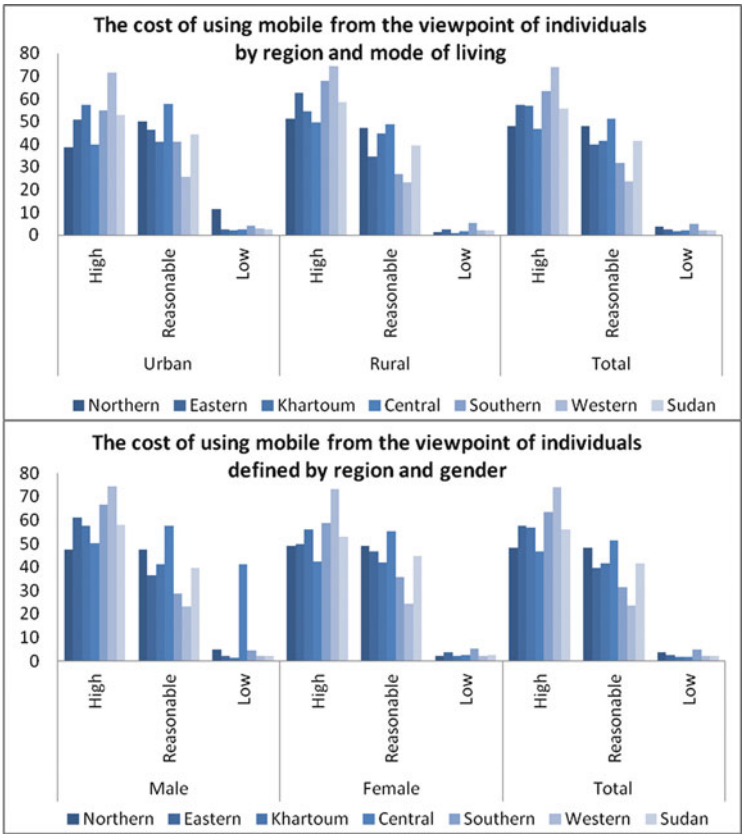

Fig. 6.6 (continued)

households' ownership of computer in Khartoum (34.4 %) is more than six time higher than that in Eastern region (5.4 %) (see Table 6.7 and Fig. 6.7).

The regional disparities in ICT indicators appear from proportions of households' use of computer defined by region and mode of living in Sudan. That implies that the proportions of households' use of computer in urban areas (39.3 %) are more than twice higher than rural areas (18.7 %) and total Sudan (29.7 %). The regional distribution implies that the highest proportions of households use of computer is reported in Khartoum followed by Southern, all Sudan, Northern, Central, Western, and Eastern regions respectively.[30] The proportion of households' use of computer in Khartoum (50.6 %) is more than three time higher than that in Eastern region (14.3 %) (see Table 6.7 and Fig. 6.7).

[30] As indicated by 50.6 %, 40 %, 29.7 %, 27.4 %, 27 %, 23.3 % and 14.3 % respectively.

Table 6.7 The proportions of households owned or used computer (% of the total population) defined by region and mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Proportions of households	Owned a computer	Urban	12.5	12.9	39.5	19.3	17	12.1	20.3
		Rural	7.6	5	15.4	8.7	6.2	1.8	22.4
		Region	8.8	5.4	34.4	12	12.8	10.4	14
	Used a computer	Urban	26.9	29	54.4	39.8	49.2	30.9	39.3
		Rural	22.2	7	37	21.8	25.7	7.8	18.7
		Region	23.3	14.3	50.6	27.4	40	27	29.7

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012," See Household of individuals ICT survey 2012, accessed on August 09, 2014: http://www.ntc.gov.sd/index.php/en/publications-eng/research-studies-eng/tech-stu-eng/14-ntc-departments/research-a-studies/248-communicationsurvey1

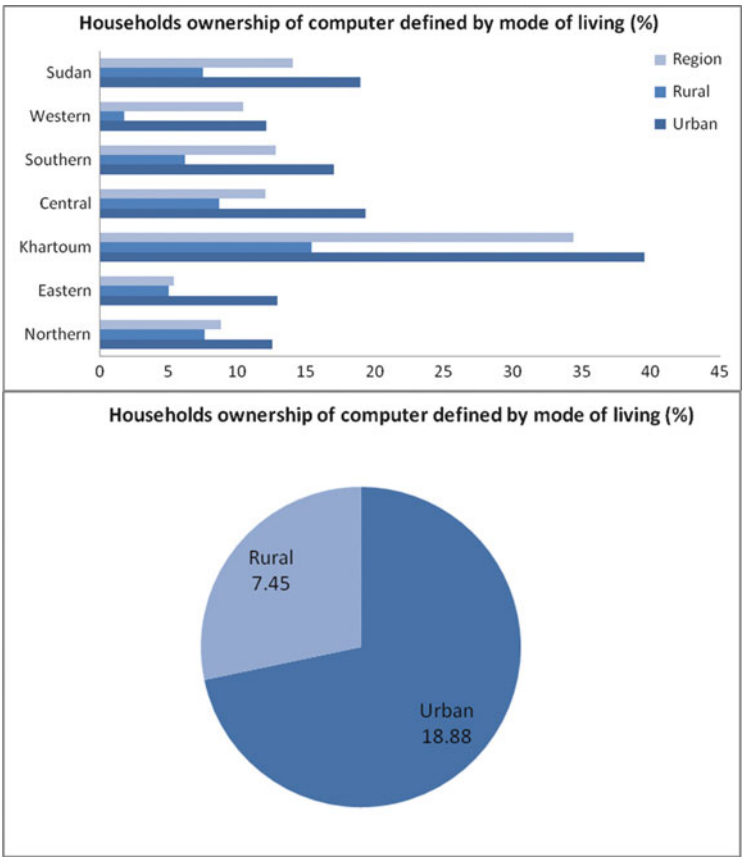

Fig. 6.7 Households ownership and use of computer defined by region and by mode of living in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

6.3.2 Knowledge, Provision and Use of Computer by Individuals

Concerning individual's use of computer, Tables 6.8 and 6.9 explains proportions of individuals with knowledge to use computer, provided with computer at home, used computer at home and outside home and scope/reasons for use of computer at home and outside home defined by region, mode of living and gender.

The regional disparities in ICT indicators appear from awareness to use computer as defined by the proportions of individuals' with knowledge to use computer defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' with knowledge to use computer in urban areas (33 %) is more than three time higher than rural areas (10.6 %) and for males (23.3 %) is higher than females (15.7 %) and total Sudan (19.4 %). The regional

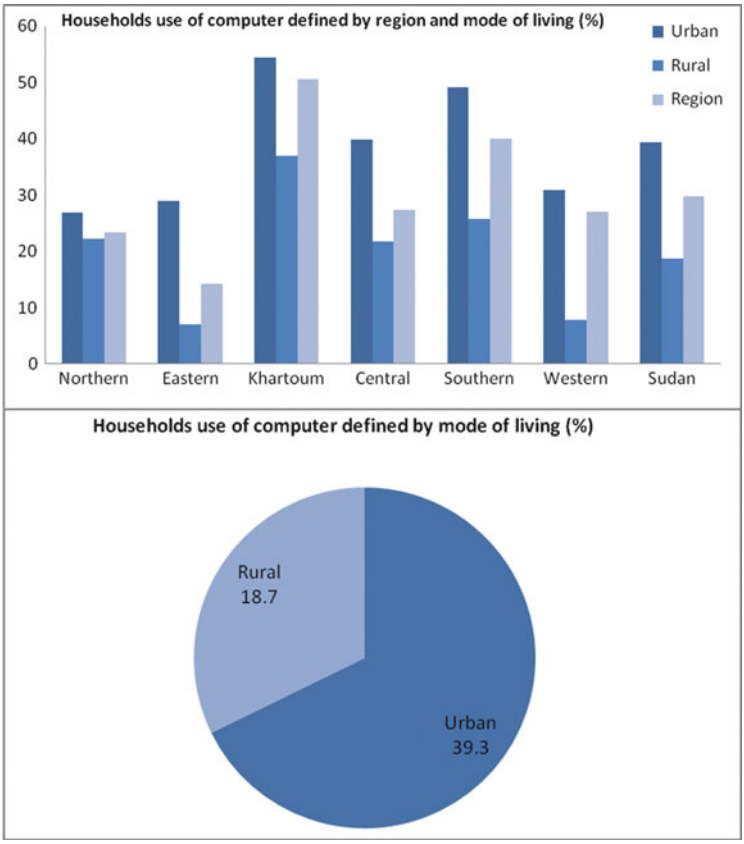

Fig. 6.7 (continued)

distribution implies that the highest proportions of individuals' with knowledge to use computer is reported in Khartoum followed by all Sudan, Southern, Central, Northern, Western, and Eastern regions respectively.[31] Proportions of individuals' with knowledge to use computer in Khartoum is more than four time higher than in Eastern regions (see Table 6.8 and Fig. 6.8).

The regional disparities in ICT indicators appear from awareness to use computer outside home as defined by the proportions of individuals use computer of total individuals with knowledge to use computer outside home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals use computer of total individuals with knowledge to use computer outside home in rural areas (68.6 %) is higher than urban areas (62.4 %) and for males (68.5 %) is higher than females (58.7 %) and total Sudan (64.4 %). The regional distribution implies that the highest proportions of individuals use computer of total individuals

[31] As reported by 41.9 %, 19.4 %, 18.3 %, 15.6 %, 14.8 %, 10.9 % and 9.2 % respectively.

Table 6.8 The proportions of individuals used computer at home and outside home defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Have the knowledge how to use computer	Mode of living	Urban	17.9	19.3	45.9	27.1	30.9	18.6	33
		Rural	13.7	3.2	23.1	11.8	13.3	8.2	10.6
	Gender	Males	16.7	11.9	47.1	19.4	25.1	11.8	23.3
		Females	12.9	6.2	36	12.4	12.1	10	15.7
	Region		14.8	9.2	41.9	15.6	18.3	10.9	19.4
Provided with computer at home	Mode of living	Urban	7.7	9.6	32.4	12.5	14	8.5	20.2
		Rural	5.4	0.8	10.4	5.8	4	1.6	4.1
	Gender	Males	7.6	4.7	31.8	9.7	9.7	3.9	12.7
		Females	4.4	3.4	24.9	5.6	4.3	2.8	8.3
	Region		6	4.1	28.6	7.4	6.9	3.4	10.5
Used a computer at home	Mode of living	Urban	93.4	93.5	95.7	95.3	93.6	94.3	95.3
		Rural	96.6	100	92.4	97.1	85.7	100	95.8
	Gender	Males	96.7	95.6	96.2	97.8	86.9	96.1	96.1
		Females	93.6	92.5	94.5	94.2	97.1	96.6	94.5
	Region		95.5	94.3	95.5	96.3	90.3	96.3	95.4
Used computer outside the home	Mode of living	Urban	53.9	55.3	58.9	71.2	76.3	74.4	62.4
		Rural	69.8	73.9	62.3	66	85.6	68.5	68.6
	Gender	Males	64.9	64.2	64.2	71.1	87.3	74.5	68.5
		Females	64.9	49.5	51.7	64.6	69.8	67.3	58.7
	Region		64.9	59.4	59.2	68.3	81.2	71.1	64.4

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

Table 6.9 Purposes of use of computer at home and outside home defined by region, mode of living and gender in Sudan during 2011

				Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
At home	For games and entertainment	Mode of living	Urban	65.8	72.4	65.2	76	82.1	75.1	68.1
			Rural	91.3	27.4	80.4	86.5	96.7	85.7	85
		Gender	Males	81.4	67.4	64	83.7	87.5	77.3	71.2
			Females	86.2	65.3	69.4	79.9	88.9	81.1	73.6
		Region		83.1	66.6	66.2	82.2	88	78.9	72.2
	To connect to the Internet	Mode of living	Urban	51.6	70.9	82.6	69.8	69.3	75.8	79
			Rural	66.7	83.6	65.1	72.4	88.9	72	72.1
		Gender	Males	61.7	73.3	83.9	74.5	80.2	73.4	79.5
			Females	62.1	71.4	78.1	66.4	71.7	75.8	74.1
		Region		61.9	72.5	81.6	71.3	77.2	74.4	77.3
	To print files	Mode of living	Urban	3.9	21.6	39.5	35.8	38	48.4	37.7
			Rural	15.8	0	22.2	52.2	28.9	29.2	38.5
		Gender	Males	10.9	15.1	41.6	47.9	36	38.9	39.8
			Females	13.8	24.5	33.9	41.5	31.3	44.8	35
		Region		12	18.8	38.5	45.4	34.3	41.4	37.9
	For educational purposes	Mode of living	Urban	62.6	76.2	68.8	72	71.7	77.8	70.1
			Rural	73.8	71.9	59.5	70.6	83.4	63.4	69.6
		Gender	Males	67	74.4	67.9	69.9	73.9	79.5	69.6
			Females	75.9	77.6	68.7	73.2	80.8	63.5	70.5
		Region		70.2	75.6	68.2	71.2	76.4	72.6	70
	To save the data	Mode of living	Urban	47.7	53	60.7	59.1	58.2	76.1	60.5
			Rural	68.4	33.6	36.2	65.8	96.7	92.6	65.3
		Gender	Males	63.6	48.8	63.5	62.9	78	85.8	64.4
			Females	58.6	53.1	52.8	63.1	65.6	77.2	57.5
		Region		61.8	50.5	59.2	63	73.6	82	61.7

(continued)

Table 6.9 (continued)

				Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
	For work-related work	Mode of living	Urban	16.8	15.2	25	22.6	18.4	32	24.1
			Rural	5.3	11	10.3	23.4	10	13.7	17.3
		Gender	Males	10.1	17.4	30	25.7	18.3	34.8	27.3
			Females	6.9	10.2	15.2	19	9.1	13.1	15.2
		Region		9	14.6	14.1	23.1	15	22.4	25.4
Outside home	For games and entertainment	Mode of living	Urban	48.1	47.2	47.5	56.9	65.6	67.4	51.9
			Rural	56.1	62.4	50.7	63.2	82.9	82	66.6
		Gender	Males	65.9	56.5	49.3	62.4	76.9	75.4	59
			Females	39	37.5	45	57.3	71.1	75	53.9
		Region		54.1	51.4	47.8	60.3	75.1	75.2	57.1
	To connect to the Internet	Mode of living	Urban	30.8	59.9	67.7	63.2	52.4	59.6	64
			Rural	40.1	54.7	44.4	54.8	48.7	50	50.3
		Gender	Males	43.3	64	69.8	64.1	54.2	59	64.2
			Females	30.5	43.7	57.2	50.5	41.3	48.9	50.8
		Region		37.7	58.5	65.4	58.6	50.3	54.4	59.2
	To print files	Mode of living	Urban	38	44.2	48.6	48	59.1	54.6	49
			Rural	23.1	27.6	26	56.1	51.7	24.1	41.1
		Gender	Males	28.1	38.1	46.1	52.4	53.4	40	46.3
			Females	25.4	43.7	46.8	52.5	58.7	36	46.2
		Region		26.9	39.6	46.3	52.4	55	38.2	46.2
	For educational purposes	Mode of living	Urban	75.9	61.2	69.1	70.9	62.6	72.7	69
			Rural	68.5	74.5	64	76.1	66.8	90.1	75.1
		Gender	Males	69.7	61.9	65	69.8	63.9	78.4	67.5
			Females	71.2	72.9	75.3	79.4	67.2	86.4	77.2
		Region		70.4	64.9	68.6	73.7	64.9	82	71.2

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

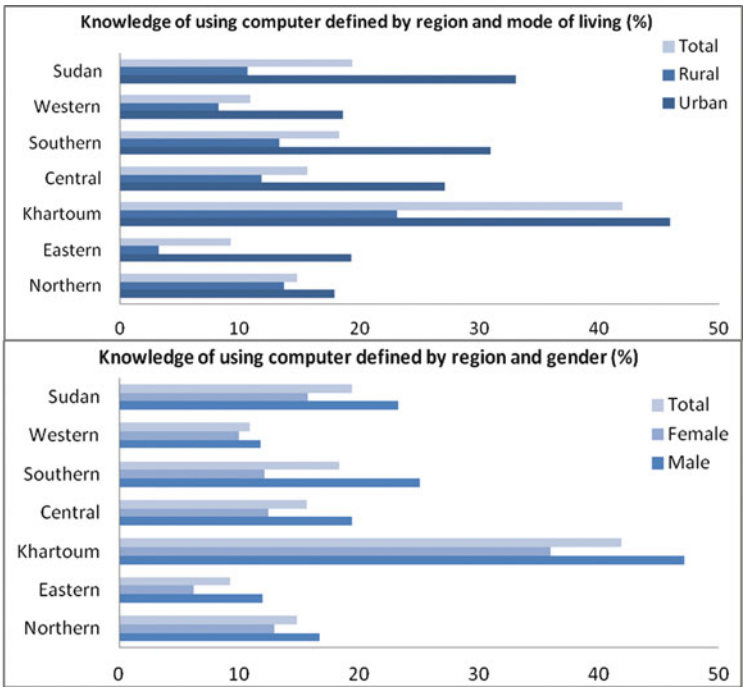

Fig. 6.8 The use of computer at home and outside home defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

with knowledge to use computer outside home is reported in Southern region followed by Western, Central, Northern, all Sudan, Eastern, and Khartoum regions respectively (see Table 6.8 and Fig. 6.8).[32]

The regional disparities in ICT indicators appear from the proportions of individuals' provided with computer at home for their use defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' provided with computer at home for their use in urban areas (20.2 %) is more than four times higher than rural areas (4.1 %) and for males (12.7 %) is higher than females (8.3 %) and total Sudan (10.5 %). The regional distribution implies that the highest proportions of individuals' provided with computer at home for their use is reported in Khartoum followed by all Sudan, Central, Southern, Northern, Eastern, and Western regions respectively.[33] Proportions of individuals' provided with computer at home in Khartoum is more than six time higher than in Eastern regions (see Table 6.8 and Fig. 6.8).

[32] As reported by 81.2 %, 71.1 %, 68.3 %, 64.9 %, 64.4 %, 59.4 %, and 59.2 % respectively.

[33] As indicated by 28.6 %, 10.5 %, 7.4 %, 6.9 %, 6 %, 4.1 %, and 3.4 % respectively.

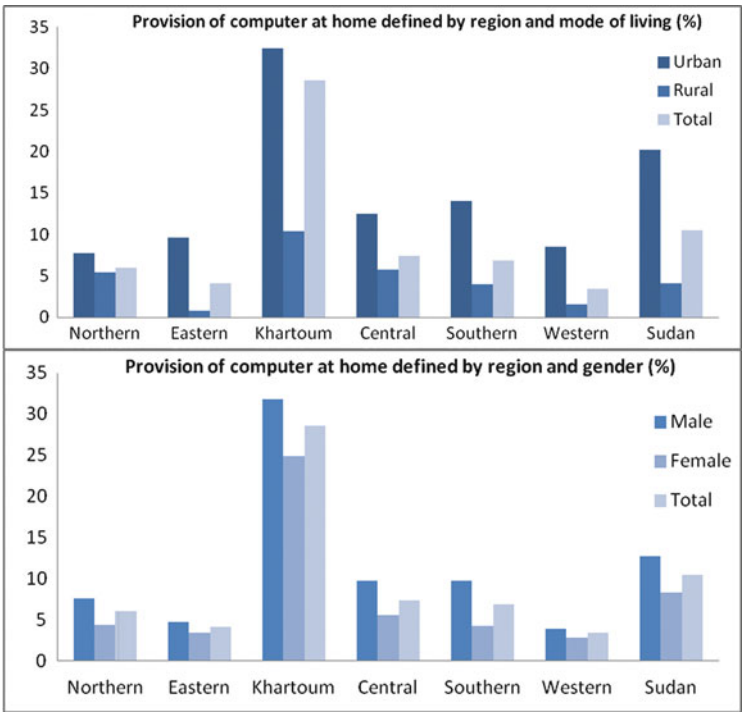

Fig. 6.8 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals use computer of total individuals with knowledge to use computer at home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals use computer of total individuals with knowledge to use computer at home in rural areas (95.8 %) is higher than urban areas (95.3 %) and for males (96.1 %) is higher than females (94.5 %) and total Sudan (95.4 %). The regional distribution implies that the highest proportions of individuals use computer of total individuals with knowledge to use computer at home is reported in Western region followed by Central, Khartoum, Northern, all Sudan, Eastern, and Southern regions respectively (see Table 6.8 and Fig. 6.8).[34]

6.3.3 Purposes of the Use of Computer

From the viewpoint of individuals in Sudan computer is widely used at home and outside home for several purposes, notably, it is widely used at home to connect to the Internet, for games and entertainment, for educational purposes, save the data,

[34] As reported by 96.3 %, 96.3 %, 95.5 %, 95.5 %, 95.4 %, and 94.3 % respectively.

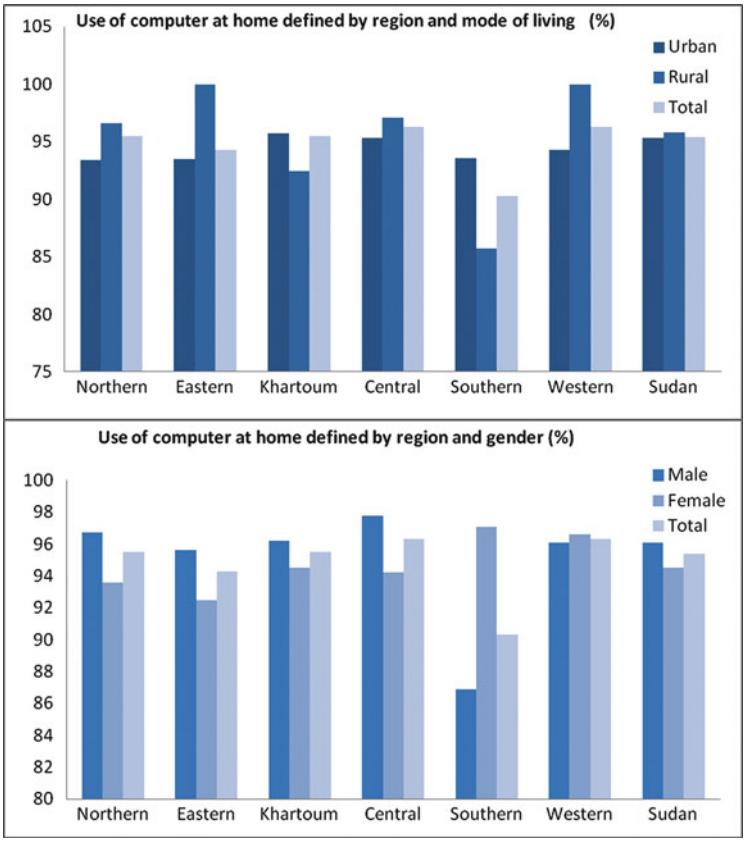

Fig. 6.8 (continued)

print files, and for work-related work respectively, in addition, for all Sudan computer is widely used outside home for educational purposes, to connect to the Internet, for games and entertainment, and to print files respectively.[35] The gender gap between males and females in ICT indicators appear from several purposes of using computer defined by gender that implies that for males and females computer is widely used at home to connect to the Internet, for games and entertainment, for educational purposes, to save the data, to print files, and for work-related work respectively, in addition, computer is widely used outside home for educational purposes, to connect to the Internet, for games and entertainment, and to print files respectively for males and females respectively (see Table 6.9 and Fig. 6.9).[36,37]

[35] As indicated by 77.3 %, 72.2 %, 70 %, 61.7 %, 37.9 % and 25.4 % respectively for at home. And as indicated by 71.2 %, 59.2 %, 57.1 % and 46.2 % respectively for outside home.

[36] As reported by 79.5 %, 71.2 %, 69.6 %, 64.4 %, 39.8 % and 27.3 % respectively at home. And as indicated by 67.5 %, 64.2 %, 59 % and 46.3 % for outside home respectively for males.

[37] As indicated by 74.1 %, 73.6 %, 70.5 %, 57.5 %, 35 % and 15.2 % respectively for females at home. And as indicated by 77.2 %, 50.8 %, 53.9 % and 46.2 % for females outside home respectively.

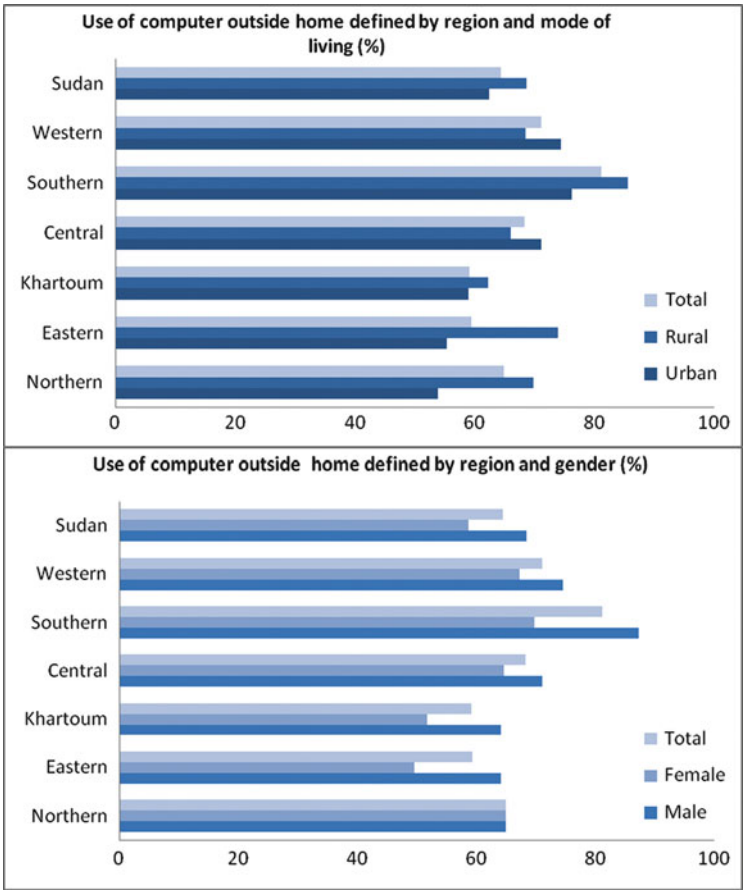

Fig. 6.8 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used computer at home for games and entertainment defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer at home for games and entertainment in rural (85 %) is higher than urban (68.1 %) and for females (73.6 %) is higher than males (71.2 %) and total Sudan (72.2 %). The regional distribution implies that the highest proportions of individuals used computer at home for games and entertainment is reported in Southern region followed by Northern, Central, Western, all Sudan, Eastern, and Khartoum regions respectively (see Table 6.9 and Fig. 6.9).[38]

The regional disparities in ICT indicators appear from the proportions of individuals used computer outside home for games and entertainment defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals

[38] As indicated by 88 %, 83.1 %, 82.2 %, 78.9 %, 72.2 %, 66.6 %, and 66.2 % respectively.

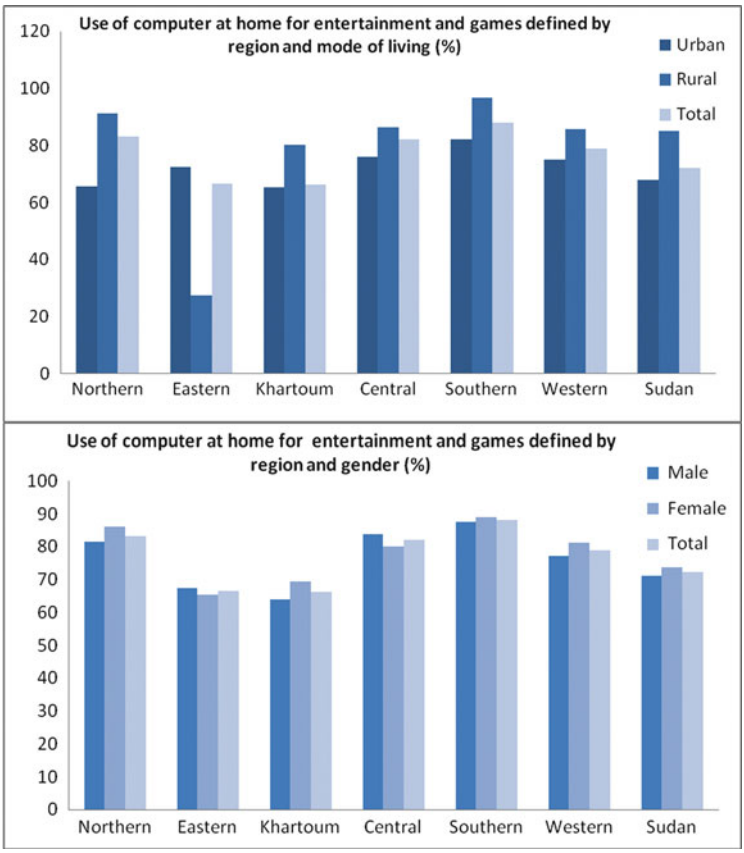

Fig. 6.9 Purposes of use of computer at home and outside home defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

used computer outside home for games and entertainment in rural (66.6 %) is higher than urban (51.9 %) and for males (59 %) is higher than females (53.9 %) and total Sudan (57.1 %). The regional distribution implies that the highest proportions of individuals used computer outside home for games and entertainment is reported in Western region followed by Southern, Central, all Sudan, Northern, Eastern, and Khartoum regions respectively (see Table 6.9 and Fig. 6.9).[39]

The regional disparities in ICT indicators appear from the proportions of individuals used computer at home to connect to the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer at home to connect to the Internet in urban (79 %) is higher than rural

[39] As indicated by 75.2 %, 75.1 %, 60.3 %, 57.1 %, 54.1 %, 51.4 %, and 47.8 % respectively.

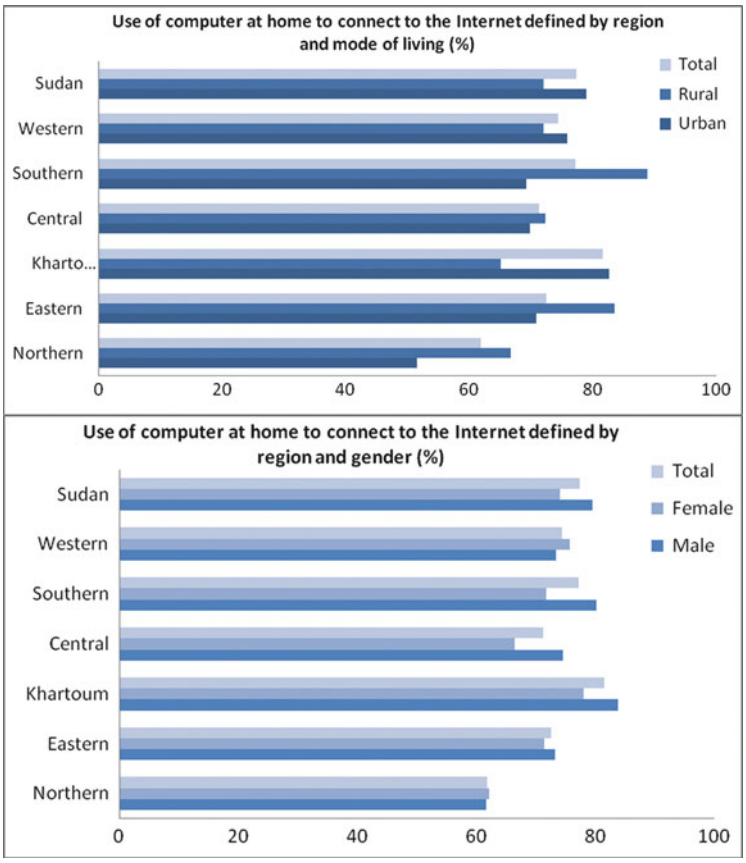

Fig. 6.9 (continued)

(72.1 %) and for males (79.5 %) is higher than females (74.1 %) and total Sudan (77.3 %). The regional distribution implies that the highest proportions of individuals used computer at home to connect to the Internet is reported in Khartoum followed by all Sudan, Southern, Western, Eastern, Central, and Northern regions respectively (see Table 6.9 and Fig. 6.9).[40]

The regional disparities in ICT indicators appear from the proportions of individuals used computer outside home to connect to the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer outside home to connect to the Internet in urban (64 %) is higher than rural (50.3 %) and for males (64.2 %) is higher than females (50.8 %) and total Sudan (59.2 %). The regional distribution implies that the highest proportions of individuals used computer outside home to connect to the Internet is reported in

[40] As reported by 81.6 %, 77.3 %, 77.2 %, 74.4 %, 72.5 %, 71.3 % and 61.9 % respectively.

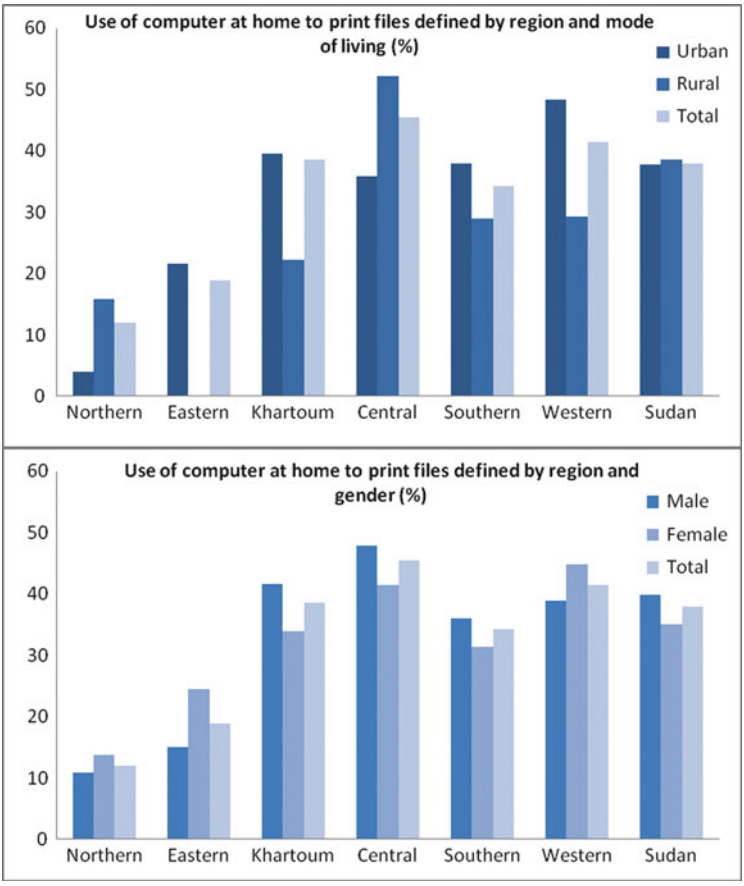

Fig. 6.9 (continued)

Khartoum followed by all Sudan, Central, Eastern, Western, Southern, and Northern regions respectively (see Table 6.9 and Fig. 6.9).[41]

The regional disparities in ICT indicators appear from the proportions of individuals used computer at home to print files defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer at home to print files in rural (38.5 %) is higher than urban (37.7 %) and for males (39.8 %) is higher than females (35 %) and total Sudan (37.9 %). The regional distribution implies that the highest proportions of individuals used computer at home to print files is reported in Central region followed by Western, Khartoum, all Sudan, Southern, Eastern, and Northern regions respectively (see Table 6.9 and Fig. 6.9).[42]

[41] As reported by 65.4 %, 59.2 %, 58.6 %, 58.5 %, 54.4 %, 50.3 %, and 37.7 % respectively.

[42] As indicated by 45.4 %, 41.4 %, 38.5 %, 37.9 %, 34.3 %, 18.8 %, and 12 % respectively.

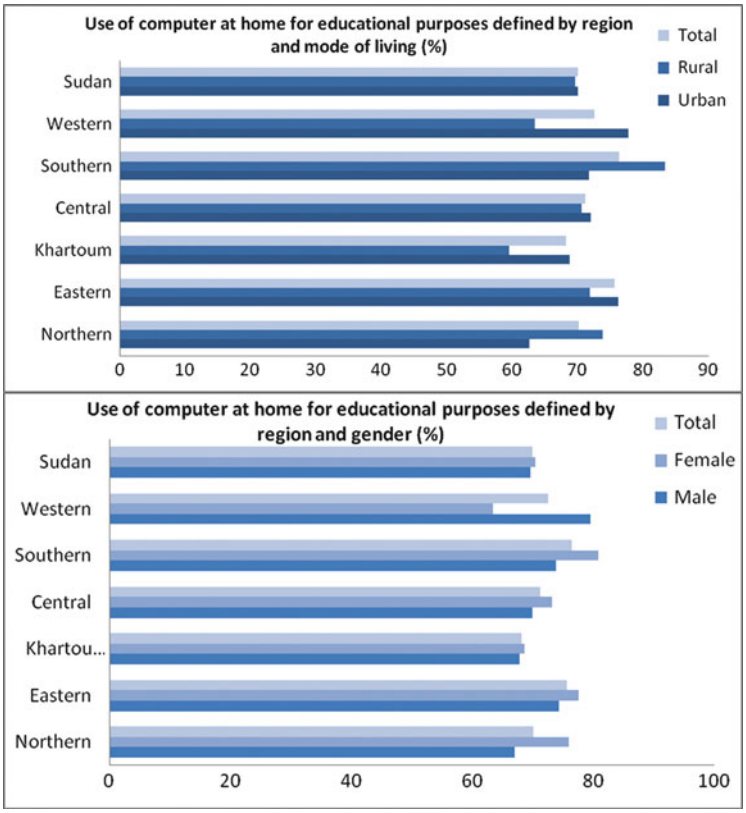

Fig. 6.9 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used computer outside home to print files defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer outside home to print files in urban (49 %) is higher than rural (41.1 %) and for males (46.3 %) is higher than females (46.2 %) and total Sudan (46.2 %). The regional distribution implies that the highest proportions of individuals used computer outside home to print files is reported in Southern region followed by Central, Khartoum, all Sudan, Eastern, Western, and Northern regions respectively (see Table 6.9 and Fig. 6.9).[43]

The regional disparities in ICT indicators appear from the proportions of individuals used computer at home for educational purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer at home for educational purposes in urban (70.1 %) is higher than rural (69.6 %) and for females (70.5 %) is slightly higher than males (69.6 %) and total

[43] As indicated by 55 %, 52.4 %, 46.3 %, 46.2 %, 39.6 %, 38.2 %, and 26.9 % respectively.

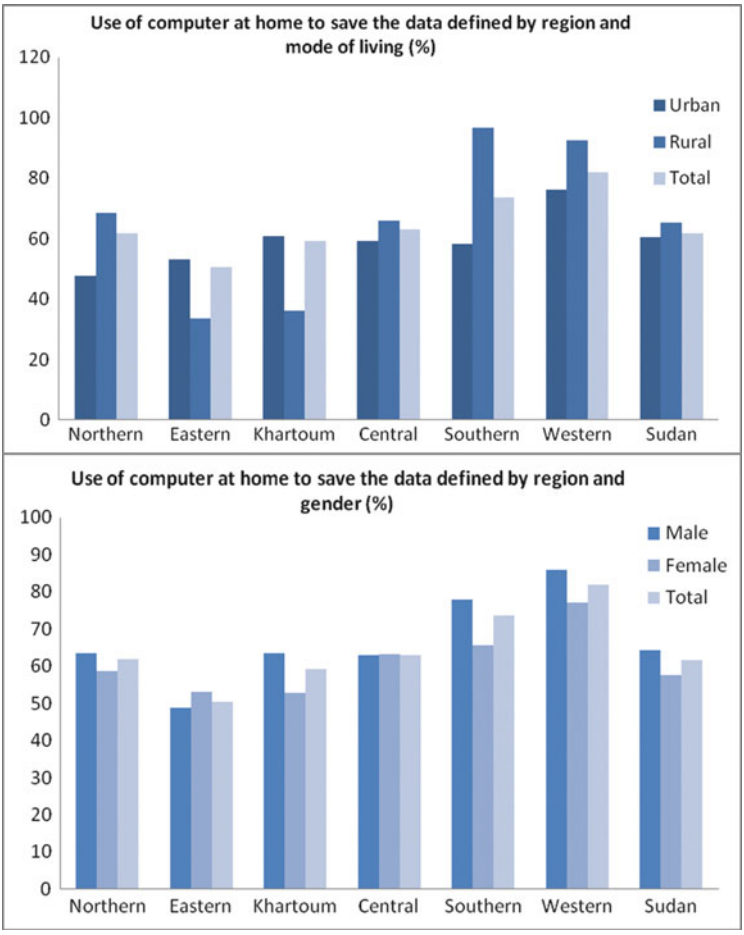

Fig. 6.9 (continued)

Sudan (70 %). This result implies that the use of computer at home is useful to help to increase educational attainment for females and therefore can be used to reduce the gender gap in educational attainment between males and females in Sudan. The regional distribution implies that the highest proportions of individuals used computer at home for educational purposes is reported in Southern region followed by Eastern, Western, Central, Northern, all Sudan, and Khartoum regions respectively (see Table 6.9 and Fig. 6.9).[44]

The regional disparities in ICT indicators appear from the proportions of individuals used computer outside home for educational purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals

[44] As reported by 76.4 %, 75.6 %, 72.6 %, 71.2 %, 70.2 %, 70 %, and 68.2 % respectively.

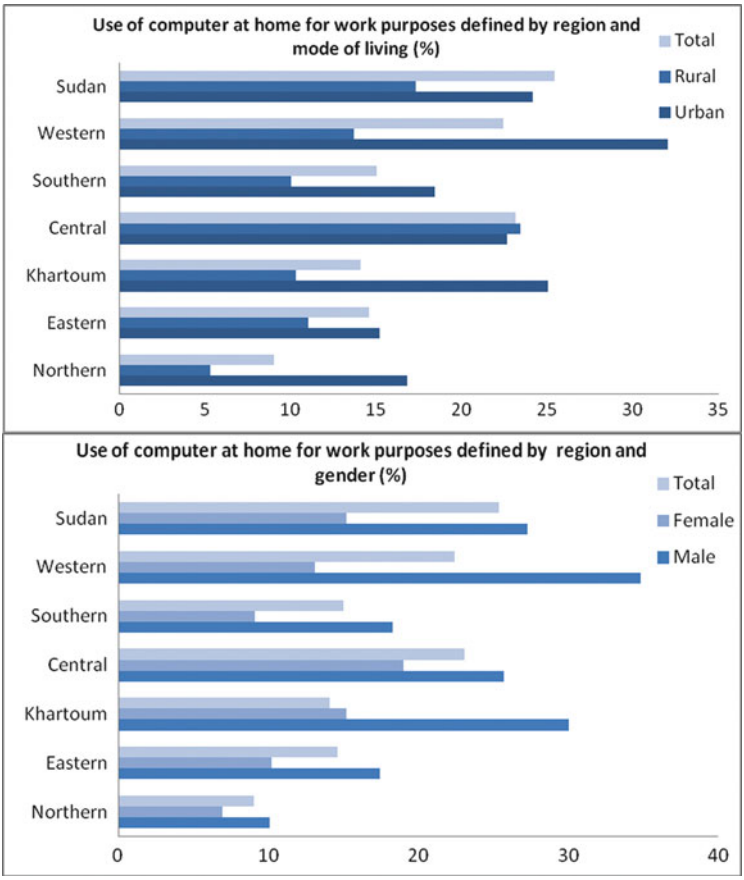

Fig. 6.9 (continued)

used computer outside home for educational purposes in rural (75.1 %) is higher than urban (69 %) and for females (77.2 %) is higher than males (67.5 %) and total Sudan (71.2 %). This result implies that the use of computer outside home is useful to help to increase educational attainment for rural areas and therefore can be used to reduce the regional disparity in educational attainment between urban and rural areas in Sudan. This result also implies that the use of computer outside home is useful to help to increase educational attainment for females and therefore can be used to reduce the gender gap in educational attainment between males and females in Sudan. The regional distribution implies that the highest proportions of individuals used computer outside home for educational purposes is reported in Western region followed by Central, all Sudan, Northern, Khartoum, Southern, and Eastern regions respectively (see Table 6.9 and Fig. 6.9).[45]

[45] As reported by 82 %, 73.7 %, 71.2 %, 70.4 %, 68.6 %, 64.9 %, and 64.9 % respectively.

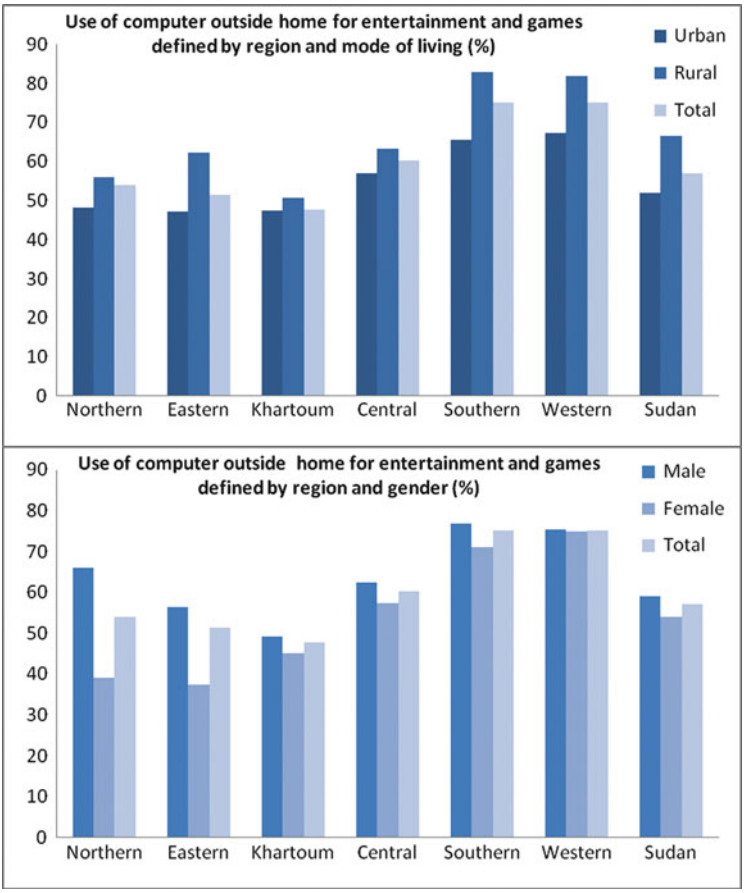

Fig. 6.9 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used computer at home to save the data defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used computer at home to save the data in rural (65.3 %) is higher than urban (60.5 %) and for males (64.4 %) is higher than females (57.5 %) and total Sudan (61.7 %). The regional distribution implies that the highest proportions of individuals used computer at home to save the data is reported in Western region followed by Southern, Central, Northern, all Sudan, Khartoum, and Eastern regions respectively.[46]

The regional disparities in ICT indicators appear from the proportions of individuals used computer at home for work-related work defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used

[46] As indicated by 82 %, 73.6 %, 63 %, 61.8 %, 61.7 %, 59.2 %, and 50.5 % respectively.

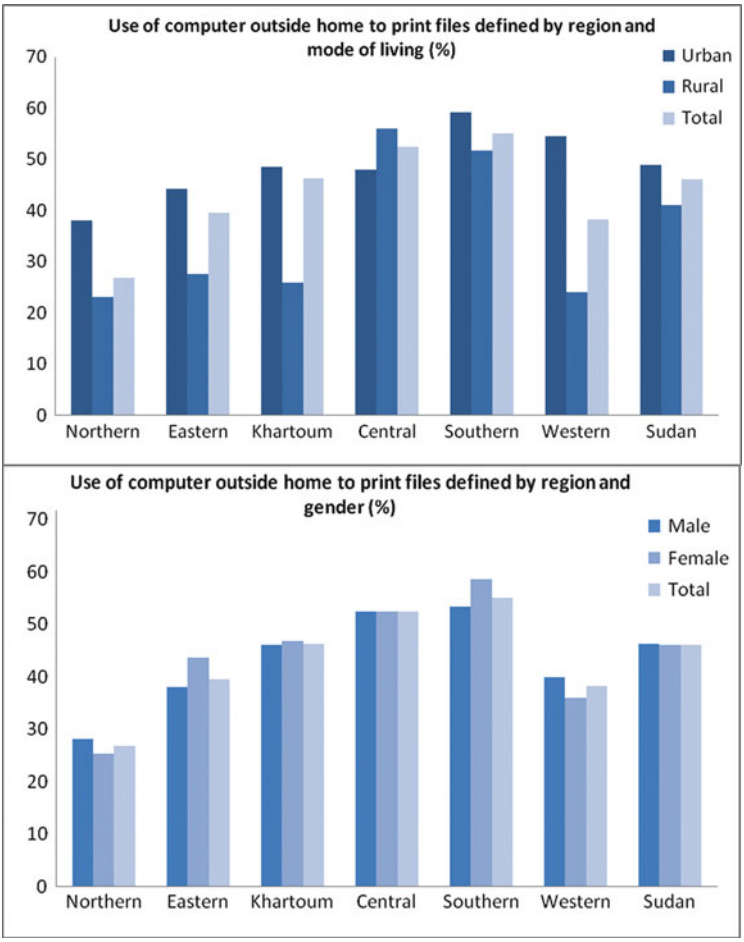

Fig. 6.9 (continued)

computer at home for work-related work in urban (24.1 %) is higher than rural (17.3 %) and for males (27.3 %) is higher than females (15.2 %) and total Sudan (25.4 %). The regional distribution implies that the highest proportions of individuals used computer at home for work-related work is reported in all Sudan followed by Central, Western, Southern, Eastern, Khartoum, and Northern regions respectively (see Table 6.9 and Fig. 6.9).[47]

[47] As indicated by 25.4 %, 23.1 %, 22.4 %, 15 %, 14.6 %, 14.1 %, and 9 % respectively.

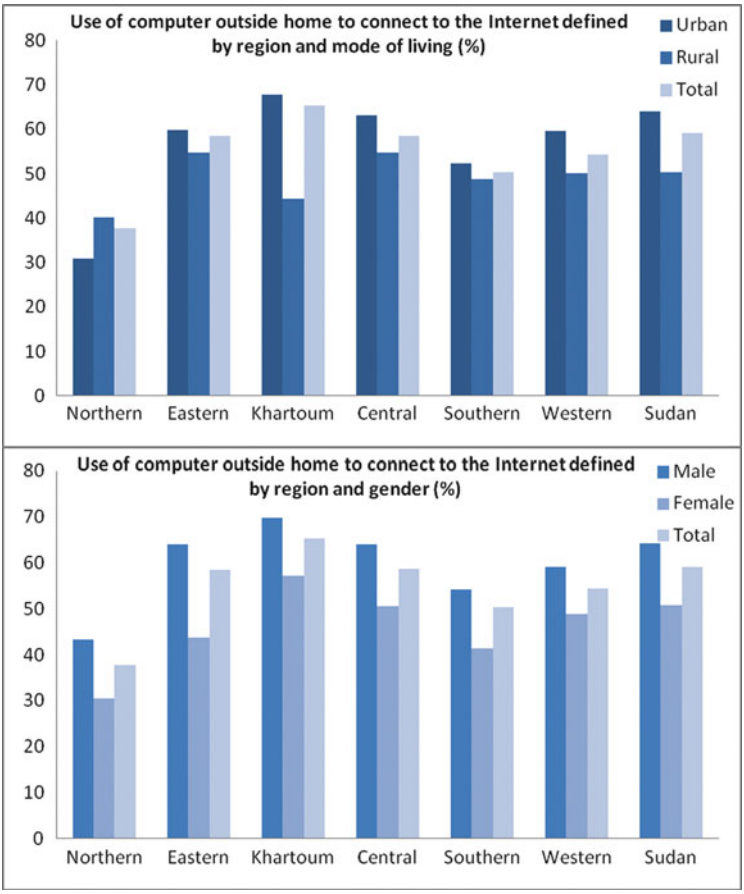

Fig. 6.9 (continued)

6.3.4 Impediment Factors Impeded the Use of Computer

From the viewpoint of individuals, several impediment factors impeded the use of computer at home and outside home. Regarding the factors that hindered the use of computer, Table 6.10 explains that the proportions of individuals to use computer at home and outside home are impeded by impediment factors such as the lack of electricity, the presence of inhibitors related to health reasons, the lack of desire, and for other reasons at home and outside home defined by region, mode of living and gender (see Table 6.10 and Fig. 6.10).

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer at home for the lack of electricity of total who did not use computer at home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use computer at home for the lack of electricity of total who did not use computer at home in rural (32.1 %) is near

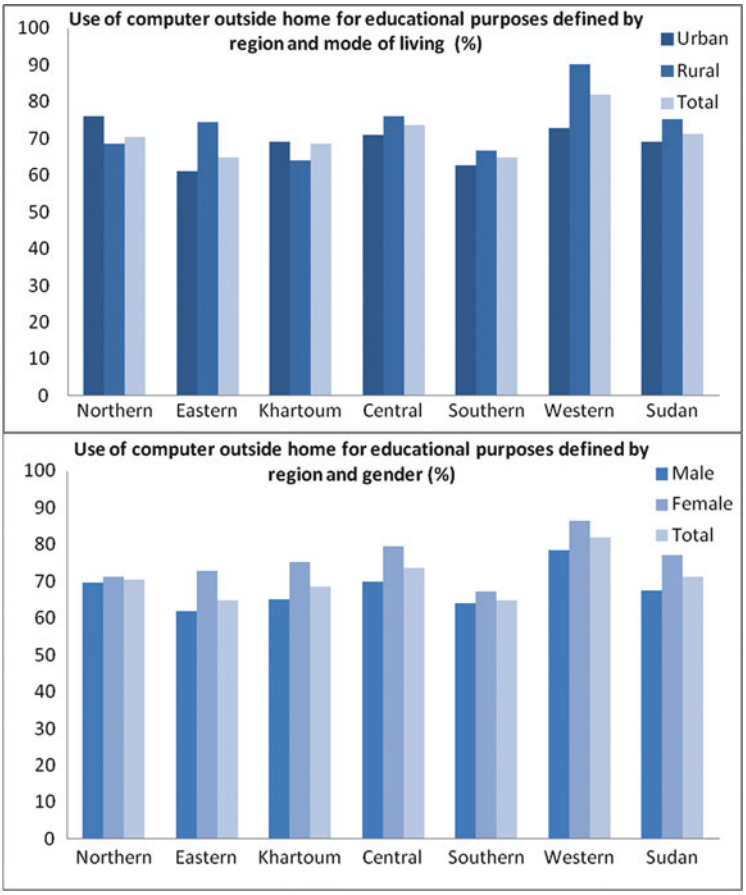

Fig. 6.9 (continued)

to twice/higher than urban (16.4 %) and for males (27.9 %) is more than double/higher than females (11.4 %) and total Sudan (19.9 %). The regional distribution implies that the highest proportions of individuals who did not use computer at home for the lack of electricity of total who did not use computer at home is reported in Southern region followed by Eastern, Western, all Sudan, Khartoum, Central, and Northern regions respectively (see Table 6.10 and Fig. 6.10).[48]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer at home for the presence of inhibitors related to health reasons of total who did not use computer at home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use computer at home for the presence of inhibitors related to health reasons of total who did not use computer at home in urban (8.7 %) is higher than rural

[48] As reported by 54.4 %, 35.3 %, 33.2 %, 19.9 %, 14.7 %, 14.3 %, and 0 % respectively.

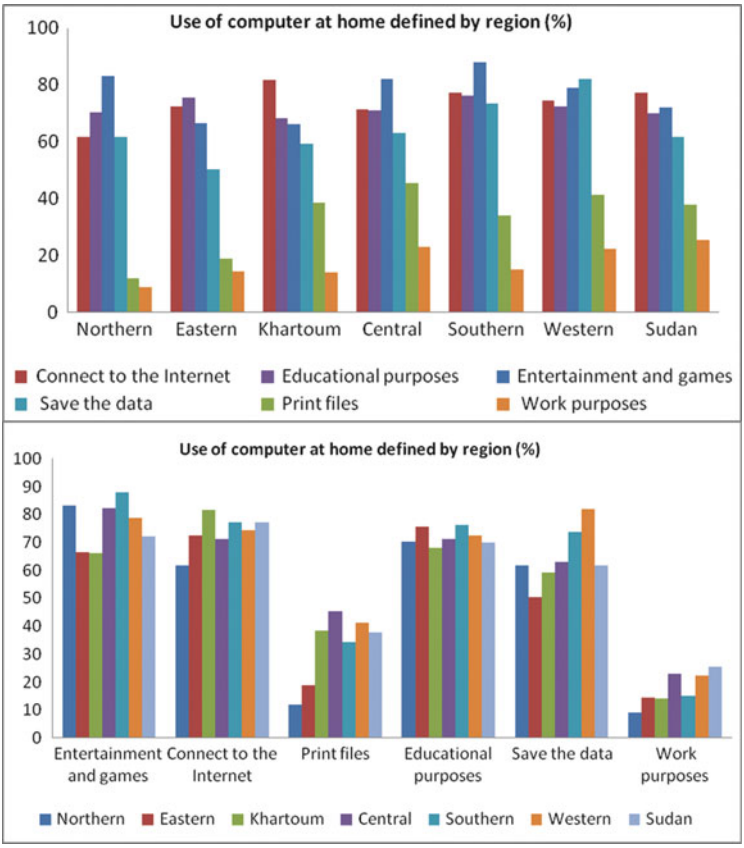

Fig. 6.9 (continued)

(0 %) and for females (7.3 %) is higher than males (6.3 %) and total Sudan (6.8 %). The regional distribution implies that the highest proportions of individuals who did not use computer at home for the presence of inhibitors related to health reasons of total who did not use computer at home is reported in Northern region followed by Western, Khartoum, all Sudan, Southern, Central, and Eastern regions respectively (see Table 6.10 and Fig. 6.10).[49]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer at home for the lack of desire of total who did not use computer at home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use computer at home for the lack of desire of total who did not use computer at home in urban (27.9 %) is more than twice/higher than rural (13.9 %) and for females (34.6 %) is more than double/higher than males (15.7 %) and total Sudan (24.9 %). The regional distribution

[49] As indicated by 26.6 %, 26.1 %, 7.3 %, 6.8 %, 3.2 %, 0 %, and 0 % respectively.

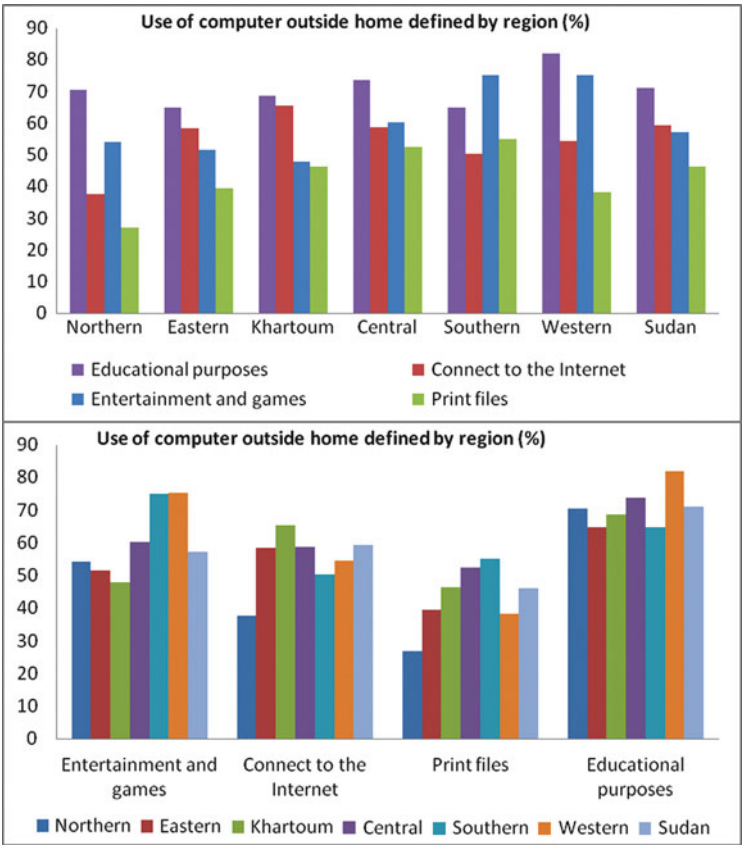

Fig. 6.9 (continued)

implies that the highest proportions of individuals who did not use computer at home for the lack of desire of total who did not use computer at home is reported in Khartoum followed by Western, all Sudan, Central, Southern, Eastern, and Northern regions respectively (see Table 6.10 and Fig. 6.10).[50]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer outside home for the lack of desire of total who did not use computer outside home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' who did not use computer outside home for the lack of desire of total who did not use computer outside home in urban (20.7 %) is higher than rural (18.2 %) and for males (20.7 %) is higher than females (19.2 %) and total Sudan (20 %). The regional distribution implies that the highest proportions of individuals who did not use computer outside home for the lack of desire of total who did not use a computer outside home is reported in

[50] As reported by 31.6 %, 30.1 %, 24.9 %, 22.8 %, 12.8 %, 0 %, and 0 % respectively.

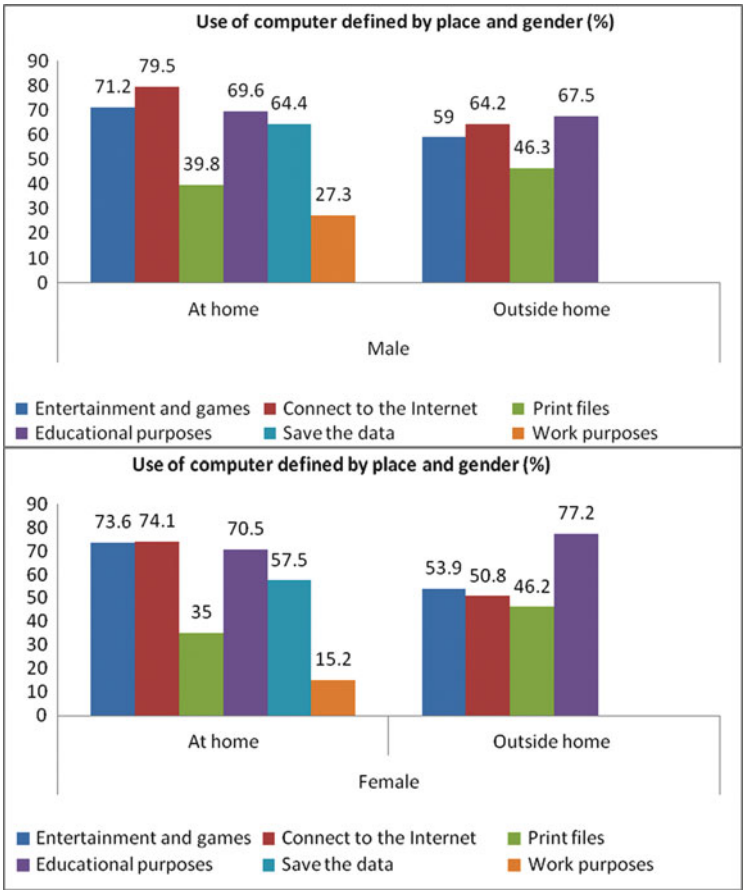

Fig. 6.9 (continued)

Southern region followed by Western region, Eastern, all Sudan, Khartoum, Central, and Northern regions respectively (see Table 6.10 and Fig. 6.10).[51]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer outside home for high value of rent of computer of total who did not use computer outside home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' who did not use computer outside home for high value of rent of computer of total who did not use computer outside home in urban (12.6 %) is higher than rural (9.4 %) and for males (12.7 %) is higher than females (10.5 %) and total Sudan (11.7 %). The regional distribution implies that the highest proportions of individuals who did not use computer outside home for high value of rent of computer of total who did not use computer outside home is reported in Southern region followed by Eastern, all

[51] As indicated by 30.7 %, 28.7 %, 25.1 %, 20 %, 20 %, 14.7 %, and 14 % respectively.

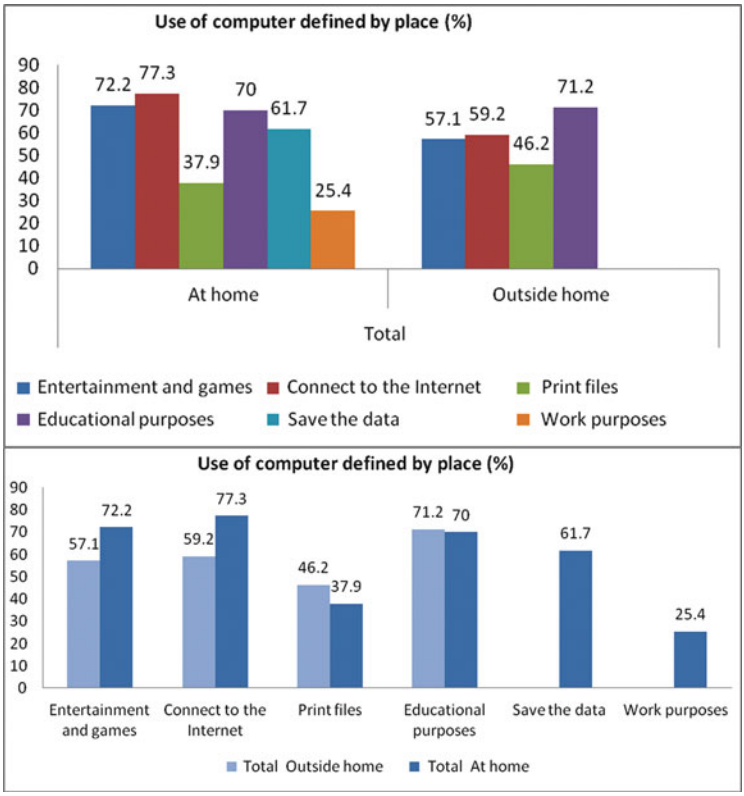

Fig. 6.9 (continued)

Sudan, Central, Khartoum, Western, and Northern regions respectively (see Table 6.10 and Fig. 6.10).[52]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer outside home for the lack of need of total who did not use a computer outside home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use computer outside home for the lack of need of total who did not use computer outside home in rural (36.6 %) is higher than urban (35.5 %) and for females (41.9 %) is higher than males (30.3 %) and total Sudan (35.9 %). The regional distribution implies that the highest proportions of individuals who did not use computer outside home for the lack of need of total who did not use computer outside home is reported in Northern region followed by Western, Eastern, Southern, all Sudan, Khartoum, and Central regions respectively (see Table 6.10 and Fig. 6.10).[53]

[52] As reported by 27.4 %, 24.5 %, 11.7 %, 10.8 %, 10.7 %, 7.8 %, and 1.4 % respectively.

[53] As indicated by 51.1 %, 45 %, 45 %, 41.8 %, 35.9 %, 35.5 %, and 25.6 % respectively.

Table 6.10 Factors limit the use of computer at home and outside home defined by region, mode of living and gender in Sudan during 2011

				Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Did not use a computer at home	For lack of electricity	Mode of living	Urban	0	35.3	16.4	0	9	33.2	16.4
			Rural	0	0	0	30.9	80	0	32.1
		Gender	Males	0	75	15.9	23.2	58.5	35.3	27.9
			Females	0	0	13.5	9.3	0	30	11.4
		Region		0	35.3	14.7	14.3	54.4	33.2	19.9
	For the presence of inhibitors related to health reasons	Mode of living	Urban	54.7	0	8.2	0	9	26.1	8.7
			Rural	0	0	0	0	0	0	0
		Gender	Males	0	0	7.9	0	3.5	23.5	6.3
			Females	49.9	0	6.7	0	0	30	7.3
		Region		26.6	0	7.3	0	3.2	26.1	6.8
	For the lack of desire	Mode of living	Urban	0	0	33.7	31.6	0	30.1	27.9
			Rural	0	0	14.6	12.7	20	0	13.9
		Gender	Males	0	0	19.8	8.9	13.7	23.5	15.7
			Females	0	0	43.5	30.8	0	40	34.6
		Region		0	0	31.6	22.8	12.8	30.1	24.9
	For other reasons	Mode of living	Urban	45.3	64.8	69.8	62.1	82	77	68.7
			Rural	48.1	0	70.9	69.1	40	0	60.3
		Gender	Males	100	25	76.2	67.9	51.8	88.2	69.5
			Females	0	100	63.5	63.9	100	60	64
		Region		46.8	64.8	69.9	65.3	55.1	77	66.9

(continued)

Table 6.10 (continued)

				Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Did not use a computer outside home	For the lack of desire	Mode of living	Urban	22	20.5	20.2	16.5	20.3	38.5	20.7
			Rural	8.8	52.6	17.9	13.5	46	22.2	18.2
		Gender	Males	15.3	26.8	20.1	15.4	18.1	37.8	20.7
			Females	12.5	22.5	19.9	13.8	40.7	20.5	19.2
		Region		14	25.1	20	14.7	30.7	28.7	20
	For the high value of the total rent of computer	Mode of living	Urban	0	26.8	10.4	15.6	14.8	12.9	12.6
			Rural	2.3	10.9	13.8	7.8	46	4.4	9.4
		Gender	Males	0	23.2	12.5	12.1	18.1	11.3	12.7
			Females	3.1	26.5	8.8	9.4	34.8	4.6	10.5
		Region		1.4	24.5	10.7	10.8	27.4	7.8	11.7
	For the lack of need	Mode of living	Urban	46.8	44.6	33.4	33.9	40.3	42.5	35.5
			Rural	54	47.4	57.6	20.3	44	46.6	36.6
		Gender	Males	42	45.1	30.1	22.2	40.3	26.5	30.3
			Females	62.5	44.9	41.5	29.3	43	61.6	41.9
		Region		51.1	45	35.5	25.6	41.8	45	35.9
	For other reasons	Mode of living	Urban	34.1	36.1	74.8	54.9	70.5	57	66.5
			Rural	35.1	32.1	65.6	64.3	80	40.3	56.6
		Gender	Males	42.5	29.3	144.1	68.8	62.5	54.3	64.6
			Females	25	44.9	212.2	51.6	83.7	40.5	62.5
		Region		34.7	35.6	174.9	60.6	74.4	47	63.6

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

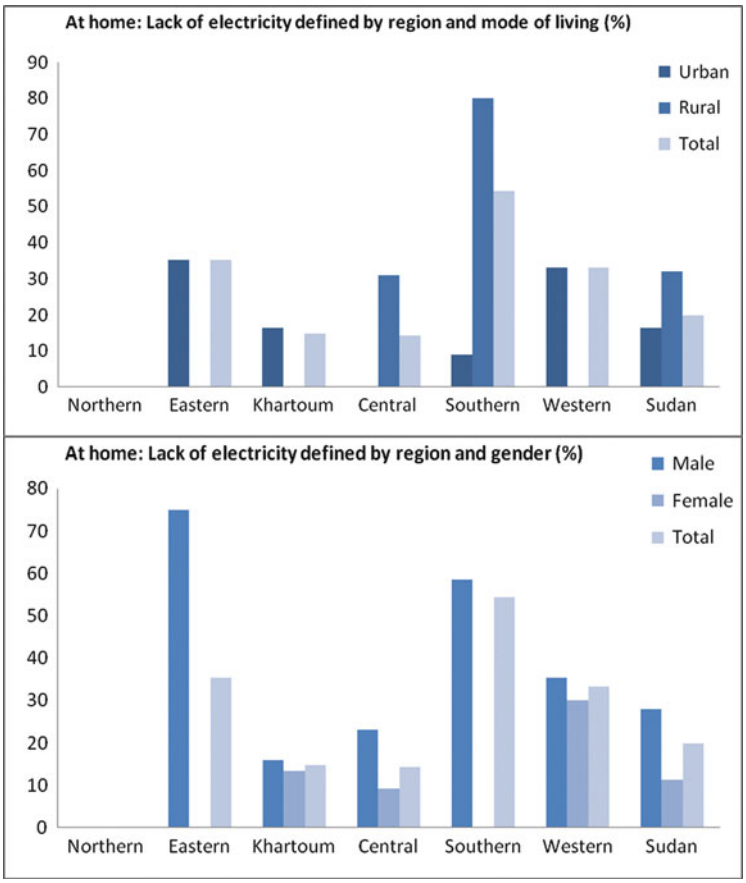

Fig. 6.10 Factors limit the use of computer at home and outside home defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer at home for other reasons of total who did not use computer at home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use computer at home for other reasons of total who did not use computer at home in urban (68.7 %) is higher than rural (60.3 %) and for males (69.5 %) is higher than females (64 %) and total Sudan (66.9 %). The regional distribution implies that the highest proportions of individuals who did not use computer at home for other reasons of total who did not use computer at home is reported in Western region followed by Khartoum, all Sudan, Central, Eastern, Southern, and Northern regions respectively (see Table 6.10 and Fig. 6.10).[54]

[54] As indicated by 77 %, 69.9 %, 66.9 %, 65.3 %, 64.8 %, 55.1 %, and 46.8 % respectively.

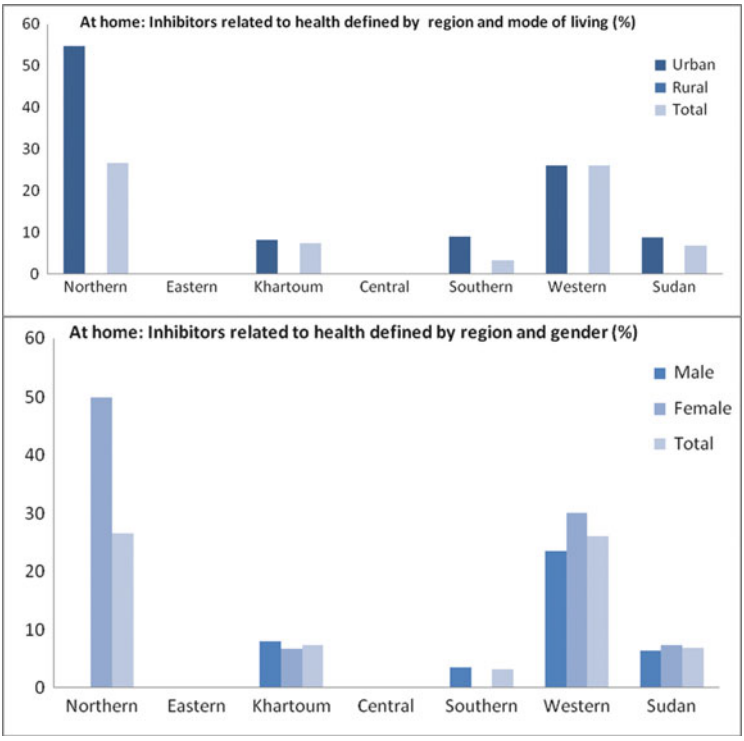

Fig. 6.10 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals who did not use computer outside home for other reasons of total who did not use computer outside home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use computer outside home for other reasons of total who did not use computer outside home in urban (66.5 %) is higher than rural (56.6 %) and for males (64.6 %) is higher than females (62.5 %) and total Sudan (63.6 %). The regional distribution implies that the highest proportions of individuals who did not use computer outside home for other reasons of total who did not use computer outside home is reported in Khartoum followed by Southern, all Sudan, Central, Western, Eastern, and Northern regions respectively (see Table 6.10 and Fig. 6.10).[55]

[55] As reported by 74.9 %, 74.4 %, 63.6 %, 60.6 %, 47 %, 35.6 %, and 34.7 % respectively.

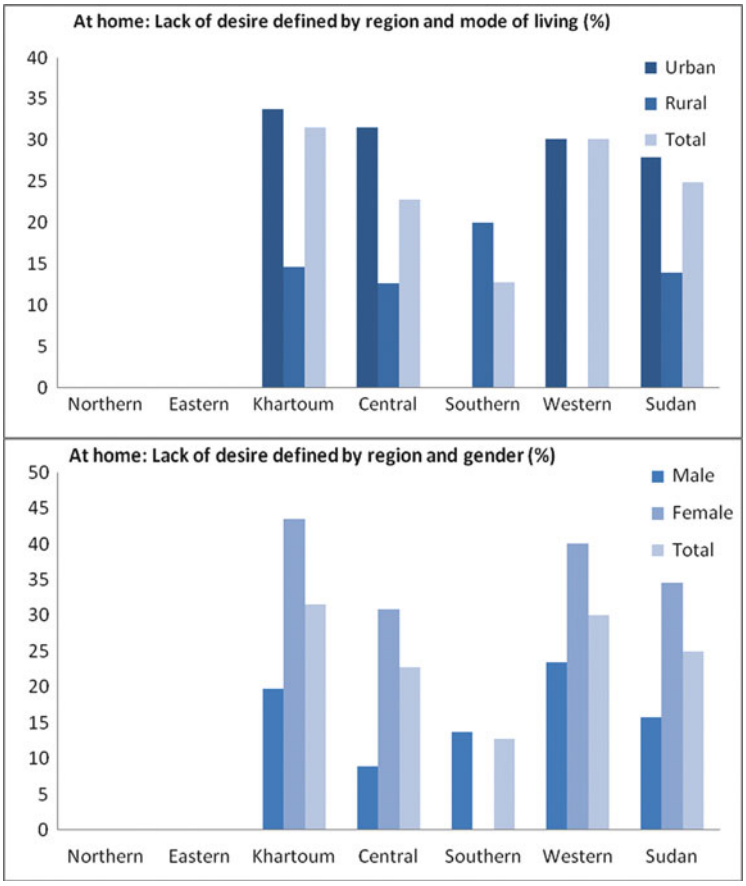

Fig. 6.10 (continued)

6.4 The Use of Internet and Digital Divide in Sudan

This section investigates the use of Internet and digital divide in Sudan and shows evidences on the occurrence of the digital divide for households and individuals in terms of access, use, average spending on the Internet per month, awareness and knowledge to use Internet, locations and purposes of use of Internet defined by mode of living gender, and region.

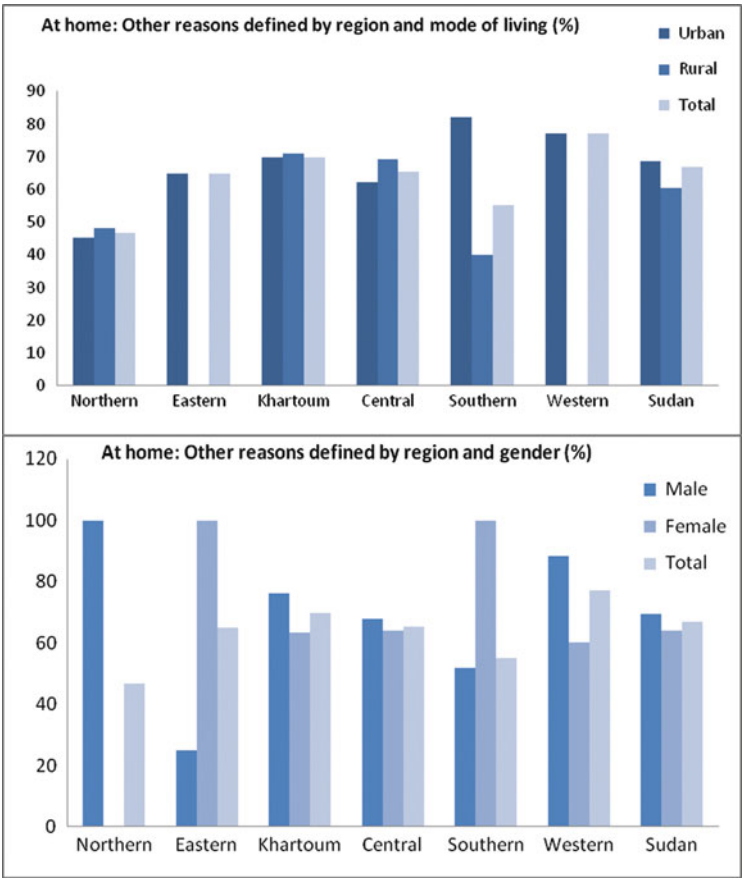

Fig. 6.10 (continued)

6.4.1 Pattern of Access to and Spending on the Internet by Households

Concerning households' access to the Internet, Tables 6.11 and 6.12 explains the proportions of households with access to the Internet, pattern of households' access to the Internet from home, and households and individuals average spending on fixed telephone, Internet mobile per month, defined by region and mode of living.

The regional disparities in ICT indicators appear from proportions of households' access to the internet defined by region and mode of living in Sudan. That implies that households' access to the internet in urban (37.4 %) is near to twice higher than rural (20.1 %) and total Sudan (29.3 %). The regional distribution implies that the highest access to the internet is reported in Khartoum followed by

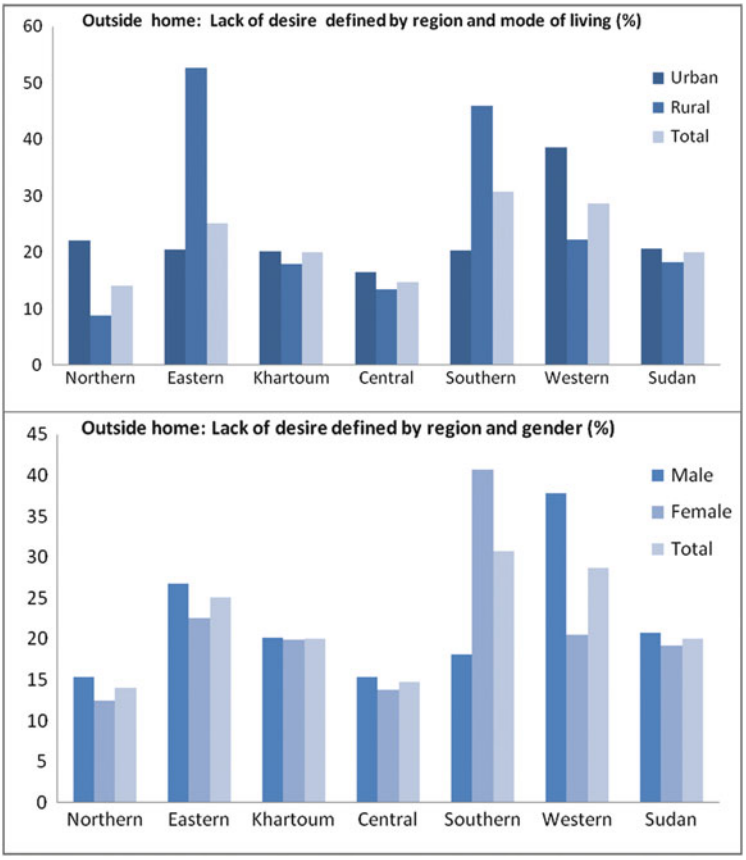

Fig. 6.10 (continued)

Southern, all Sudan, Central, Western, Northern, and Eastern regions respectively.[56] The regional distribution implies that the highest access to the internet in Khartoum (49.4 %) is more than three time higher than in Eastern (14.8 %) region (see Table 6.11 and Fig. 6.11).

The regional disparities in ICT indicators appear from households' average spending on the Internet per month defined by region and mode of living in Sudan. That implies that households' average spending on the Internet per month in urban areas (30 %) is similar to total Sudan (30 %) and both are higher than rural areas (20 %). The regional distribution implies that the highest households' average spending on the Internet per month is reported in Khartoum followed by all Sudan, Western, Eastern, Central, Northern, and Southern regions respectively (see Table 6.11 and Fig. 6.11).[57]

[56] As reported by 49.4 %, 40 %, 29.3 %, 29 %, 25.4 %, 16.9 % and 14.8 % respectively.

[57] As reported by 30 %, 30 %, 30 %, 30 %, 23 %, 21.5 % and 20 % respectively.

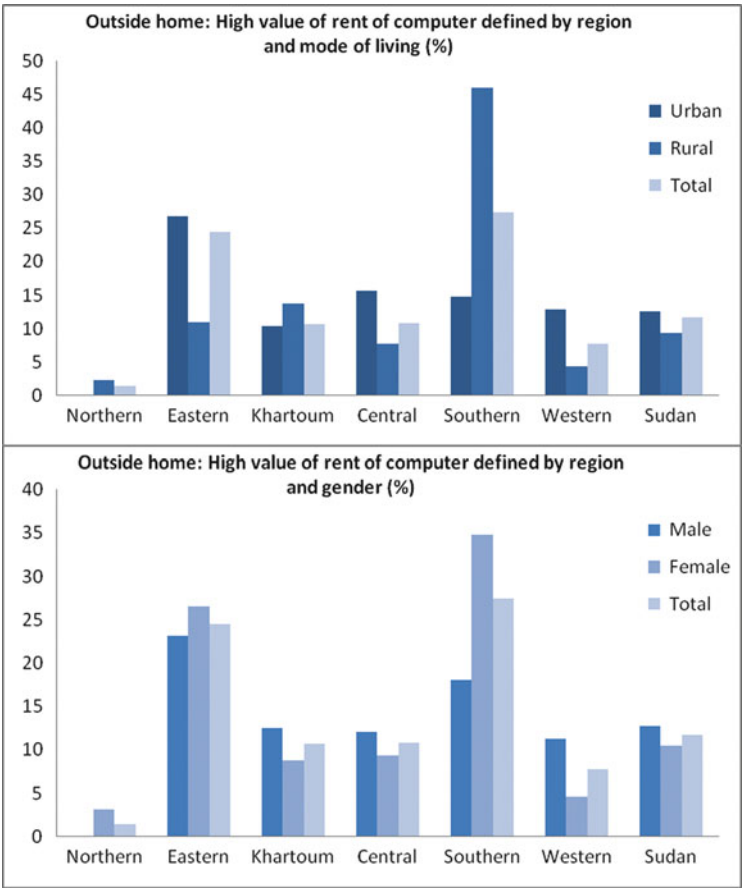

Fig. 6.10 (continued)

6.4.2 Knowledge and Use of the Internet by Individuals

Concerning individual's use of the Internet, Table 6.12 explains proportions of individuals with knowledge to use the Internet, used the Internet, the languages used for using the Internet, the methods for connection to the Internet, places for using the Internet and the purposes of the use of the Internet defined by region, mode of living and gender (see Table 6.12 and Fig. 6.12).

The regional disparities in ICT indicators appear from awareness to use the Internet as defined by the proportions of individuals' with knowledge to use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' with knowledge to use the Internet in urban areas

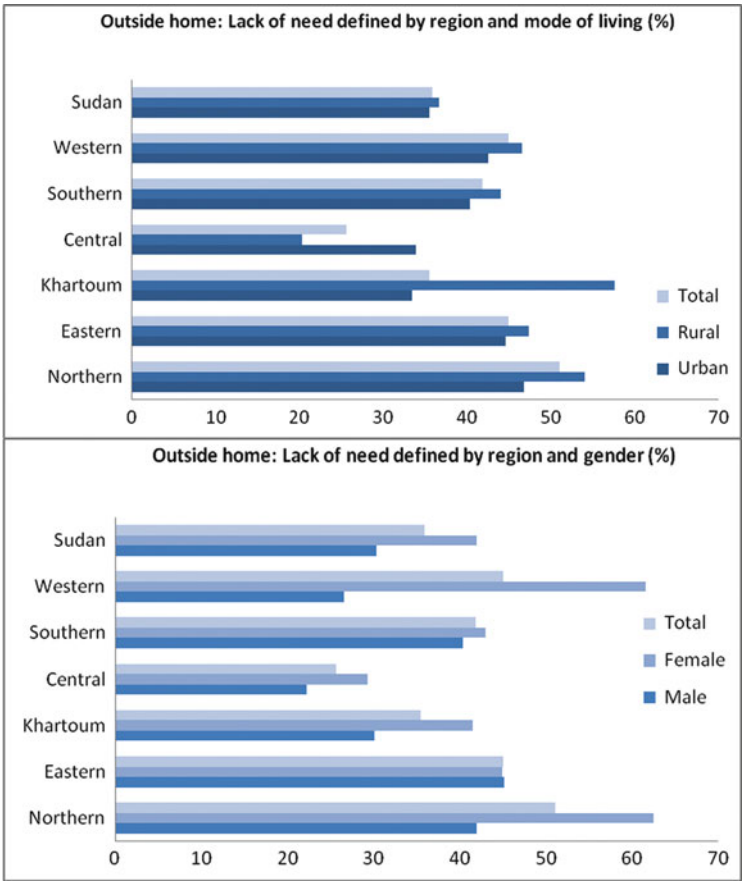

Fig. 6.10 (continued)

(29.1 %) is more than three times higher than rural areas (9.6 %) and for males (22.5 %) is nearly twice higher than females (12.3 %) and total Sudan (17.3 %). The regional distribution implies that the highest proportions of individuals' with knowledge to use the Internet is reported in Khartoum followed by Southern region, all Sudan, Central, Northern, Eastern, and Western regions respectively.[58] The regional disparity in terms of awareness to use the Internet as defined by the proportions of individuals' with knowledge to use the Internet is evidenced from the highest proportions in Khartoum, which is more than twice the proportions in all Sudan, Southern and Central regions, more than three times in Northern, more than

[58] As reported by 37 %, 17.6 %, 17.3 %, 15.5 %, 10.7 %, 9 %, and 7.2 % respectively.

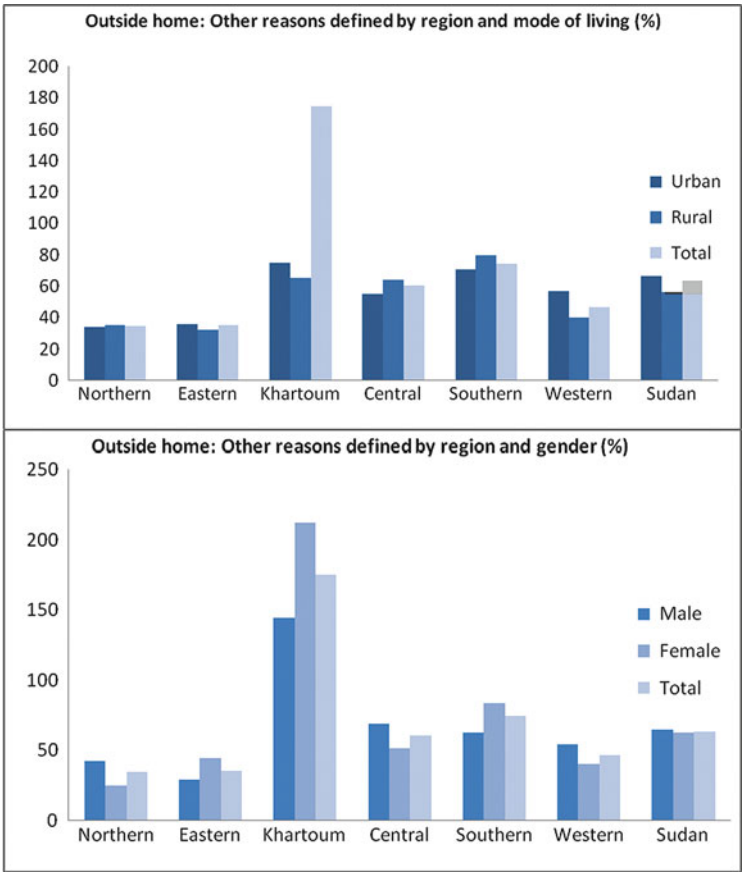

Fig. 6.10 (continued)

four times in Eastern, and more than five times in Western regions respectively (see Table 6.12 and Fig. 6.12).

The regional disparities in ICT indicators appear from the use of the Internet as defined by the proportions of individuals use the Internet of total individuals with knowledge to use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet of total individuals with knowledge to use the Internet in urban areas (94.8 %) is higher than rural areas (94.2 %) and for males (95.1 %) is higher than females (93.8 %) and total Sudan (94.6 %). The regional distribution implies that the highest proportions of individuals used the Internet of total individuals with knowledge to use the Internet is reported in Western region followed by Khartoum, all Sudan, Southern,

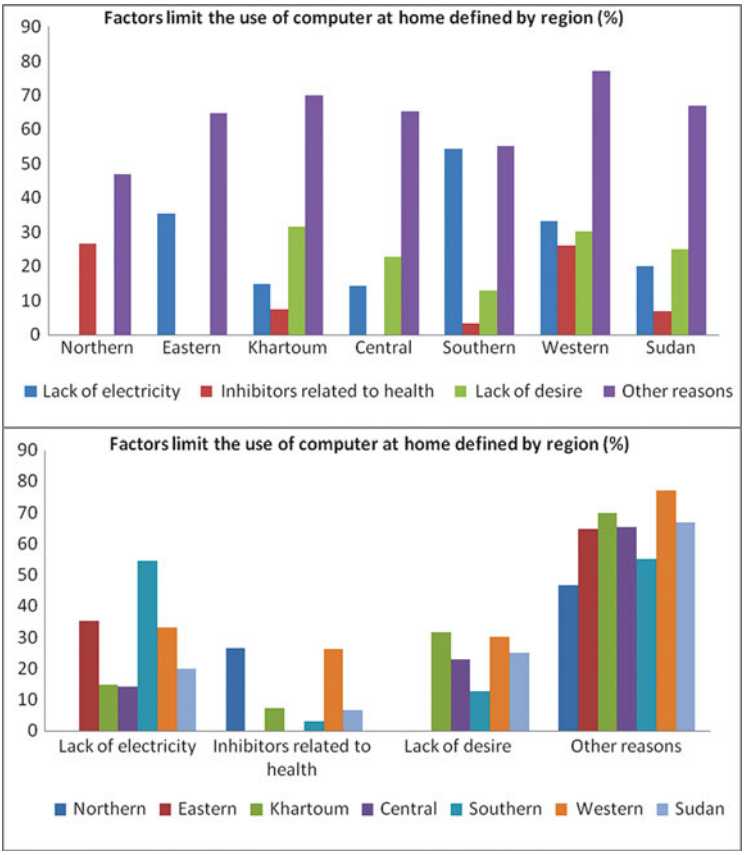

Fig. 6.10 (continued)

Central, Eastern, and Northern regions respectively (see Table 6.12 and Fig. 6.12).[59]

The regional disparities in ICT indicators appear from the proportions of individuals' have E-mail defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' have E-mail in urban areas (58.3 %) is more than four times higher than rural areas (39.8 %) and for males (57.5 %) is higher than females (50.5 %) and total Sudan (55 %). The regional distribution implies that the highest proportions of individuals' have E-mail is reported in Khartoum followed by Northern region, all Sudan, Central, Eastern, Western, and Southern, regions respectively.[60] The regional disparity in terms of the proportions

[59] As reported by 97.7 %, 96.3 %, 94.6 %, 93.5 %, 93.1 %, 92 %, and 86.9 % respectively.

[60] As indicated by 68 %, 56.9 %, 55 %, 50.2 %, 40.5 %, 30.9 %, and 30.4 % respectively.

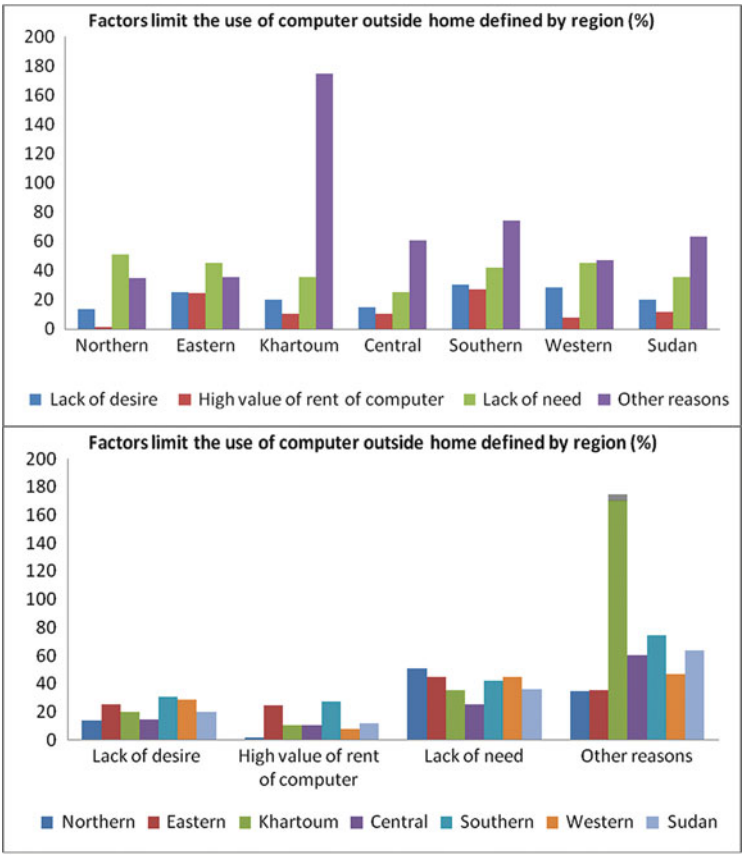

Fig. 6.10 (continued)

of individuals' have E-mail is evidenced from the highest proportions in Khartoum, which is more than twice the proportions in Southern and Western regions (see Table 6.12 and Fig. 6.12).

6.4.3 Language of Connectivity and Use of the Internet

The disparities in ICT indicators appear from the language of connectivity and the use of the Internet measured by the proportions of individuals used the Internet according to language which implies that for the majority of individuals in Sudan Arabic is the most widely used language for using the Internet, followed by the

Table 6.11 Pattern of households' access to the Internet from home, proportions of households with access to the Internet, households average spending on Internet per month (in pounds) defined by region and the mode of living in Sudan during 2011

Mode of living		Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Narrow broadband	Urban	80	48.5	37.8	43.5	23.5	62	
	Rural	78	14.3	44.8	36.6	14.1	0	
Wide fixed broadband	Urban	15	16.2	9.7	18.4	2	11.6	
	Rural	1.9	6.8	7.4	12.9	3.1	0	
Wide flexible (variable) broadband	Urban	25	61.9	78.9	55.1	61.2	52.8	
	Rural	37.3	76.2	62.1	59.8	73.4	87.5	
Proportions of households with access to the internet	Urban	19.2	28.8	52.1	38.1	46.2	29.3	37.4
	Rural	16.3	8	39.6	25	30.3	5.7	20.1
	Region	16.9	14.8	49.4	29	40	25.4	29.3
Average spending on internet	Urban	24.5	30	30	30	20	30	30
	Rural	20	22.5	22.5	20	20	30	20
	Region	21.5	30	30	23	20	30	30

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

Table 6.12 The proportions of individuals used the Internet defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Have the knowledge how to use the internet	Mode of living	Urban	12.7	17.2	40.5	24.4	26.3	16.8	29.1
		Rural	10.1	4.1	20.6	12.6	14.1	3.9	9.6
	Gender	Males	13.3	12.4	42.9	21.7	27	9.5	22.5
		Females	8.2	5.2	30.3	10.4	9.1	5.1	12.3
	Region		10.7	9	37	15.5	17.6	7.2	17.3
Used internet	Mode of living	Urban	100	92.7	96.5	90.8	92.8	96.1	94.8
		Rural	100	90.4	94.1	94.6	94	100	94.2
	Gender	Males	88.5	90.4	97.1	94.1	93	97.7	95.1
		Females	84.5	96.3	95	91.5	94.9	97.6	93.8
	Region		86.9	92	96.3	93.1	93.5	97.7	94.6
Have e-mail	Mode of living	Urban	58.8	35.5	67.6	46.6	31.1	48.5	58.3
		Rural	45.4	41.5	45.8	46.8	26.6	2.8	39.8
	Gender	Males	56.7	44.4	69.9	54.5	33.4	35.7	57.5
		Females	57.1	30.8	64.8	42.4	22.5	22.6	50.5
	Region		56.9	40.5	68	50.2	30.4	30.9	55

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

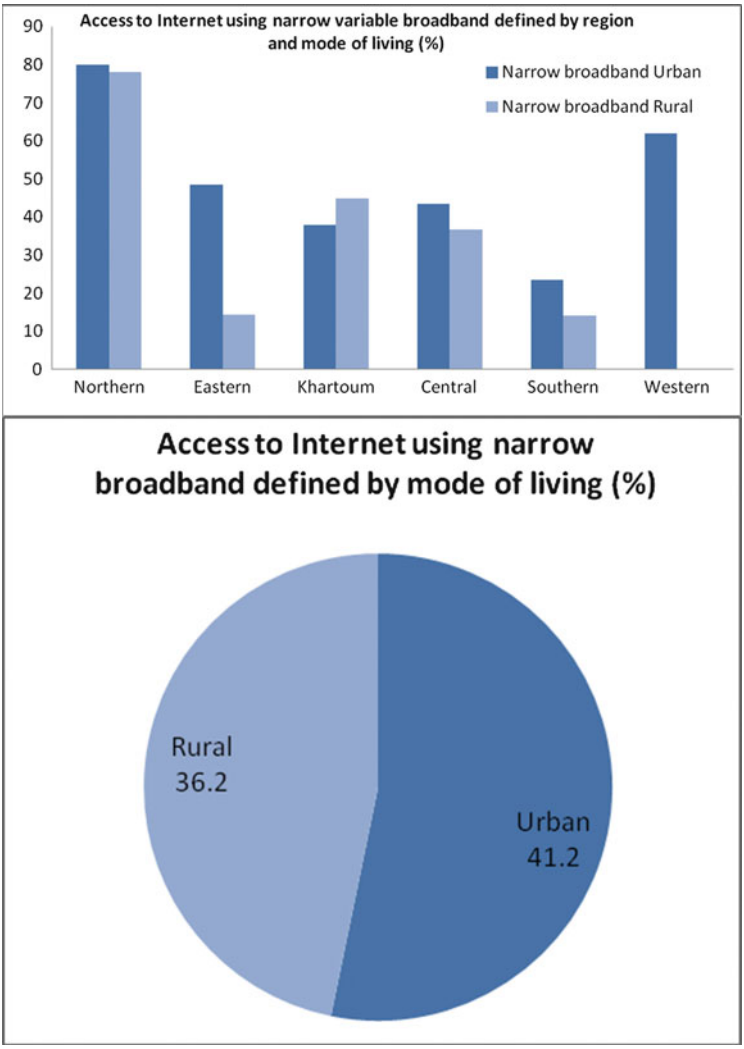

Fig. 6.11 Pattern of households' access to the Internet from home, proportions of households with access to the Internet, households average spending on Internet per month (in pounds) defined by region and the mode of living in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

English language and the other language respectively (see Table 6.13 and Fig. 6.13).[61]

The regional disparities in ICT indicators appear from the use of Arabic language to use the Internet as defined by the proportions of individuals use Arabic

[61] As indicated by 97 %, 49.8 %, and 1.4 % respectively.

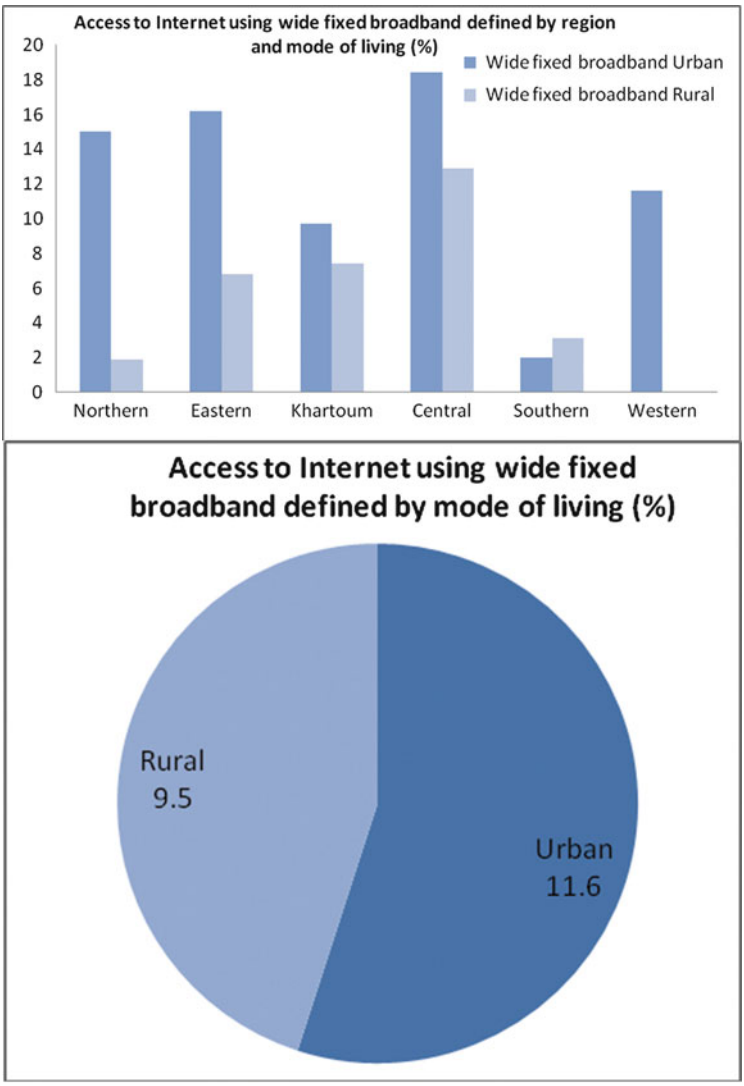

Fig. 6.11 (continued)

language to use the Internet of total individuals use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals use Arabic language to use the Internet of total individuals use the Internet in rural areas (98.8 %) is higher than urban areas (95.8 %) and for males (97 %) is higher than females (96 %) and total Sudan (97 %). The regional distribution implies that the highest proportions of individuals use Arabic language to use the Internet of total individuals use the Internet is reported in Northern region followed by Eastern

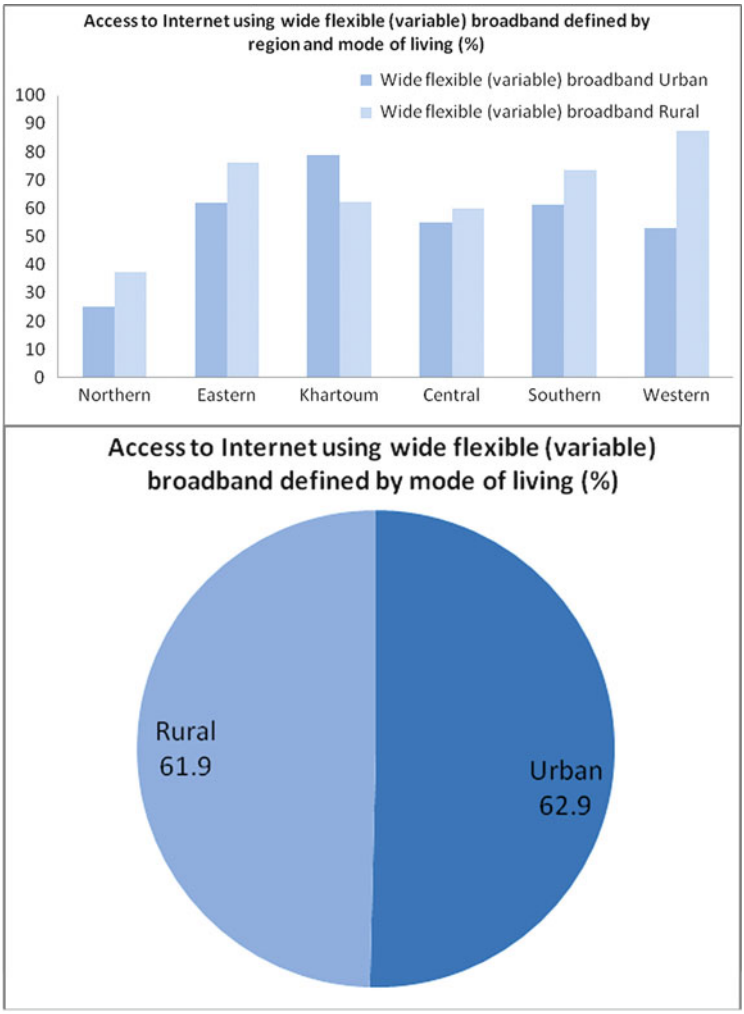

Fig. 6.11 (continued)

region, Western, Central, Southern, all Sudan, and Khartoum regions respectively (see Table 6.13 and Fig. 6.13).[62]

The regional disparities in ICT indicators appear from the use of English language to use the Internet as defined by the proportions of individuals use English language to use the Internet of total individuals use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals use English language to use the Internet of total individuals use the Internet in urban areas (53.1 %) is higher than rural areas (43.3 %) and for females (50.4 %) is higher

[62] As reported by 100 %, 99 %, 99 %, 98 %, 98 %, 97 %, and 95 % respectively.

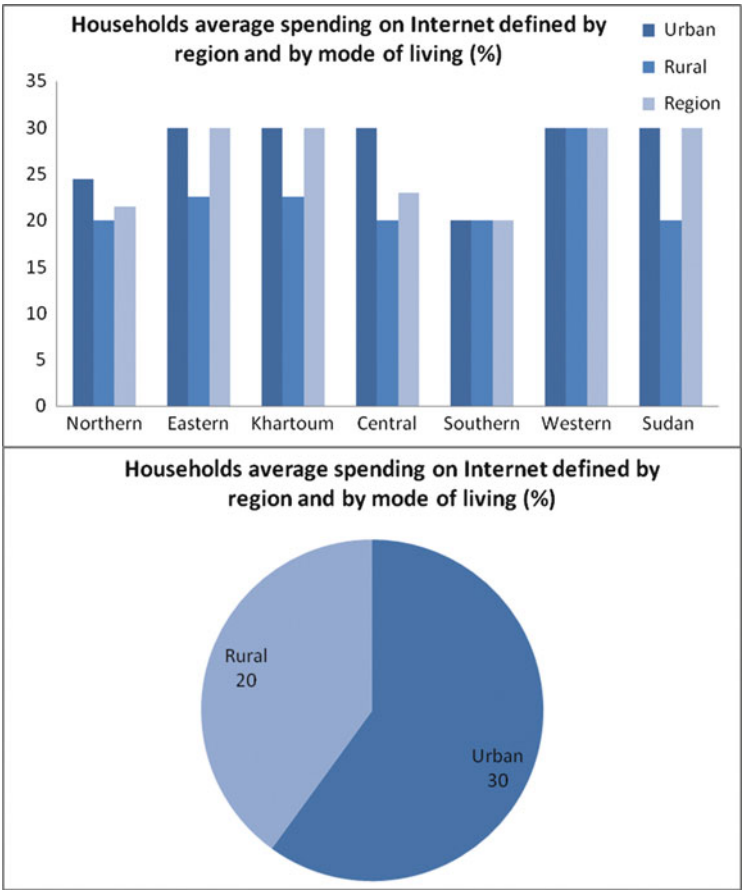

Fig. 6.11 (continued)

than males (49.5 %) and total Sudan (49.8 %). The regional distribution implies that the highest proportions of individuals use English language to use the Internet of total individuals use the Internet is reported in Khartoum followed by Central region, all Sudan, Western, Northern, Southern, and Eastern regions respectively (see Table 6.13 and Fig. 6.13).[63]

The regional disparities in ICT indicators appear from the use of other language to use the Internet as defined by the proportions of individuals use other language to use the Internet of total individuals use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals use other language to use the Internet of total individuals use the Internet in rural areas (1.8 %) is higher than urban areas (1.2 %) and for males (1.2 %) is higher than females (0.2 %) and total Sudan (1.4 %). The regional distribution implies that the

[63] As reported by 58.1 %, 52.9 %, 49.8 %, 42.5 %, 35 %, 31.7 %, and 18.2 % respectively.

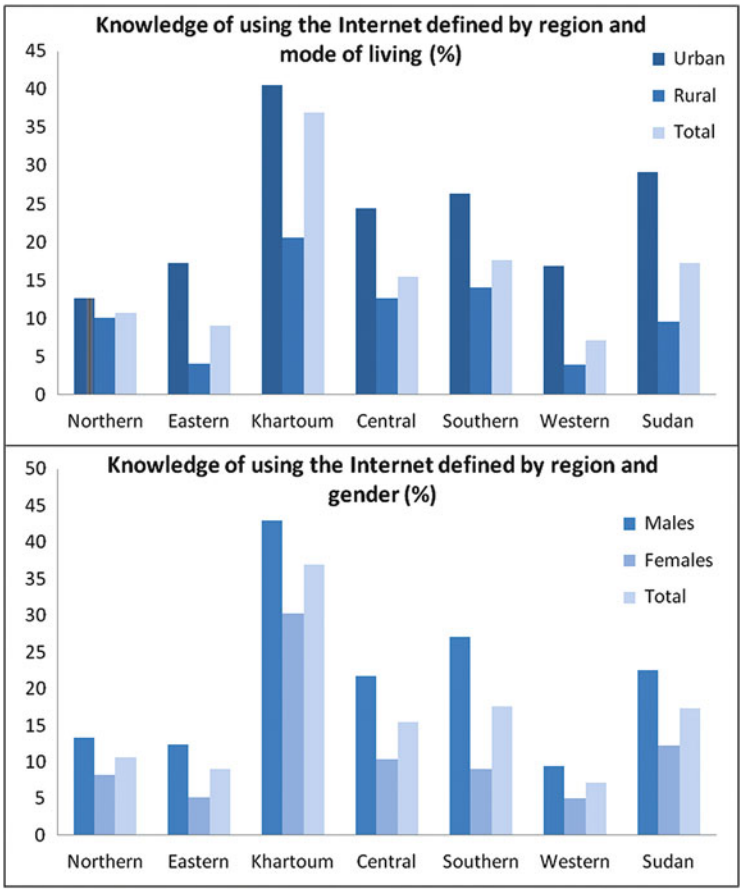

Fig. 6.12 The proportions of individuals used the Internet and E-mail defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012)

highest proportions of individuals use other language to use the Internet of total individuals use the Internet is reported in Central region followed by Western region, Khartoum, all Sudan, Eastern, Southern, and Northern regions respectively (see Table 6.13 and Fig. 6.13).[64]

[64] As reported by 2 %, 1.6 %, 1.4 %, 1.4 %, 0.7 %, 0.1 %, and 0 % respectively.

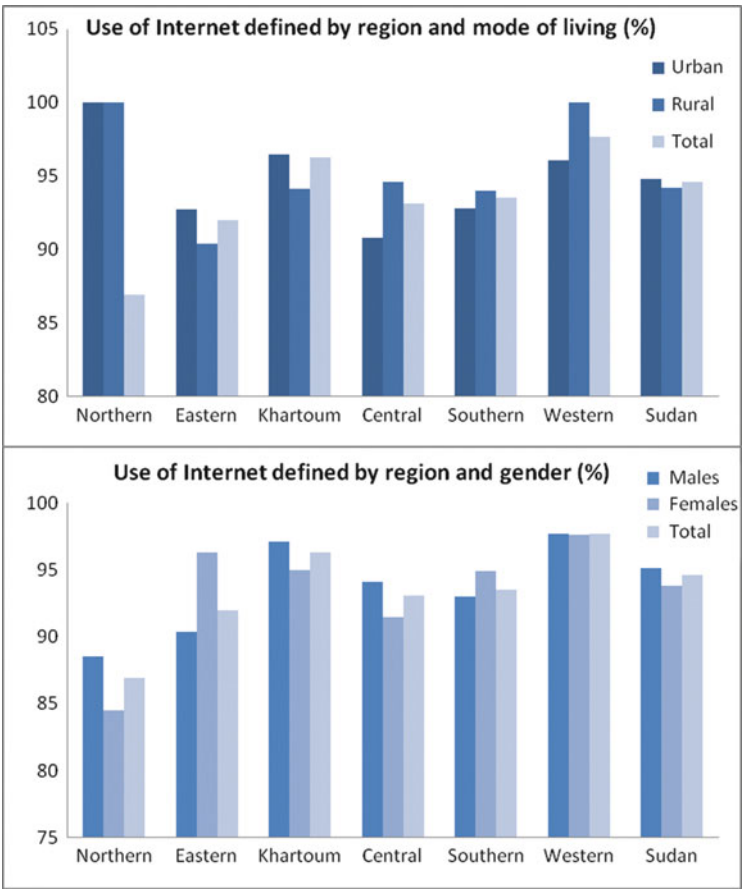

Fig. 6.12 (continued)

6.4.4 Means of Connectivity and Use of the Internet

The disparities in ICT indicators appear from means of connectivity and the use of the Internet measured by the proportions of individuals used the Internet according to means of connectivity or methods of connection which implies that for the majority of individuals in Sudan mobile cellular telephone is the most widely used to methods of connection for using the Internet, followed by DSL/mDSL and fixed telephone respectively.[65] The proportion of individuals using mobile

[65] As indicated by 74.1 %, 59.5 %, and 5.2 % respectively.

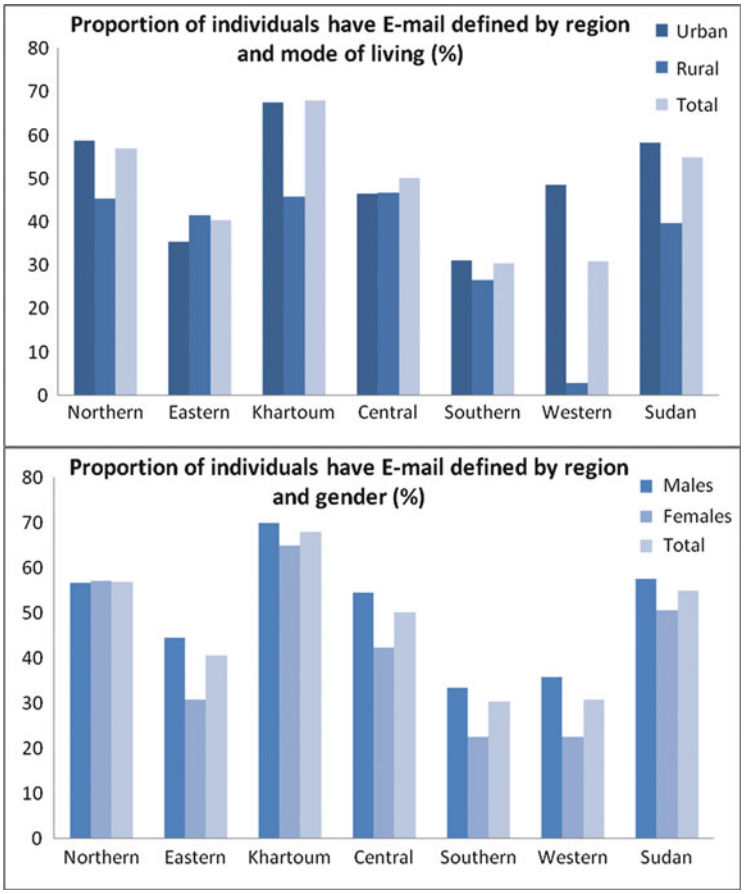

Fig. 6.12 (continued)

cellular telephone is more than fourteen times of the proportion of individuals using fixed telephone (see Table 6.14 and Fig. 6.14).

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet through fixed telephone defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet through fixed telephone in urban (5.4 %) is higher than rural (4.7 %) and for females (5.8 %) is higher than males (4.8 %) and total Sudan (5.2 %). The regional distribution implies that the highest proportions of individuals used the Internet through fixed telephone is reported in Eastern region followed by Central region, all

Table 6.13 Languages of connectivity and the use of the Internet defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Used Arabic language to use the internet	Mode of living	Urban	100	98.6	94.2	97.7	99.7	98.4	95.8
		Rural	100	98.7	98.8	98.9	96.3	100	98.8
	Gender	Males	100	99	99	98	98	99	97
		Females	199	98.6	97	98	98	99	96
	Region		100	99	95	98	98	99	97
Used English language to use the internet	Mode of living	Urban	22.5	20.7	60.4	52.5	39.6	41.6	53.1
		Rural	40.2	11.9	36.1	53.2	25.9	43.7	43.3
	Gender	Males	37.6	19.9	58.7	53.2	33.3	36	49.5
		Females	30.6	14.1	57.3	52.4	27.5	53.6	50.4
	Region		35	18.2	58.1	52.9	31.7	42.5	49.8
Used other language to use the internet	Mode of living	Urban	0	1	1.4	1	0.3	0.6	1.2
		Rural	0	0	1.1	2.7	0	3	1.8
	Gender	Males	0	0.5	1.5	1.8	0	0.6	1.2
		Females	0	0.1	0.4	0.2	0	0.2	0.2
	Region		0	0.7	1.4	2	0.1	1.6	1.4

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

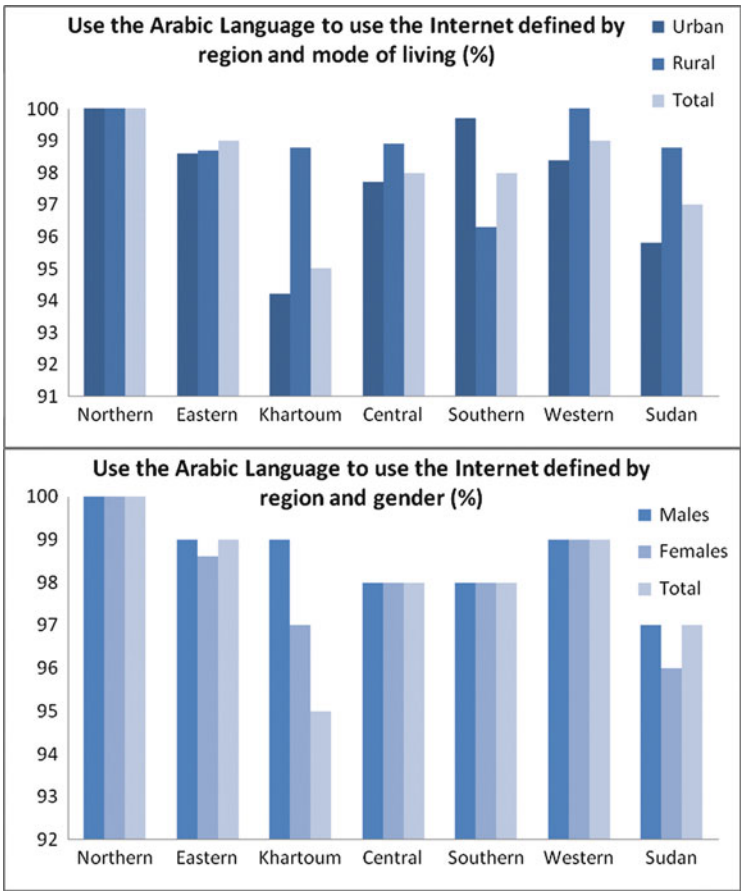

Fig. 6.13 Languages of connectivity and use of the Internet defined by region, mode of living and gender during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

Sudan, Khartoum, Western, Southern, and Northern regions respectively (see Table 6.14 and Fig. 6.14).[66]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet through mobile cellular telephone defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet through mobile cellular telephone in rural (82.5 %) is higher than urban (69.8 %) and for males (76.3 %) is higher than females (70.1 %) and total Sudan (74.1 %). The regional distribution implies that the highest proportions of individuals used the Internet through mobile cellular telephone is reported in Southern

[66] As indicated by 9.1 %, 7 %, 5.2 %, 4.8 %, 2.5 %, 2.2 %, and 0 % respectively.

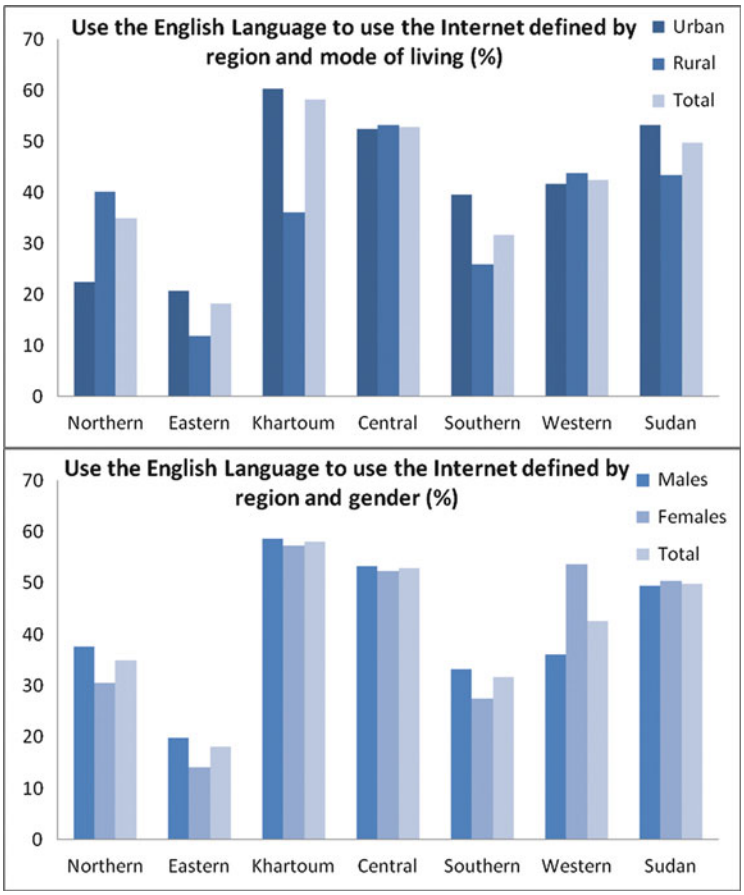

Fig. 6.13 (continued)

region followed by Central region, Eastern, all Sudan, Northern, Khartoum and Western regions respectively (see Table 6.14 and Fig. 6.14).[67]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet through DSL/mDSL defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet through DSL/mDSL in urban (67 %) is higher than rural (44.7 %) and for females (60.2 %) is higher than males (59.1 %) and total Sudan (59.5 %). The regional distribution implies that the highest proportions of individuals used the Internet

[67] As indicated by 90 %, 80.8 %, 76.1 %, 74.1 %, 70.5 %, 69.5 %, and 64 % respectively.

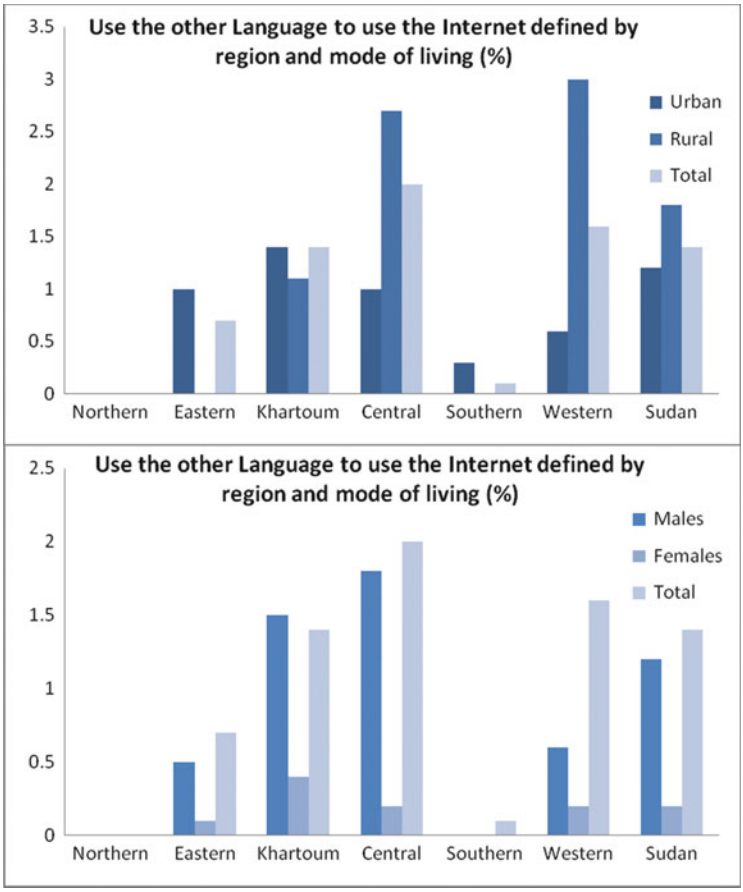

Fig. 6.13 (continued)

through DSL/mDSL is reported in Khartoum followed by all Sudan, Southern, Western, Northern, Eastern, and Central, regions respectively (see Table 6.14 and Fig. 6.14).[68]

6.4.5 Locations of Connectivity and Use of the Internet

The disparities in ICT indicators appear from the location of connectivity and the use of the Internet measured by the proportions of individuals used the Internet according to locations of connectivity or place of connection which implies that for

[68] As indicated by 71.1 %, 59.5 %, 53.1 %, 51.2 %, 49.4 %, 49 %, and 48.7 % respectively.

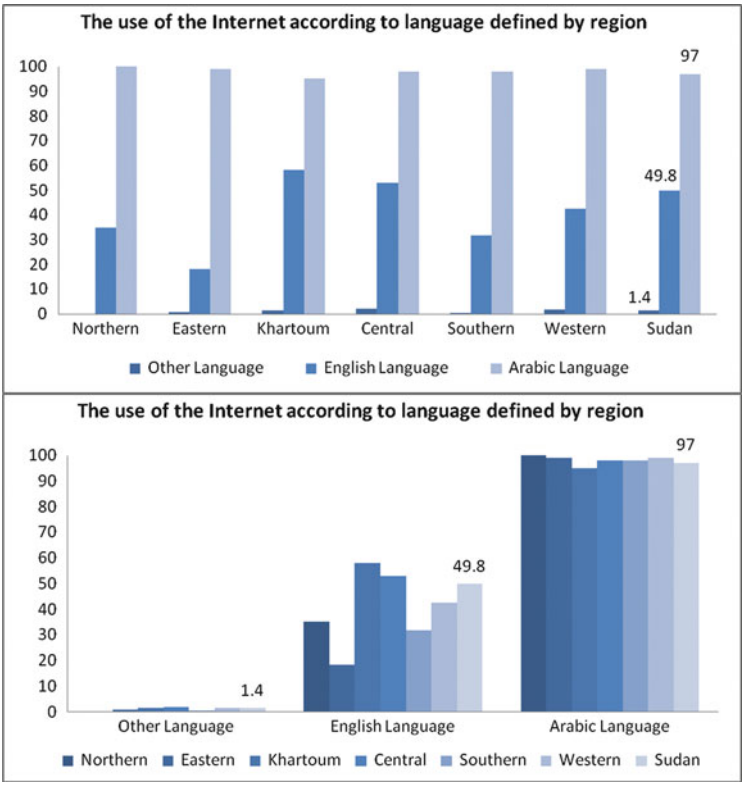

Fig. 6.13 (continued)

the majority of individuals in Sudan home is the most commonly place for using the Internet, followed by house of other person, work place, educational institution, Internet café, other place, and service centre respectively (see Table 6.15 and Fig. 6.15).[69]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet from home defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet from home in rural (85.6 %) is higher than urban (83.9 %) and for females (84.9 %) is higher than males (84.3 %) and total Sudan (84.5 %). The regional distribution implies that the highest proportions of individuals used the Internet from home is reported in Western region followed by Northern region, Khartoum, all Sudan, Southern, Central and Eastern regions respectively (see Table 6.15 and Fig. 6.15).[70]

[69] As indicated by 84.5 %, 24.7 %, 23.6 %, 22.6 %, 19.1 %, 7.9 %, and 1.6 % respectively.

[70] As indicated by 88.2 %, 87.4 %, 86.5 %, 84.5 %, 83.6 %, 82.1 %, and 75.8 % respectively.

Table 6.14 Means of connectivity and use of the Internet defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Fixed telephone	Mode of living	Urban	0	10.3	5	6.6	5.3	2.1	5.4
		Rural	0	5.9	2.3	7.3	0	3	4.7
	Gender	Males	0	6.5	4.9	6.6	2.1	1.4	4.8
		Females	0	15.4	4.5	7.8	2.5	4.3	5.8
	Region		0	9.1	4.8	7	2.2	2.5	5.2
Mobile cellular telephone	Mode of living	Urban	71.4	71.8	68.1	73.5	80.4	67.3	69.8
		Rural	70.1	87	82.3	85.3	96.8	59.3	82.5
	Gender	Males	72.4	81	69.8	82.8	92.5	71.6	76.3
		Females	67.4	64.1	68.9	77.2	83.3	50.9	70.1
	Region		70.5	76.1	69.5	80.8	90	64	74.1
DSL/mDSL	Mode of living	Urban	44.2	51.2	73.5	56.7	63.6	59.1	67
		Rural	51.6	43.5	47.5	43.8	45.5	39.8	44.7
	Gender	Males	48.5	48.6	71.4	47.6	52	53.7	59.1
		Females	51	50	70.5	50.7	55.9	46.8	60.2
	Region		49.4	49	71.1	48.7	53.1	51.2	59.5

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

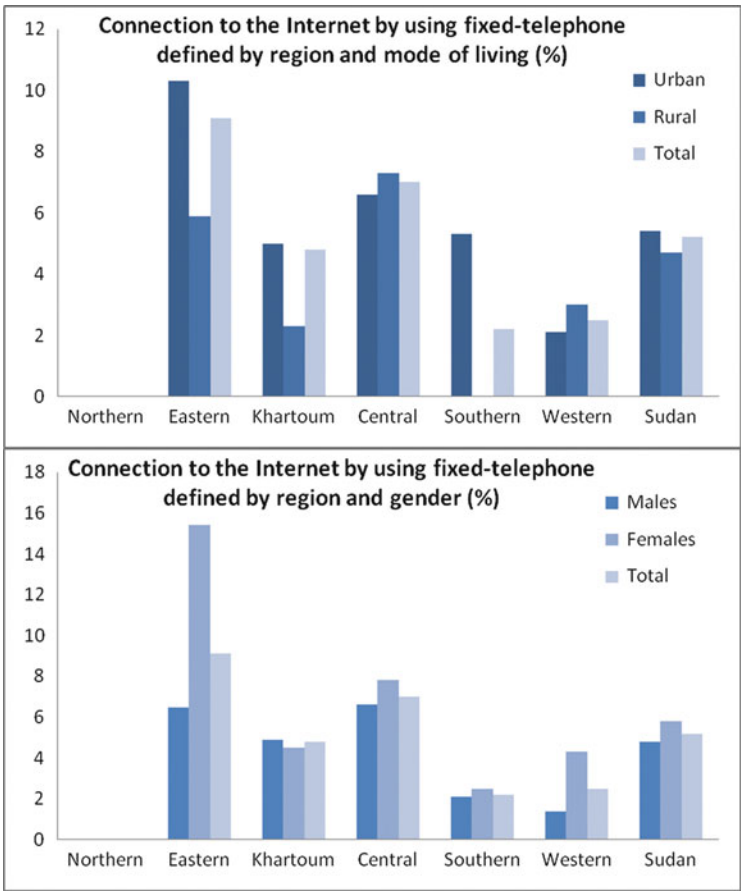

Fig. 6.14 Means of connectivity and use of the Internet defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet at work place defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet at work place in urban (26.2 %) is nearly twice higher than rural (18.5 %) and for males (28.4 %) is nearly twice higher than females (14.9 %) and total Sudan (23.6 %). The regional distribution implies that the highest proportions of individuals used the Internet at work place is reported in Khartoum followed by all Sudan, Central, Southern, Eastern, Western, and Northern, regions respectively (see Table 6.15 and Fig. 6.15).[71]

[71] As indicated by 26.1 %, 23.6 %, 22.3 %, 21.4 %, 21.3 %, 20.7 %, and 18.3 % respectively.

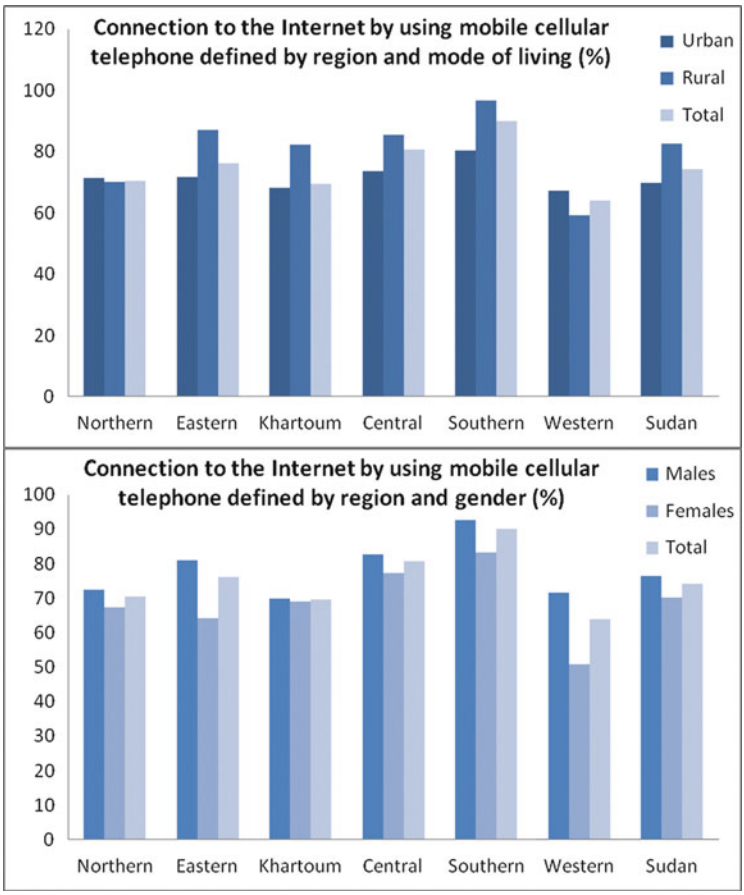

Fig. 6.14 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet from educational institution defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet from educational institution in rural (22.7 %) is higher than urban (22.5 %) and for females (27.9 %) is higher than males (19.6 %) and total Sudan (22.6 %). The regional distribution implies that the highest proportions of individuals used the Internet from educational institution is reported in Western region followed by Khartoum, Northern, all Sudan, Southern, Central, and Eastern regions respectively (see Table 6.15 and Fig. 6.15).[72]

[72] As indicated by 30.3 %, 24.4 %, 24 %, 22.6 %, 22 %, 18.9 %, and 15.7 % respectively.

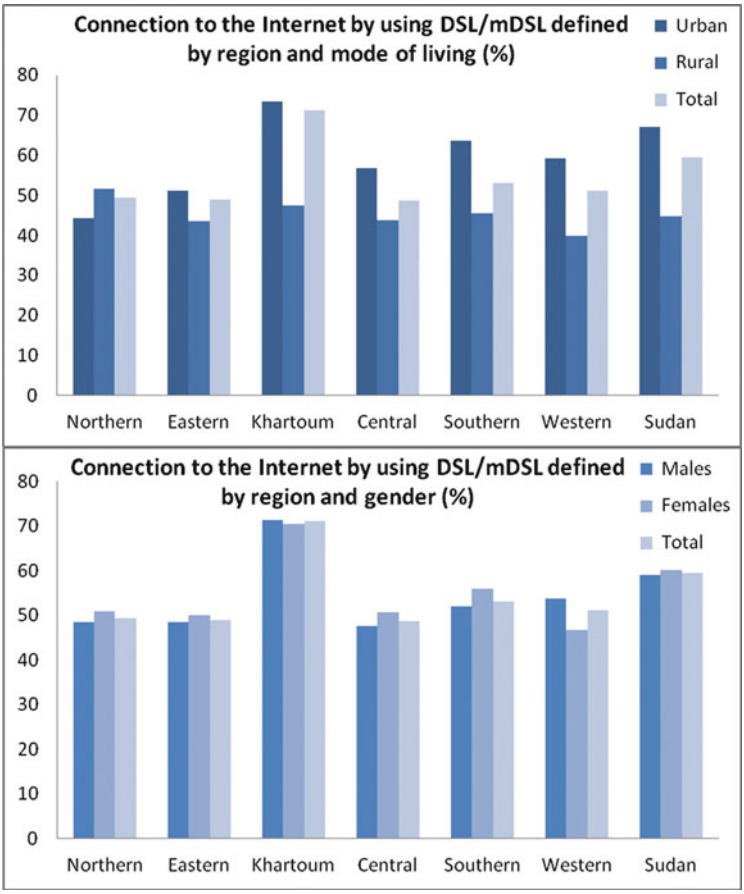

Fig. 6.14 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet from service centre defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet from service centre in urban (2.9 %) is more than three times higher than rural (0.8 %) and for males (2.3 %) is more than twice higher than females (1 %) and total Sudan (1.6 %). The regional distribution implies that the highest proportions of individuals used the Internet from service centre is reported in Khartoum followed by all Sudan, Central, Eastern, Western, Southern and Northern, regions respectively.[73] The

[73] As indicated by 3.8 %, 1.6 %, 1.6 %, 0.9 %, 0.7 %, 0.7 %, and 0.1 % respectively.

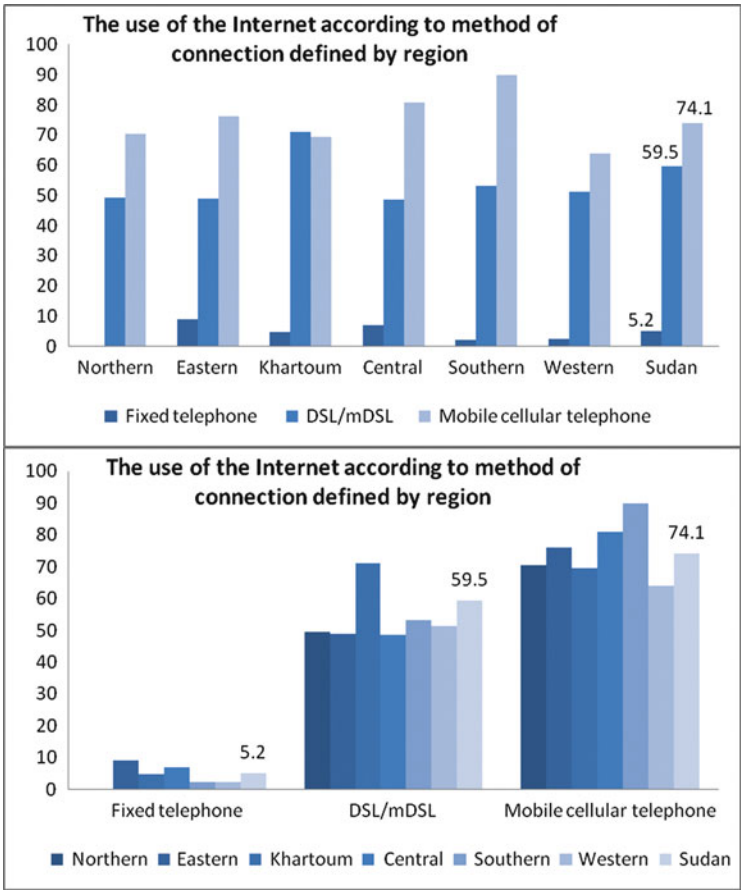

Fig. 6.14 (continued)

regional disparity in terms of the proportions of individuals used the Internet from service centre is evidenced from the highest proportions in Khartoum, which is more than twice the proportions in all Sudan, Southern and Central regions, more than four times in Eastern, more than five times in Western, and 38 times in Northern regions respectively (see Table 6.15 and Fig. 6.15).

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet from Internet café defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet from Internet café in rural (19.9 %) is higher than urban (18.7 %) and for males (22.6 %) is nearly twice higher than females (12.8 %) and total Sudan (19.1 %). The regional distribution implies that the highest proportions of individuals used the Internet from Internet café is reported in Eastern region followed by Western

Table 6.15 Locations of connectivity and use of the Internet defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
From home	Mode of living	Urban	94.8	74.1	86.2	78.9	83.3	84	83.9
		Rural	84.4	80.2	89.8	84.2	83.9	94.3	85.6
	Gender	Males	90.9	76.4	85.7	82.1	85	88.4	84.3
		Females	81.6	74.4	87.9	82.2	79.9	87.9	84.9
	Region		87.4	75.8	86.5	82.1	83.6	88.2	84.5
From work place	Mode of living	Urban	22.9	22.7	26.5	25.7	25.8	29.2	26.2
		Rural	16.4	17.7	22.1	20.1	18.1	8.5	18.5
	Gender	Males	20.7	23.2	32.3	26.4	26.1	24.6	28.4
		Females	14.3	16.7	15.6	14.8	8.8	14.1	14.9
	Region		18.3	21.3	26.1	22.3	21.4	20.7	23.6
From educational institution	Mode of living	Urban	11.7	16	24.4	19.6	21	23.2	22.5
		Rural	29.1	15.1	24.7	18.5	22.8	40.5	22.7
	Gender	Males	21.2	14.8	20.8	17.2	20.5	24.8	19.6
		Females	28.6	17.9	30.5	22.1	26	39.8	27.9
	Region		24	15.7	24.4	18.9	22	30.3	22.6
From services centre	Mode of living	Urban	0.5	1.9	4.1	2.6	1.6	1.7	2.9
		Rural	0	0.3	2.1	1.3	0.3	0.3	0.8
	Gender	Males	0.2	1.5	4.9	2.2	1.2	1	2.3
		Females	0	0.3	2.4	1.2	0.2	0.4	1
	Region		0.1	0.9	3.8	1.6	0.7	0.7	1.6

From internet cafe	Mode of living	Urban	2.2	27.7	16.4	29.2	8.6	14.5	18.7
		Rural	5	25.5	17	20.7	9.2	40.2	19.9
	Gender	Males	6.7	32.9	20.5	28.4	9.4	23.4	22.6
		Females	0	12.8	9.8	16	7.8	27.9	12.8
	Region		4.2	27.1	16.5	24	9	25	19.1
From other person's house	Mode of living	Urban	13.4	23.6	22.5	29.4	22.9	31.8	24.3
		Rural	30.8	15.2	29.2	25.8	40.9	5.5	25.6
	Gender	Males	28.9	23.6	23.7	30.2	37.7	26.5	26.9
		Females	20.4	15.4	22.4	21.8	22	11.7	20.8
	Region		25.7	21.2	23.2	27.2	33.4	21	24.7
From other place	Mode of living	Urban	9.1	15.1	4.2	8.6	12.3	25.1	7.7
		Rural	19.6	13	0.6	6.6	12.4	8.3	8.1
	Gender	Males	17.8	15.7	4.5	9	14.6	23.1	9.4
		Females	14.3	11.5	2.8	4.4	6.4	9.8	5
	Region		16.5	14.5	3.8	7.4	12.4	18.2	7.9

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

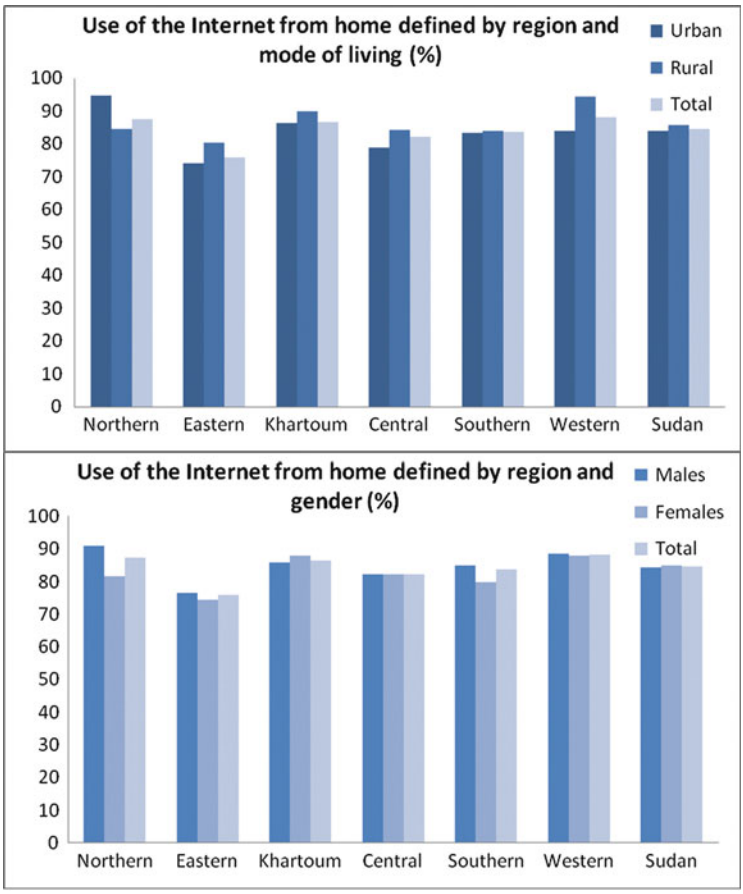

Fig. 6.15 Locations of connectivity and use of the Internet defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012)

region, Central, all Sudan, Khartoum, Southern and Northern regions respectively.[74]

The regional differences in ICT indicators appear from the proportions of individuals used the Internet from house of other person defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet from house of other person in rural (25.6 %) is higher than urban (24.3 %) and for males (26.9 %) is higher than females (20.8 %) and total Sudan (24.7 %). The regional distribution implies that the highest proportions of individuals used the Internet from house of other person is reported in Southern region,

[74] As indicated by 27.1 %, 25 %, 24 %, 19.1 %, 16.5 %, 9 %, and 4.2 % respectively.

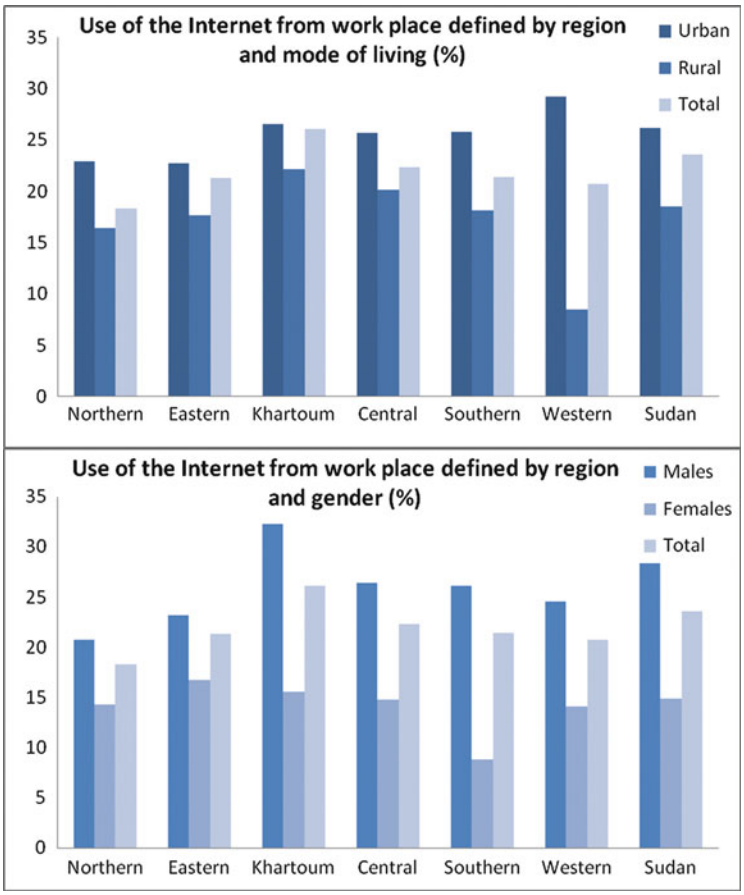

Fig. 6.15 (continued)

followed by Central region, Northern, all Sudan, Khartoum, Eastern, and Western regions respectively (see Table 6.15 and Fig. 6.15).[75]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet from other place defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet from other place in rural (8.1 %) is higher than urban (7.7 %) and for males (9.4 %) is nearly twice higher than females (5 %) and total Sudan (7.9 %). The regional distribution implies that the highest proportions of individuals used the Internet from other place is reported in Western region followed by Northern region, Eastern, Southern, all Sudan, Central, and Khartoum regions respectively (see Table 6.15 and Fig. 6.15).[76]

[75] As indicated by 33.4 %, 27.2 %, 25.7 %, 24.7 %, 23.2 %, 21.2 %, and 21 % respectively.

[76] As indicated by 18.2 %, 16.5 %, 14.5 %, 12.4 %, 7.9 %, 7.4 %, and 3.8 % respectively.

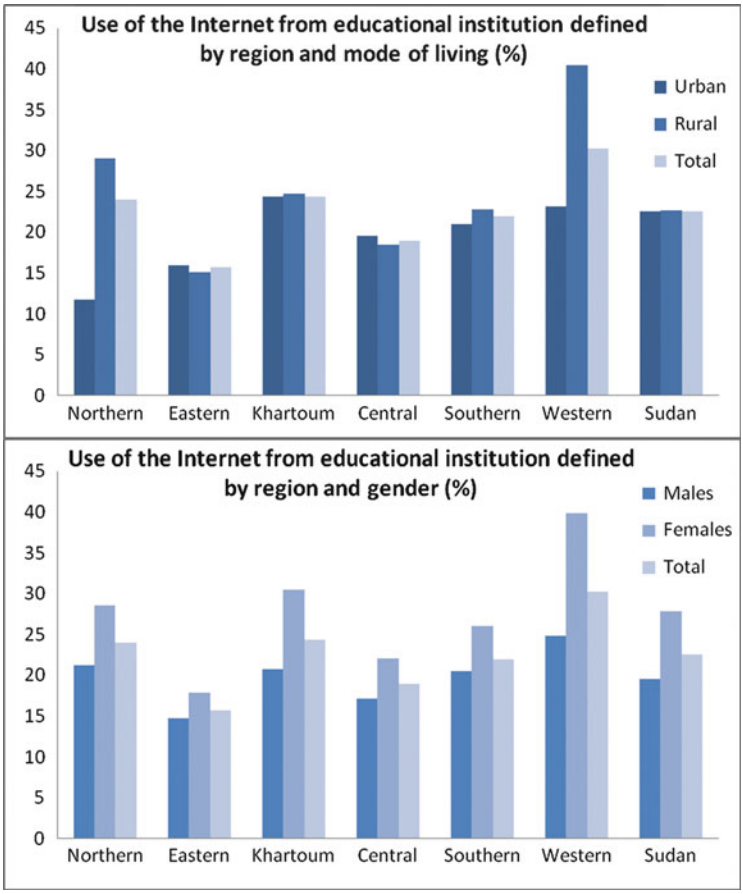

Fig. 6.15 (continued)

6.4.6 Purposes of Connectivity and Use of the Internet

From the viewpoint of individuals in Sudan the Internet is widely used for several purposes, notably, it is widely used for religious purposes, sports purposes, news purposes, educational purposes, commercial transactions purposes, games and entertainment purposes, chatting and forums, exchanging messages, connection, and other purposes. The disparities in ICT indicators appear from the proportions of individuals used the Internet according to purpose of connection which implies that for the majority of individuals in Sudan news purposes is the most commonly purposes for using the Internet for, followed by religious purposes, chatting and forums, commercial transactions purposes, exchanging messages, sports purposes,

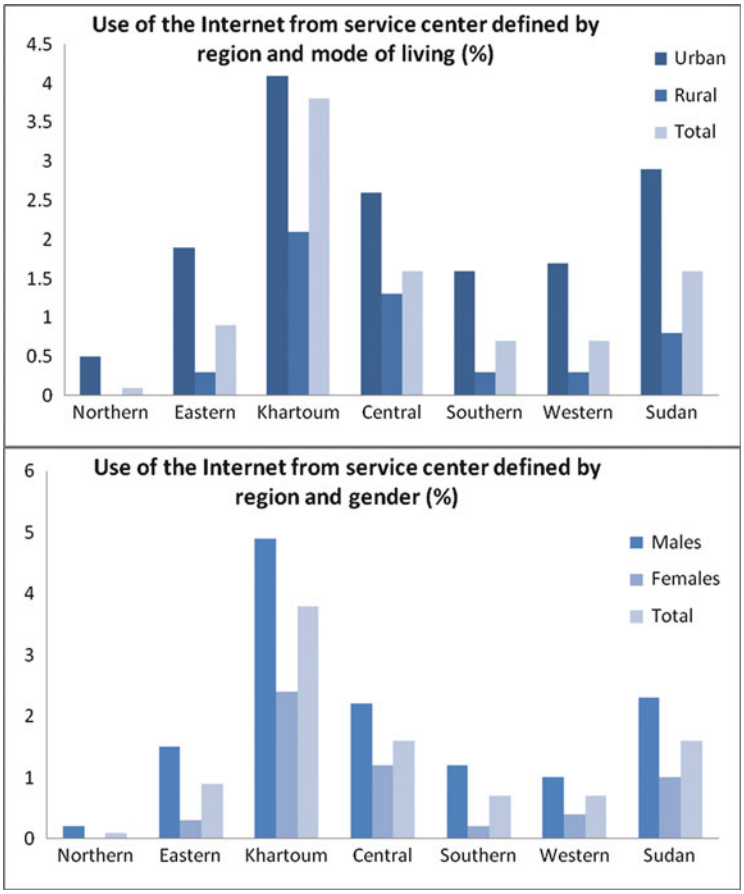

Fig. 6.15 (continued)

connection, other purposes, educational purposes, and games and entertainment purposes respectively (see Table 6.16 and Fig. 6.16).[77]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for religious purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for religious purposes in rural (73.4 %) is higher than urban (68.9 %) and for females (70.5 %) is higher than males (70.4 %) and total Sudan (70.4 %). The regional distribution implies that the highest proportions of individuals used the

[77] As indicated by 72.8 %, 70.4 %, 66.9 %, 64.6 %, 60.1 %, 55.7 %, 54.7 %, 45.6 %, 12.5 %, and 6.4 % respectively.

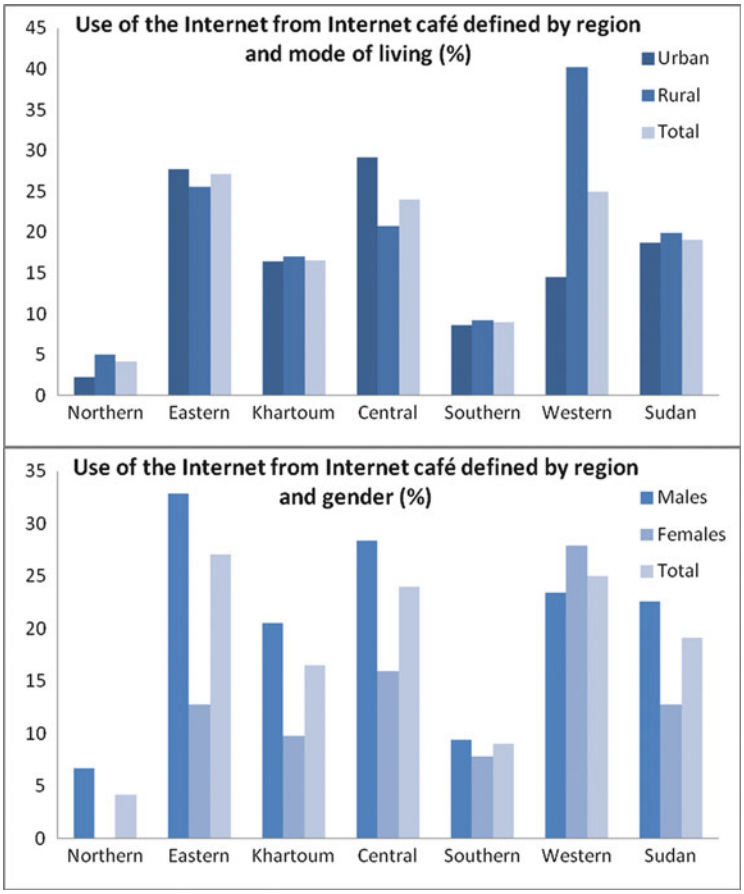

Fig. 6.15 (continued)

Internet for religious purposes is reported in Central region followed by Western region, Southern, Eastern, all Sudan, Khartoum, and Northern regions respectively (see Table 6.16 and Fig. 6.16).[78]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for sports purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for sports purposes in rural (63 %) is higher than urban (52 %) and for males (73.1 %) is nearly three times/higher than females (24.4 %) and total Sudan (55.7 %). The

[78] As indicated by 72.9 %, 72.8 %, 72 %, 70.7 %, 70.4 %, 68.9 %, and 62.3 % respectively.

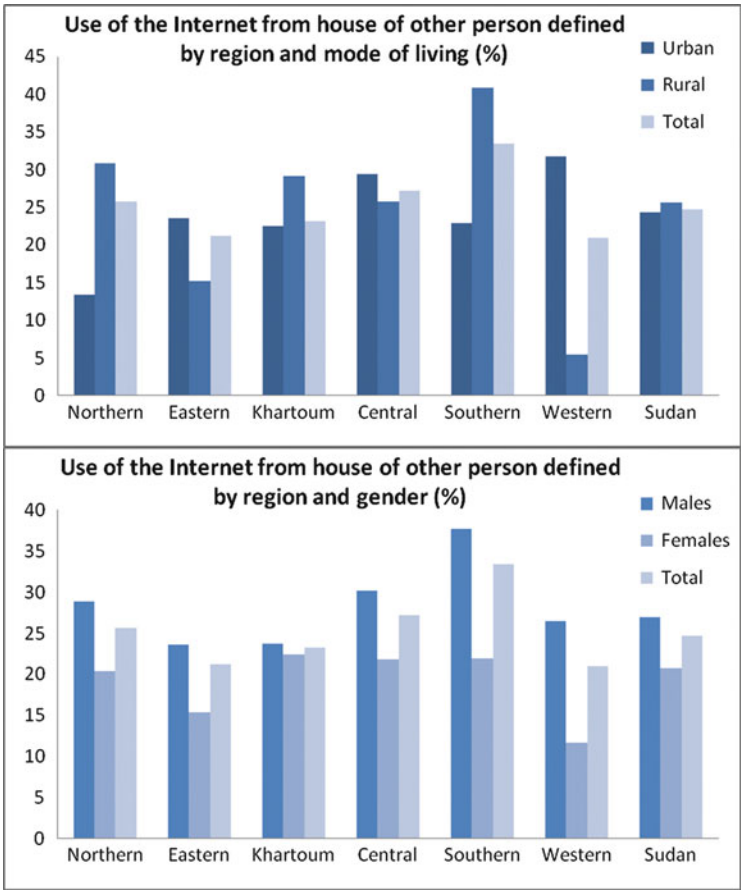

Fig. 6.15 (continued)

regional distribution implies that the highest proportions of individuals used the Internet for sports purposes is reported in Southern region followed by Western region, Central, Eastern, all Sudan, Khartoum, and Northern regions respectively.[79]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for news purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for news purposes in rural (73.9 %) is higher than urban (72.2 %) and for males (78 %) is higher than females (63.3 %) and total Sudan (72.8 %). The regional distribution implies that the highest proportions of individuals used the Internet for news purposes is reported in Western region followed by Southern region, all

[79] As indicated by 71 %, 70.1 %, 60.3 %, 57.5 %, 55.7 %, 48.9 %, and 43.7 % respectively.

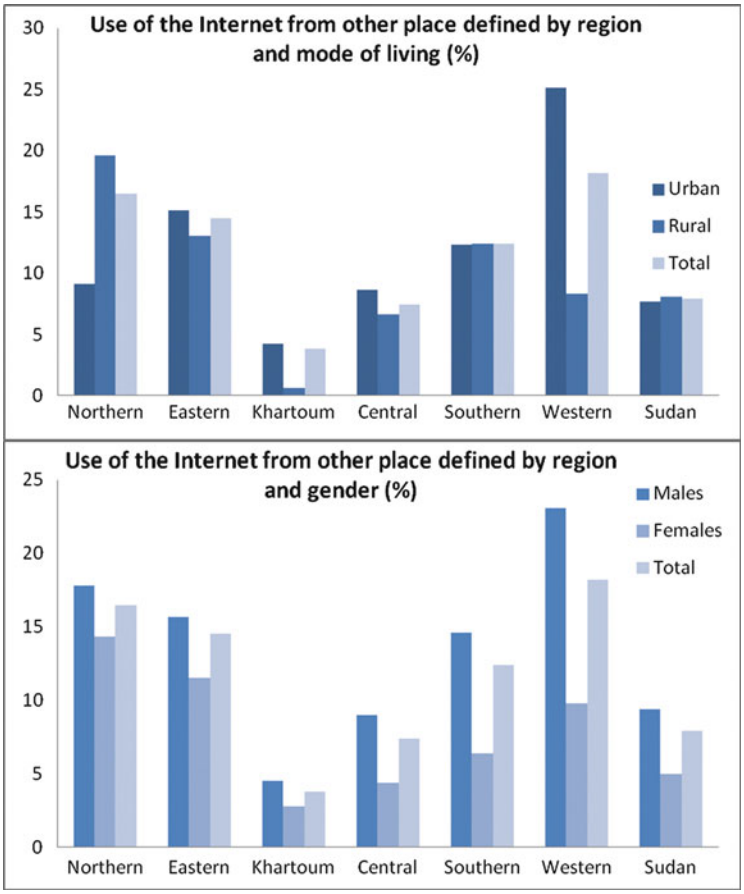

Fig. 6.15 (continued)

Sudan, Central, Khartoum, Eastern, and Northern regions respectively (see Table 6.16 and Fig. 6.16).[80]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for educational purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for educational purposes in rural (14.1 %) is higher than urban (11.6 %) and for males (13.1 %) is higher than females (11.3 %) and total Sudan (12.5 %). The regional distribution implies that the highest proportions of individuals used the Internet for educational purposes is reported in Southern region followed by Eastern region, Western, Central, all Sudan, Northern and Khartoum regions respectively (see Table 6.16 and Fig. 6.16).[81]

[80] As indicated by 89.1 %, 85.1 %, 72.8 %, 71.8 %, 71.3 %, 62.9 %, and 60.7 % respectively.

[81] As indicated by 22.8 %, 18.8 %, 18.6 %, 15.5 %, 12.5 %, 9.2 %, and 7.3 % respectively.

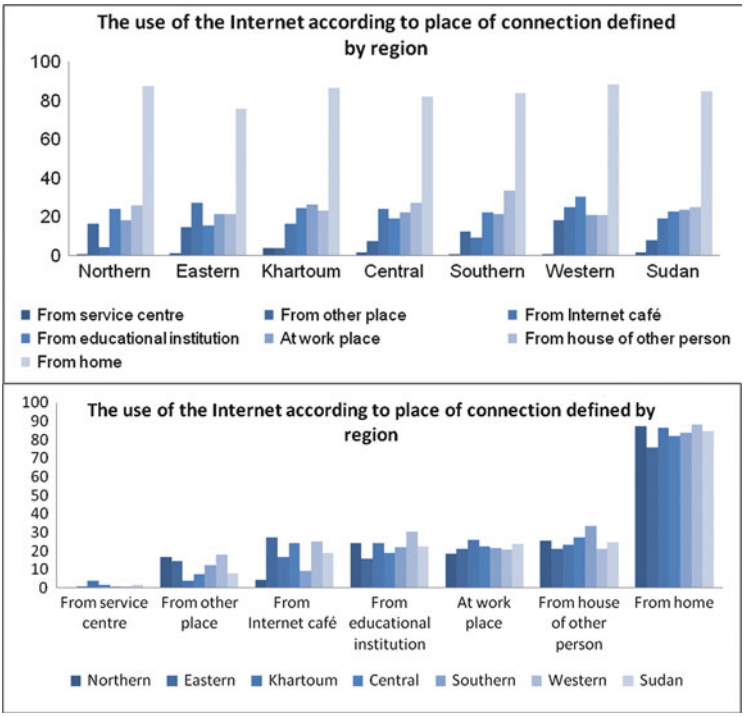

Fig. 6.15 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for commercial transactions purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for commercial transactions purposes in urban (64.6 %) is higher than rural (64.5 %) and for females (71.7 %) is higher than males (60.7 %) and total Sudan (64.6 %). The regional distribution implies that the highest proportions of individuals used the Internet for commercial transactions purposes is reported in Western region followed by Central region, all Sudan, Khartoum, Southern, Eastern, and Northern regions respectively (see Table 6.16 and Fig. 6.16).[82]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for games and entertainment purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for games and entertainment purposes in urban (7.3 %) is higher than rural (4.6 %) and for males (7.6 %) is nearly twice higher than females (4.1 %) and total Sudan (6.4 %). The regional distribution implies that the highest proportions of individuals used the Internet for games and entertainment purposes is

[82] As indicated by 73.4 %, 66.7 %, 64.6 %, 64.4 %, 59.4 %, 56.8 %, and 56.6 % respectively.

Table 6.16 Purposes of connectivity and use of the Internet defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Religious purposes	Mode of living	Urban	70.1	74.3	69.8	62.5	65	71.3	68.9
		Rural	59	61.9	60	79.3	77	75	73.4
	Gender	Males	56.8	70.8	69.5	74.2	70.1	68	70.4
		Females	71.4	70.5	67.8	70.5	76.9	81.5	70.5
	Region		62.3	70.7	68.9	72.9	72	72.8	70.4
Sports reasons	Mode of living	Urban	39.3	55.9	48.3	56	67.5	65.5	52
		Rural	45.6	61.6	54.9	63	73.5	76.8	63
	Gender	Males	62.6	73.6	67	79.1	82.4	81.7	73.1
		Females	12.3	18	19	26.4	40.7	50	24.4
	Region		43.7	57.5	48.9	60.3	71	70.1	55.7
News reasons	Mode of living	Urban	60.6	63.2	72.2	69.1	83.1	85.3	72.2
		Rural	60.7	62.2	62.6	73.5	86.4	94.5	73.9
	Gender	Males	61.6	67.1	76.8	79	88.7	90	78
		Females	59.2	52.6	62.1	58.7	75.5	87.4	63.3
	Region		60.7	62.9	71.3	71.8	85.1	89.1	72.8
Educational purposes	Mode of living	Urban	13.8	20.3	7.8	13.5	24.8	23.5	11.6
		Rural	7.3	15.1	2.9	16.8	21.3	11.5	14.1
	Gender	Males	8.6	21.8	7.3	16.4	22.1	18.4	13.1
		Females	10.2	11.5	7.3	13.8	24.5	18.9	11.3
	Region		9.2	18.8	7.3	15.5	22.8	18.6	12.5
Commercial transactions reasons	Mode of living	Urban	46.3	57.9	65.3	64.8	64.5	70.2	64.6
		Rural	60.8	54.1	56.3	67.8	55.6	78	64.5
	Gender	Males	57.4	56.9	59.3	64	56.2	65.7	60.7
		Females	55.1	56.4	72.9	71.4	67.7	86.6	71.7
	Region		56.6	56.8	64.4	66.7	59.4	73.4	64.6

Games and entertainment reasons	Mode of living	Urban	6.5	7.6	7.7	7.1	3.4	5.9	7.3
		Rural	3.1	8.1	3.4	5.6	1.7	2.8	4.6
	Gender	Males	5.3	8.8	8.9	7.3	3	5.9	7.6
		Females	2	5.1	4.7	4.3	1	2.3	4.1
	Region		4.1	7.7	7.3	6.2	2.4	4.6	6.4
Chatting and forums reasons	Mode of living	Urban	58.5	55.2	67.8	69.4	62.4	60.6	66.1
		Rural	65.2	76.5	59.5	74.4	59.9	58	68.6
	Gender	Males	58.3	64.8	65.9	70.3	61.6	53.2	65.4
		Females	71.4	52.6	68.7	76.5	59.3	70.4	69.7
	Region		63.2	61.3	67	72.5	61	59.5	66.9
Exchanging messages reasons	Mode of living	Urban	76.2	56.6	67.2	62.2	43.5	48.4	63.3
		Rural	66.1	62.3	54.3	64.6	35.2	2.8	53.7
	Gender	Males	68.8	61.6	66.3	65.4	41.6	34.8	61.4
		Females	69.4	50	65.4	60.5	30.9	20.8	57.8
	Region		69	58.2	65.9	63.7	38.7	29.7	60.1
Connection reasons	Mode of living	Urban	67.1	49.3	65.2	51.8	41.6	49.2	59.6
		Rural	54.7	45.9	48.6	52.8	36.3	0	44.8
	Gender	Males	57.8	51.9	66.1	55.2	39	33.1	56.9
		Females	59.2	39.8	59.5	47.4	37.2	22.2	50.6
	Region		58.3	48.8	63.6	52.4	38.5	29.1	54.7
Other reasons	Mode of living	Urban	34.6	39.7	61.8	40.4	28.1	40.4	53.1
		Rural	29.9	27	45	34.9	23.9	2.8	30.8
	Gender	Males	31.7	35.7	61.9	38.1	26.1	28.5	46.6
		Females	30.6	37.2	57.3	35	24.5	18.9	43.9
	Region		31.3	36.1	60.2	37	25.7	25	45.6

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

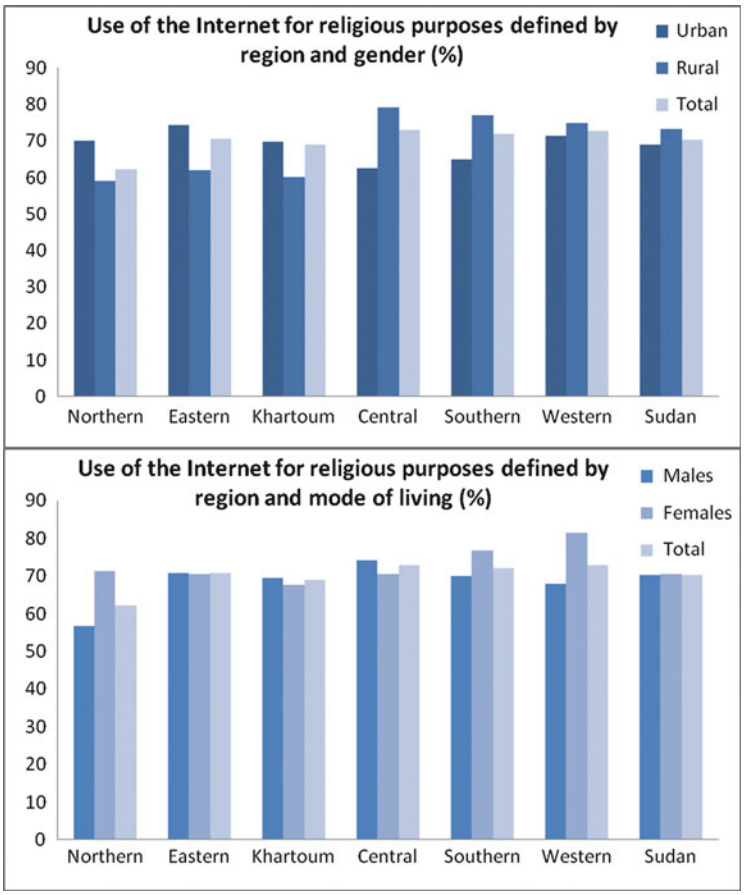

Fig. 6.16 Purposes of connectivity and use of the Internet defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

reported in Eastern region followed by Khartoum, all Sudan, Central, Western, Northern, and Southern regions respectively (see Table 6.16 and Fig. 6.16).[83]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for chatting and forums defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for chatting and forums in rural (68.6 %) is higher than urban (66.1 %) and for females (69.7 %) is higher than males (65.4 %) and total Sudan (66.9 %). The regional distribution implies that the highest proportions of individuals used the Internet for chatting and forums is reported in Central region followed by

[83] As indicated by 7.7 %, 7.3 %, 6.4 %, 6.2 %, 4.6 %, 4.1 %, and 2.4 % respectively.

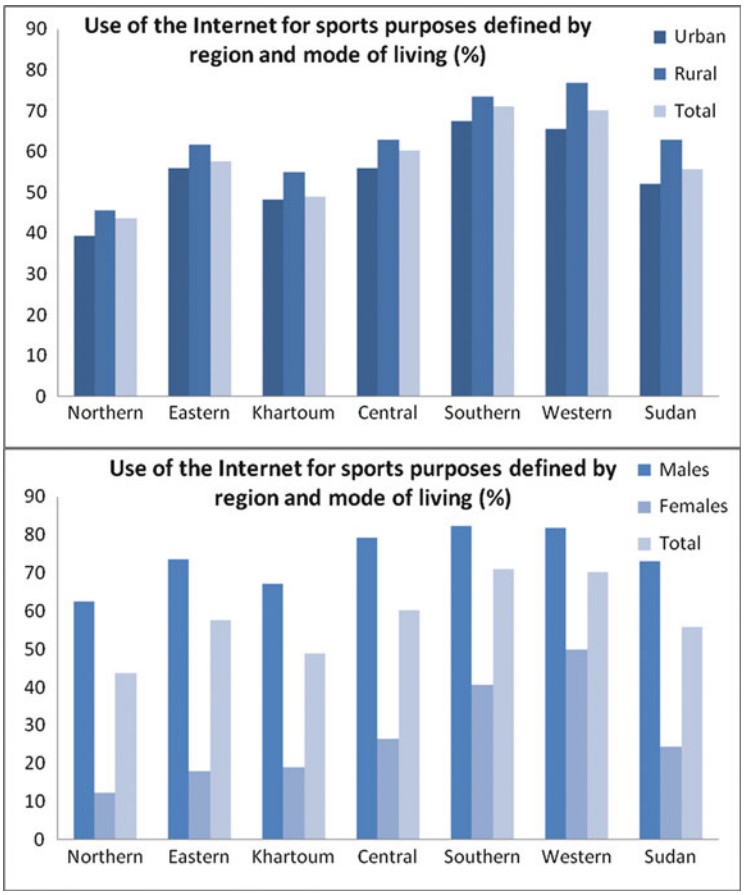

Fig. 6.16 (continued)

Khartoum, all Sudan, Northern, Eastern, Southern, and Western regions respectively (see Table 6.16 and Fig. 6.16).[84]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for exchanging messages defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for exchanging messages in urban (63.3 %) is higher than rural (53.7 %) and for males (61.4 %) is higher than females (57.8 %) and total Sudan (60.1 %). The regional distribution implies that the highest proportions of individuals used the Internet for exchanging messages is reported in Northern followed by Khartoum, Central, all Sudan, Eastern, Southern, and Western, region regions respectively.[85]

[84] As indicated by 72.5 %, 67 %, 66.9 %, 63.2 %, 61.3 %, 61 %, and 59.5 % respectively.

[85] As indicated by 69 %, 65.9 %, 63.7 %, 60.1 %, 58.2 %, 38.7 %, and 29.7 % respectively.

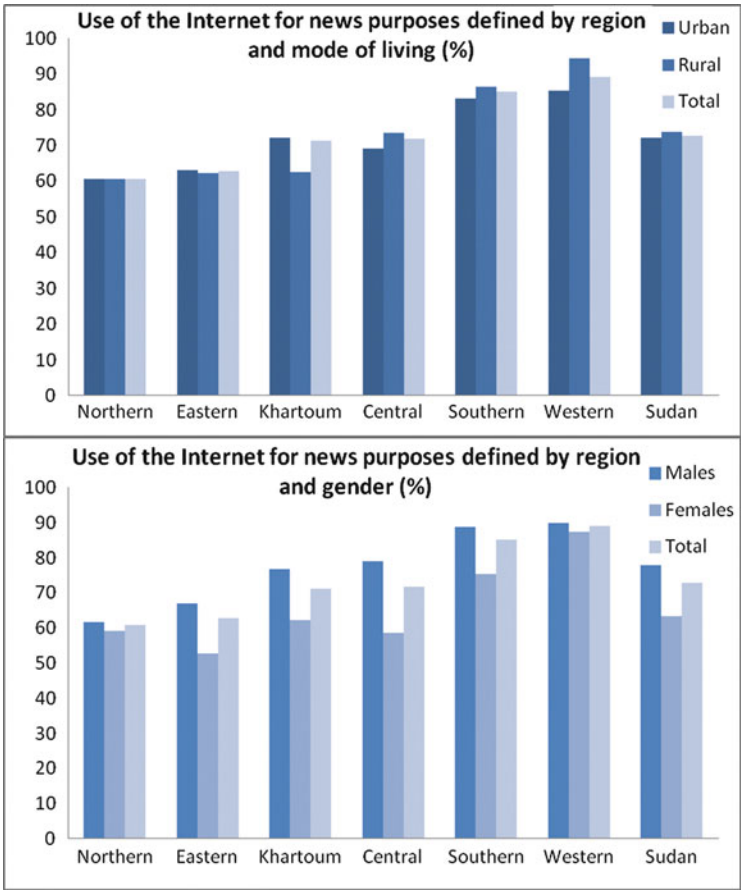

Fig. 6.16 (continued)

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for connection defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for connection in urban (59.6 %) is higher than rural (44.8 %) and for males (56.9 %) is higher than females (50.6 %) and total Sudan (54.7 %). The regional distribution implies that the highest proportions of individuals used the Internet for connection is reported in Khartoum followed by Northern, all Sudan, Central, Eastern, Southern, and Western regions respectively (see Table 6.16 and Fig. 6.16).[86]

The regional disparities in ICT indicators appear from the proportions of individuals used the Internet for other purposes defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals used the Internet for other purposes in urban (53.1 %) is higher than rural (30.8 %) and for males

[86] As indicated by 63.6 %, 58.3 %, 54.7 %, 52.4 %, 48.8 %, 38.5 %, and 29.1 % respectively.

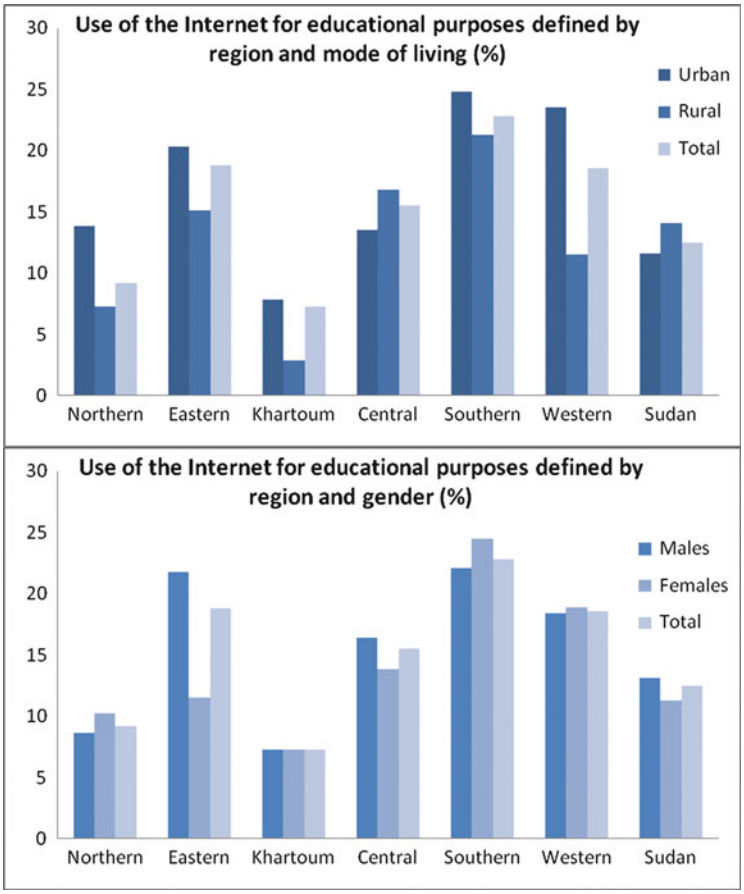

Fig. 6.16 (continued)

(46.6 %) is higher than females (43.9 %) and total Sudan (45.6 %). The regional distribution implies that the highest proportions of individuals used the Internet for other purposes is reported in Khartoum followed by all Sudan, Central, Eastern, Northern, Southern and Western regions respectively (see Table 6.16 and Fig. 6.16).[87]

[87] As indicated by 60.2 %, 45.6 %, 37 %, 36.1 %, 31.3 %, 25.7 %, and 25 % respectively.

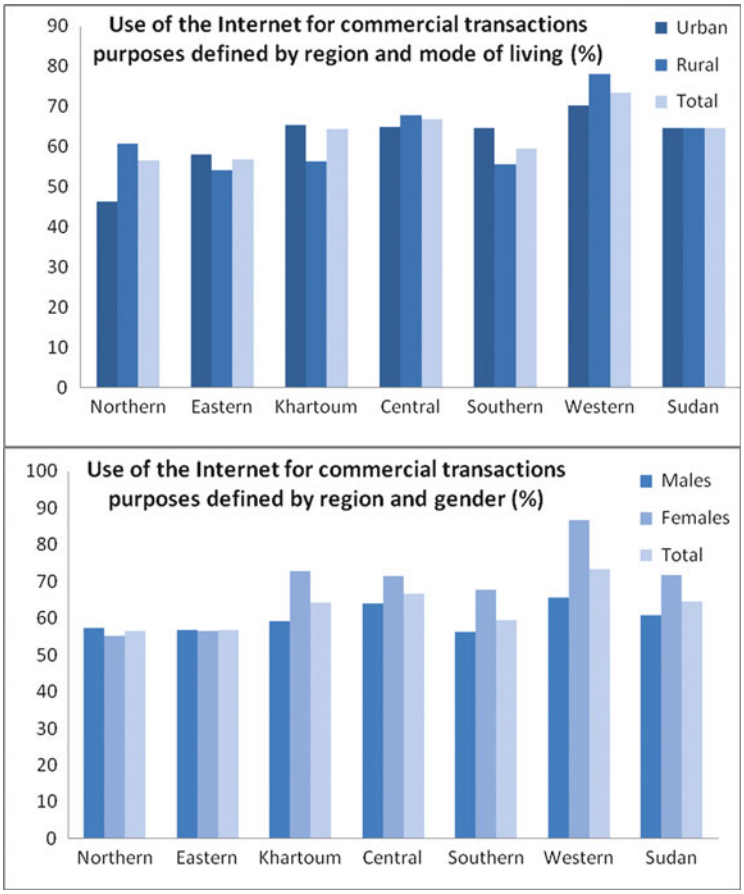

Fig. 6.16 (continued)

6.4.7 Impediment Factors Impeded the Use of the Internet

From the viewpoint of individuals, several impediment factors impeded the use of the Internet. Regarding the factors that hindered the use of the Internet, Table 6.17 explains that the proportions of individuals to use the Internet are impeded by impediment factors such as the non availability of the Internet service, cost, language, and for other reasons defined by region, mode of living and gender. The disparities in ICT indicators appear from the proportions of individuals used the Internet according to factors limit the use of the Internet that implies that for the majority of individuals in Sudan other reasons are the most commonly reasons

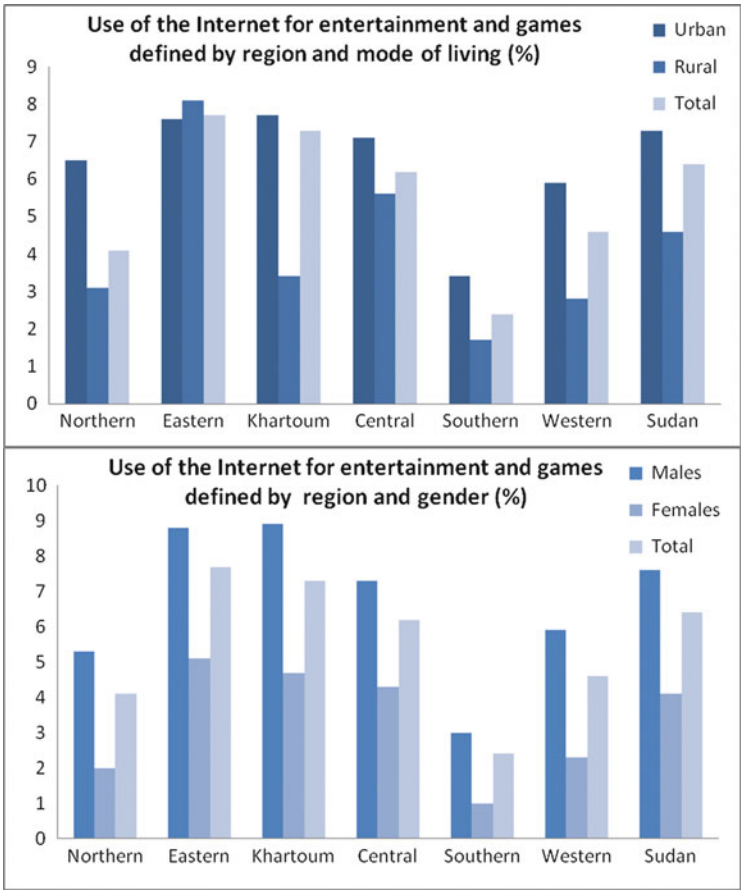

Fig. 6.16 (continued)

impeded the use of the Internet, followed by the cost, non availability of Internet service and the language respectively.[88] For nearly third of individuals in Sudan, the cost and non availability of the Internet service impeded the use of the Internet (see Table 6.17 and Fig. 6.17).

The regional disparities in ICT indicators appear from the proportions of individuals who did not use the Internet due to the non availability of the Internet service of total who did not use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use the Internet due to the non availability of the Internet service of total who did not use the Internet in rural (39.8 %) is nearly twice higher than urban (24.9 %) and for males (35.9 %) is nearly twice higher than females (22.4 %) and total Sudan (30.3 %). The regional distribution implies that the highest proportions of individuals who did not use the Internet due to the non availability of the Internet service,

[88] As indicated by 53.8 %, 30.4 %, 30.3 %, and 3.2 % respectively.

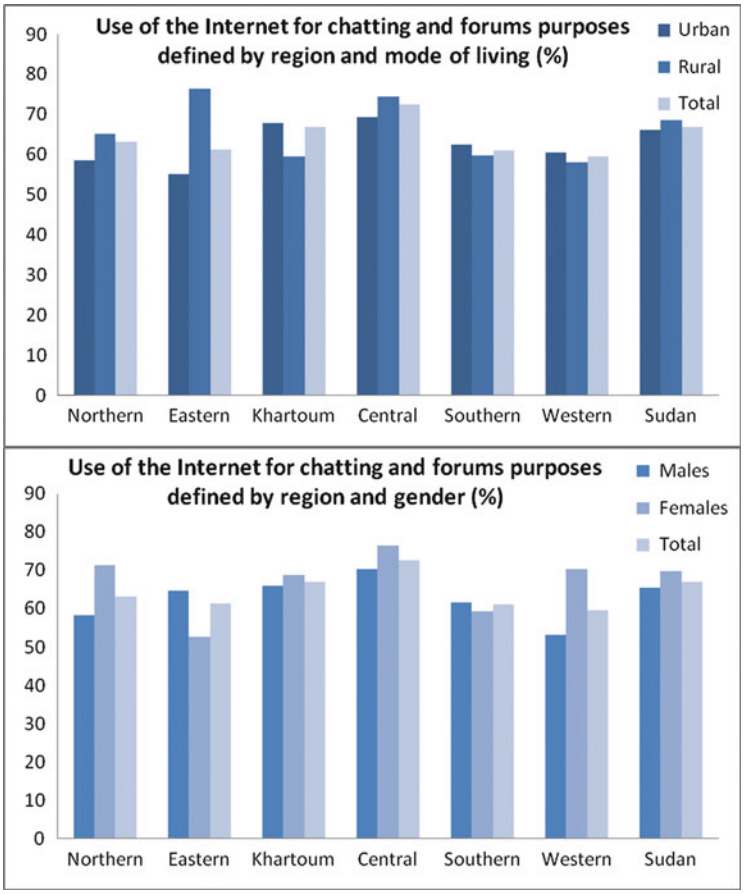

Fig. 6.16 (continued)

of total who did not use the Internet is reported in Eastern region followed by Central region, Southern, all Sudan, Western, Khartoum, and Northern regions respectively.[89]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use the Internet because of the cost of the Internet service of total who did not use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use the Internet because of the cost of the Internet service of total who did not use the Internet in urban (33.1 %) is higher than rural (25.6 %) and for males (32.1 %) is higher than females (27.9 %) and total Sudan (30.4 %). The regional distribution implies that the highest proportions of individuals who did not use the Internet because of the cost of the Internet service of total who did not use the Internet is reported in

[89] As reported by 61.6 %, 38.3 %, 33.6 %, 30.3 %, 21.4 %, 16.6 %, and 10.2 % respectively.

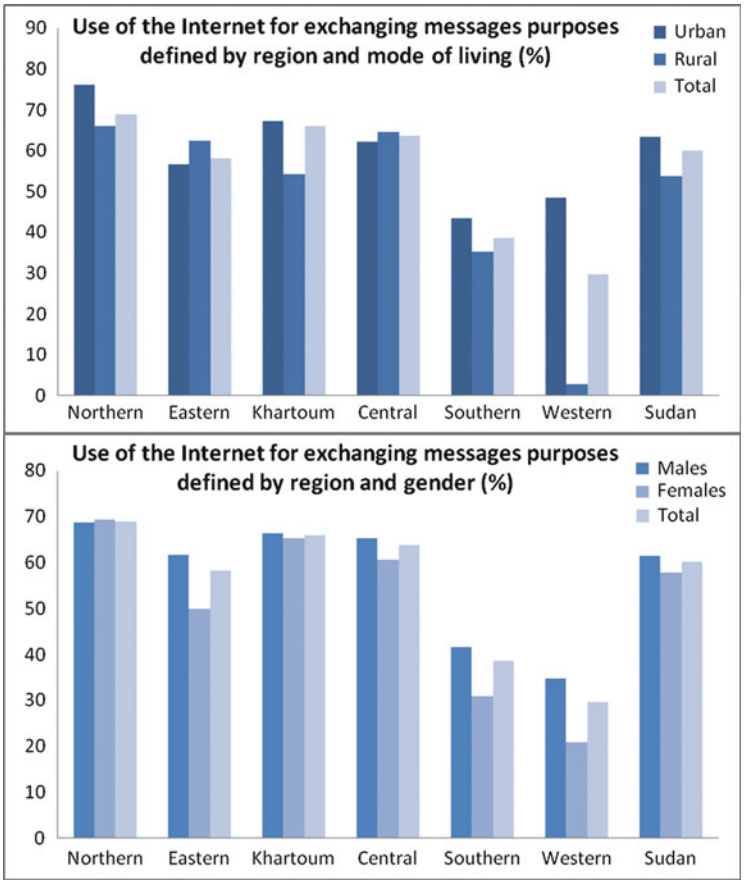

Fig. 6.16 (continued)

Eastern region followed by Khartoum, Southern, Western, all Sudan, Central, and Northern regions respectively.[90]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use the Internet because of the language of total who did not use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals who did not use the Internet because of the language of total who did not use the Internet in rural (4.2 %) is near to twice higher than urban (2.6 %) and for males (4.9 %) is more than six times/higher than females (0.8 %) and total Sudan (3.2 %). The regional distribution implies that the highest proportions of individuals who did not use the Internet because of the language of total who did not use the Internet is reported in Southern region followed by

[90] As indicated by 41.7 %, 36.5 %, 33.5 %, 32.7 %, 30.4 %, 29.5 %, and 0 % respectively.

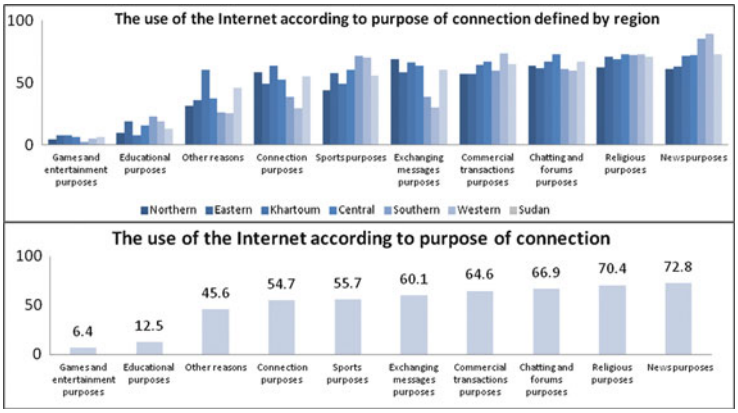

Fig. 6.16 (continued)

Western region, Central, all Sudan, Khartoum, Eastern, and Northern regions respectively.[91]

The regional disparities in ICT indicators appear from the proportions of individuals who did not use the Internet because of other reasons of total who did not use the Internet defined by region, mode of living and gender in Sudan. That implies that the proportions of individuals' who did not use the Internet because of other reasons of total who did not use the Internet in rural (54.4 %) is higher than urban (53.4 %) and for females (58.6 %) is higher than males (50.4 %) and total Sudan (53.8 %). The regional distribution implies that the highest proportions of individuals who did not use the Internet because of other reasons of total who did not use the Internet is reported in Northern region followed by Southern region, Khartoum, Western, all Sudan, Central, and Eastern regions respectively.[92]

6.4.8 Costs of Connectivity and Use of the Internet

The regional disparities in ICT indicators appear from individuals' viewpoint concerning the cost of using the Internet defined by region, mode of living and gender in Sudan. That implies that the viewpoint of the majority in other region and all Sudan implies that the cost of using the Internet is reasonable followed by high and low respectively.[93] From the viewpoint of the majority of individuals the high cost of using the Internet is reported in Western region followed by Northern region, Eastern, Southern, all Sudan, Khartoum, and Central regions respectively.[94] From the viewpoint of some people the reasonable cost of using the Internet is

[91] As reported by 16.4 %, 7.8 %, 4.5 %, 3.2 %, 0 %, 0 %, and 0 % respectively.

[92] As indicated by 89.8 %, 64.8 %, 61.3 %, 54 %, 53.8 %, 41.6 %, and 31.3 % respectively.

[93] As indicated by 67.4 %, 29.4 %, and 3.2 % respectively.

[94] As reported by 43.1 %, 39 %, 35.2 %, 30.6 %, 28.5 %, 28 %, and 21.1 % respectively.

Table 6.17 Factors limit the use of the Internet defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Non availability of services	Mode of living	Urban	0	47.1	16.3	27.6	56.4	21.4	24.9
		Rural	16	89	18	50.2	13.6	0	39.8
	Gender	Males	0	60.9	21.4	47.6	30.3	25	35.9
		Females	22.2	66.7	12.2	26.9	45.6	15.4	22.4
	Region		10.2	61.6	16.6	38.3	33.6	21.4	30.3
Cost	Mode of living	Urban	0	34.8	43.1	28	19.7	32.7	33.1
		Rural	0	54.8	0	31.1	45.5	0	25.6
	Gender	Males	0	47.8	42.9	26.3	30.2	29.2	32.1
		Females	0	0	30.5	33.3	45.3	38.5	27.9
	Region		0	41.7	36.5	29.5	33.5	32.7	30.4
Language	Mode of living	Urban	0	0	0	6.5	3.9	7.8	2.6
		Rural	0	0	0	2.3	27.3	0	4.2
	Gender	Males	0	0	0	6.5	20.8	12.5	4.9
		Females	0	0	0	2	0	0	0.8
	Region		0	0	0	4.5	16.4	7.8	3.2
Other reasons	Mode of living	Urban	100	18.9	59.2	49.1	55.7	54	53.4
		Rural	84	54.8	73	33.3	72.7	0	54.4
	Gender	Males	100	26.1	52.4	41.9	65.1	54.2	50.4
		Females	77.8	66.6	69.5	41.2	63.9	53.8	58.6
	Region		89.8	31.3	61.3	41.6	64.8	54	53.8

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

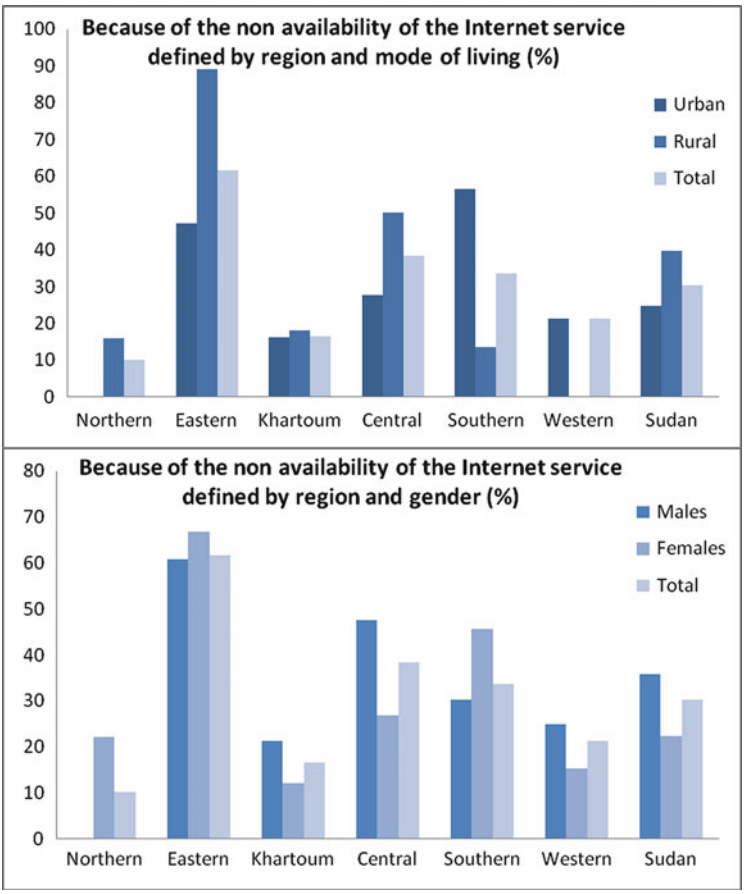

Fig. 6.17 Factors limit the use of the Internet defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

reported in Central region followed by Khartoum, all Sudan, Southern, Northern, Eastern, and Western regions respectively.[95] From the viewpoint of few people the low cost of using the Internet is reported in Eastern region followed by Southern, Western, Central, all Sudan, Khartoum, and Northern regions respectively.[96] From individuals' viewpoint the cost of using the Internet and mobile cellular telephone implies that the viewpoint of the majority in Sudan implies that the cost of using the Internet is reasonable followed by high and low respectively, while the cost of using

[95] As indicated by 74.7 %, 68.9 %, 67.4 %, 63.1 %, 59 %, 55.9 %, and 51.9 % respectively.

[96] As reported by 8.8 %, 6.3 %, 5 %, 4.2 %, 4.1 %, 3.1 %, and 2.1 % respectively.

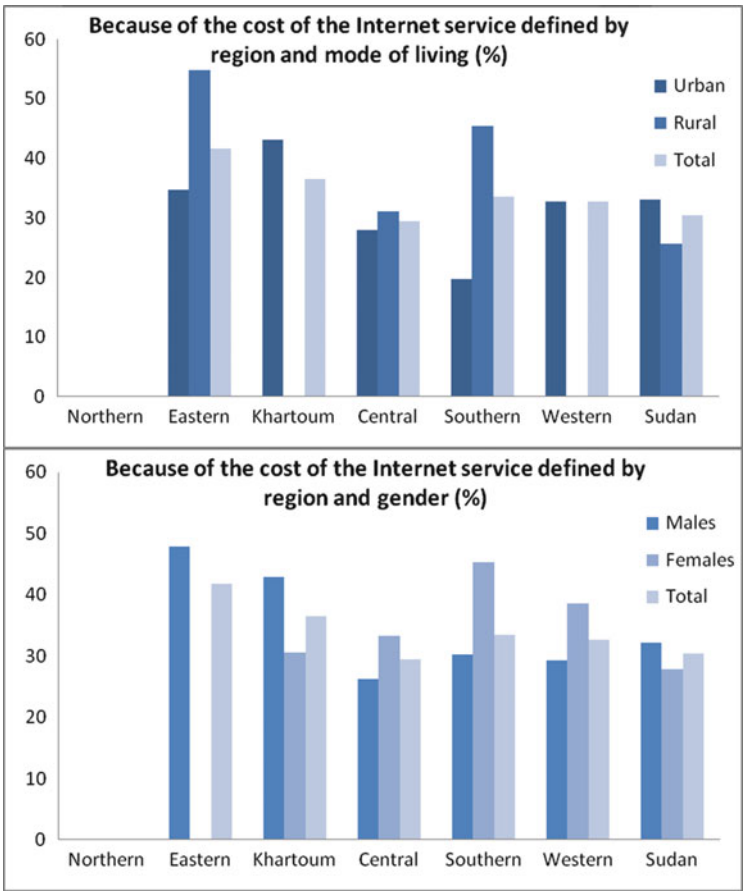

Fig. 6.17 (continued)

mobile cellular telephone is high followed by reasonable and low respectively (Table 6.18 and Fig. 6.18).[97]

[97] As indicated by 67.4 %, 29.4 %, and 3.2 % for the Internet and as indicated by for mobile cellular telephone respectively.

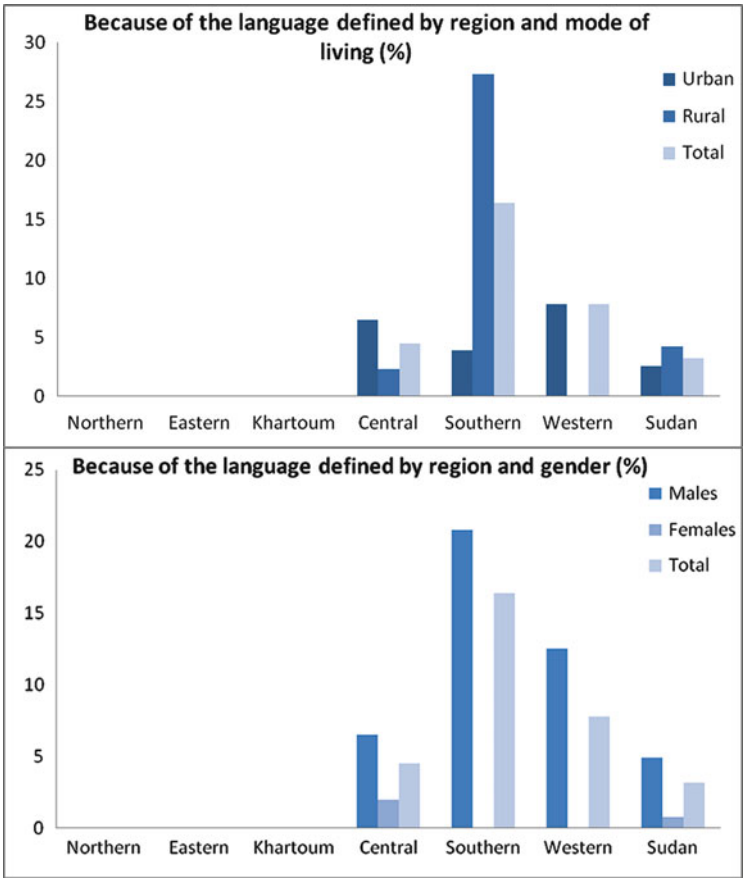

Fig. 6.17 (continued)

6.5 Determinants of the Digital Divide

This section examines the determinants of the digital divide that appears from the relationships between the use of ICT (mobile, computer and Internet) and age, educational and professional levels, and the use of ICT and per capita income, poverty and urbanization.

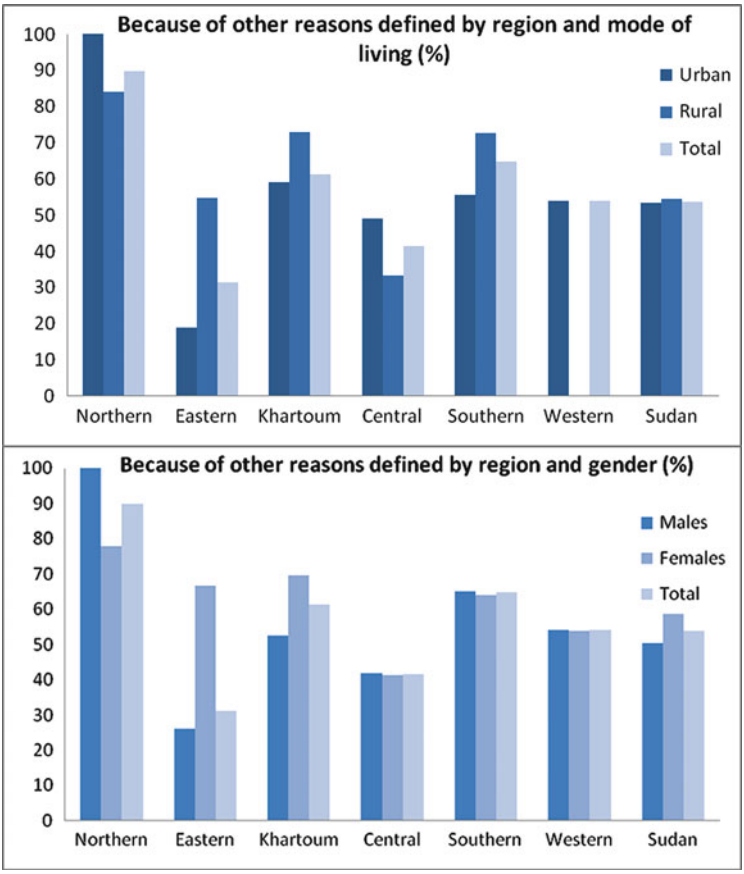

Fig. 6.17 (continued)

6.5.1 Relationships Between the Use of ICT, Age, Educational Level and Professional Level

This section examines the relationships between the use of mobile, computer and Internet and age, educational and professional levels. Table 6.19 explains the distribution of individuals used mobile at least once during the year 2011, computer at home and outside home and Internet defined by age, educational and professional levels (see Table 6.19, Figs. 6.19 and 6.20).

We examine the relationship between the use of ICT and educational level appear from the proportions and distribution of individuals used computer at home and outside home and the Internet defined by age and educational level in Sudan. We find positive relationship between the proportion of individuals used computer at home and outside home and the Internet and educational level that

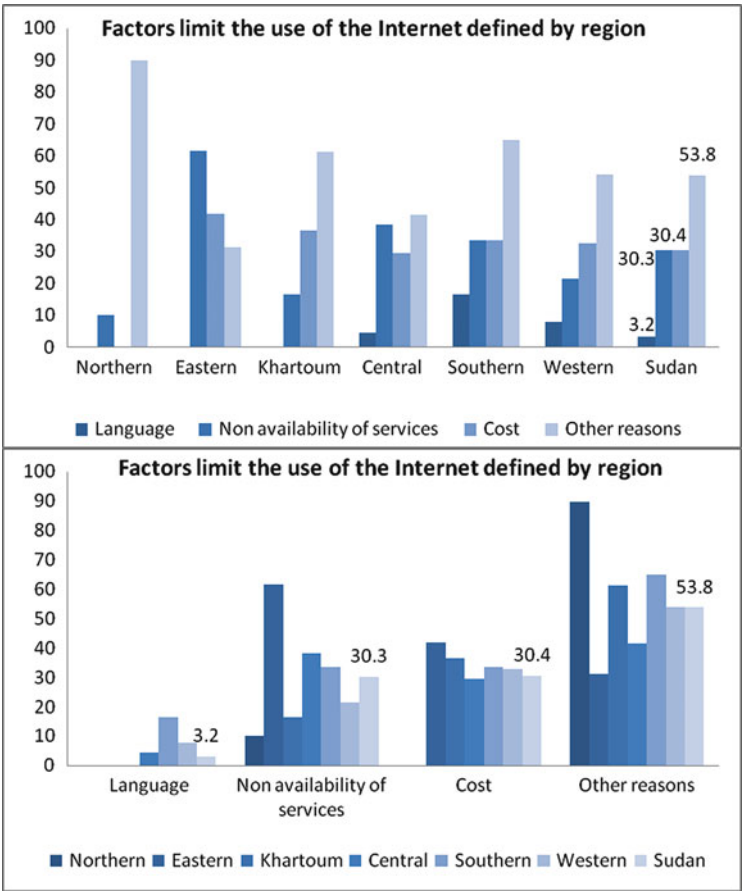

Fig. 6.17 (continued)

implies that the proportions of individuals used computer at home and outside home increases with the level of education, it is higher for university level, followed by secondary, basic, literate and illiterate levels respectively.[98,99,100] We find negative relationship between the proportion of individual use of computer at home and outside home and the Internet and age that implies that the proportions of individuals used computer at home and outside home and the Internet decreases with the

[98] As reported by 54.6 %, 37.5 %, 6.9 %, 1 %, and 0 % respectively for at home.
[99] As indicated by 50.6 %, 38.5 %, 9.5 %, 1.3 %, and 0.1 % respectively for outside home.
[100] As indicated by 47.1 %, 39.5 %, 11.4 %, 1.8 %, and 0.2 % respectively for Internet.

Table 6.18 Cost of using Internet from the viewpoint of individuals defined by region, mode of living and gender in Sudan during 2011

			Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Southern (%)	Western (%)	Sudan (%)
Gender	Males	High	34.1	32.2	26.7	23.1	30.7	38.9	27.7
		Reasonable	62.6	59.1	70	73.1	62.1	55	67.9
		Low	3.3	8.7	3.3	3.8	7.2	6	4.4
	Females	High	47	42.7	30.2	17.3	30.4	50.2	29.8
		Reasonable	53	48	67.2	77.7	65.9	46.5	66.5
		Low	0	9	2.6	4.8	3.3	3.3	3.6
	Total	high	39	35.2	28	21.1	30.6	43.1	28.5
		reasonable	59	55.9	68.9	74.7	63.1	51.9	67.4
		low	2.1	8.8	3.1	4.2	6.3	5	4.1
		Total	100	100	100	100	100	100	100
Mode of living	Urban	High	9.1	34.8	28.5	17.6	33.4	40.9	28
		Reasonable	88.8	54.3	68.4	76.6	59	52.5	67.4
		Low	2.2	11	3.1	5.7	7.6	6.6	4.6
	Rural	High	51.5	36.4	23.5	23.2	28.6	46.2	29.4
		Reasonable	46.5	60	74.2	73.5	66.1	51	67.4
		Low	2	3.6	2.3	3.3	5.3	2.8	3.2
	Total	High	39	35.2	28	21.1	30.6	43.1	28.5
		Reasonable	59	55.9	68.9	74.7	63.1	51.9	67.4
		Low	2.1	8.8	3.1	4.2	6.3	5	4.1
		Total	100	100	100	100	100	100	100

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

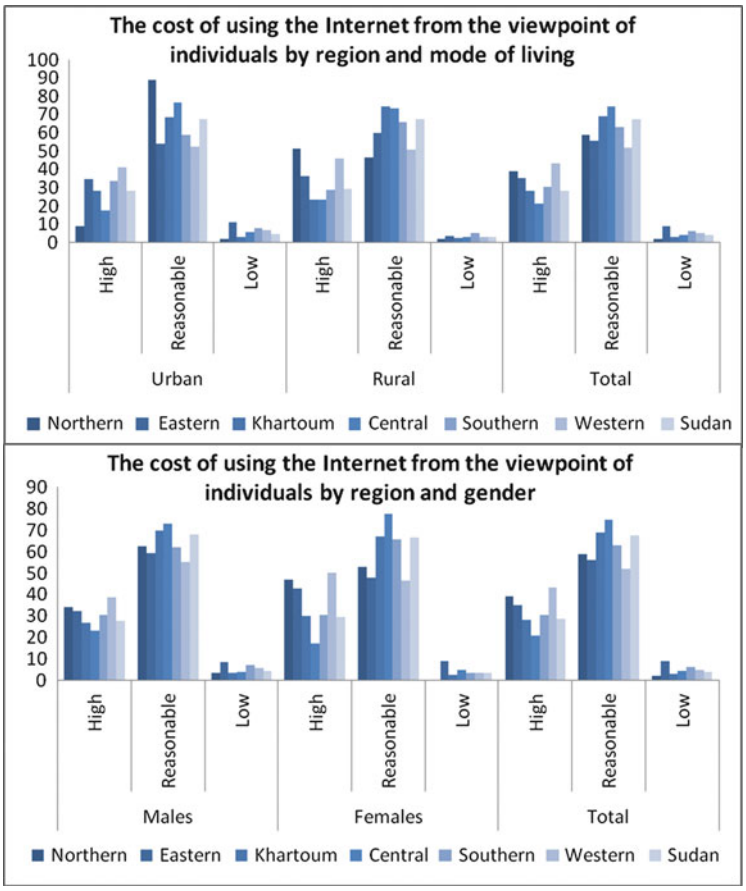

Fig. 6.18 Cost of using Internet from the viewpoint of individuals defined by region, mode of living and gender in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

increase of age, it is higher for age (15–24) followed by age (25–34), (35–44), (45–54), (55–64), (65–74), and (75) respectively (see Table 6.19, Figs. 6.19 and 6.20).[101,102,103]

We examine the relationship between the use of ICT and professional level appear from the proportions and distribution of individuals used computer at home

[101] As indicated by 43.6 %, 29.2 %, 14.3 %, 9.1 %, 3.4 %, 0.4 % and 0 % respectively for at home.

[102] As reported by 45.1 %, 31.3 %, 14.6 %, 6.8 %, 1.8 %, 0.3 %, and 0.1 % respectively for outside home.

[103] As indicated by 45.7 %, 30.6 %, 14.6 %, 6.7 %, 2 %, 0.4 %, and 0.1 % respectively for Internet.

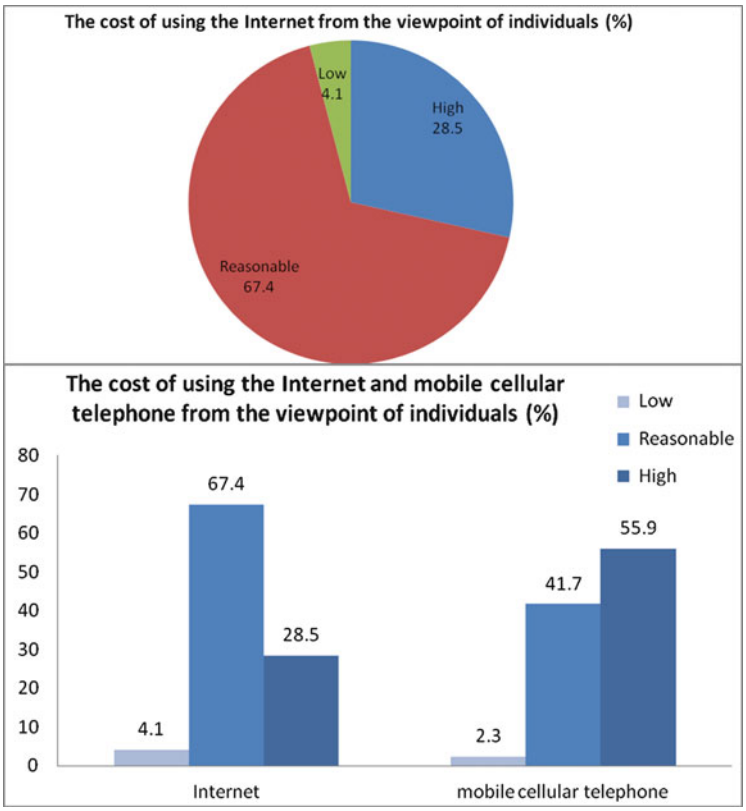

Fig. 6.18 (continued)

and outside home defined by age and professional level in Sudan. The distribution of individuals used computer at home implies that the relative distribution defined by professional level is higher for professional level, followed by services workers, clerks, technical, simple jobs, regular workers, executive and legislative, craftsmen, agricultural workers, and operational workers respectively.[104] The distribution of individuals used computer outside home implies that the relative distribution defined by professional level is higher for professional level, followed by services workers, clerks, technical, regular workers, simple jobs, craftsmen, executive and legislative, agricultural workers, and operational workers respectively.[105] The

[104] As indicated by 37.4 %, 17.8 %, 13 %, 8.3 %, 7.3 %, 5.8 %, 3.9 %, 3.3 %, 2.5 %, and 0.7 % respectively for at home.

[105] As indicated by 33.8 %, 17 %, 11.5 %, 9.5 %, 8.6 %, 7.8 %, 4.4 %, 3.6 %, 2.9 %, and 1.1 % respectively for outside home.

Table 6.19 The use of mobile at least once during 2011, computer and Internet defined by age, educational level and professional level in Sudan during 2011

			15–24	25–34	35–44	45–54	55–64	65–74	75	Sudan (%)
Used a mobile	Age and educational level	Illiterate	2.2	2.8	3.5	3.7	2.2	1.4		16.4
		Literate	3.2	2.7	2.9	2.5	1.8	1		14.5
		Basic	11.2	6.1	4.4	2.6	1.2	0.4		26
		Secondary	13	6.2	4.5	2.5	1	0.3		27.6
		University	3.9	6.3	2.9	1.5	0.6	0.2		15.5
		Sudan	33.5	24.1	18.1	12.9	6.8	3.3		100
	Age and professional level	Executive and legislative	0	0.2	0.3	0.4	0.2	0		1.2
		Professional	0.6	4	3.3	2.1	0.8	0.1		11
		Technical	0.4	1.4	1.4	1.1	0.6	0.1		5
		Clerks	0.4	1.5	1.2	0.8	0.3	0		4.2
		Services workers	2	4.2	4.7	3.4	1.7	0.7		16.8
		Agricultural workers	3.3	5	4.6	4.3	2.8	1.4		21.6
		Craftsmen	1.5	2.4	1.9	1.1	0.6	0.2		7.6
		Operational workers	0.3	0.6	0.7	0.4	0.2	0		2.2
		Simple jobs	4.3	6	6.6	4.7	2.5	1.1		25.4
		Regular workers	1.2	1.8	1.2	0.5	0.2	0		4.9
		Total	13.8	27.2	25.9	18.8	9.7	3.7		100
Used a computer at home	Age and educational level	Illiterate	0	0	0	0	0	0	0	0
		Literate	0.3	0.1	0.2	0.2	0.1	0.1	0	1
		Basic	5.3	0.5	0.3	0.6	0.1	0	0	6.9
		Secondary	23.4	6.4	4.2	2.7	0.9	0	0	37.5
		University	14.6	22.2	9.6	5.6	2.3	0.3	0	54.6
		Sudan	43.5	29.2	14.3	9	3.4	0.5	0.1	100

	Age and professional level	Executive and legislative	0.1	0.3	1.2	1.7	0.6	0	0	3.9
		Professional	3.1	15	10.8	6.3	1.9	0.2	0.1	37.4
		Technical	0.8	3.5	1.6	1.8	0.6	0	0	8.3
		Clerks	0.8	6.4	3.3	2.3	0.3	0	0	13
		Services workers	1.6	6.2	5.7	3	1.3	0	0	17.8
		Agricultural workers	0.4	1.3	0.3	0.5	0.2	0	0	2.5
		Craftsmen	0.8	1.3	0.8	0.2	0.1	0	0	3.3
		Operational workers	0.1	0.1	0.3	0	0.1	0	0	0.7
		Simple jobs	1.3	3.1	1.4	0.9	0.4	0.1	0	7.3
		Regular workers	0.8	2.3	1.6	0.7	0.3	0	0	5.8
		Total	9.8	39.6	27	17.4	5.7	0.3	0.1	100
Used a computer outside home	Age and educational level	Illiterate	0	0	0.1	0	0	0	0	0.1
		Literate	0.5	0.4	0.2	0.1	0.1	0	0	1.3
		Basic	6.9	1.2	0.9	0.4	0.1	0	0	9.5
		Secondary	23.7	7.8	4.7	2	0.3	0	0	38.5
		University	13.9	21.8	8.8	4.4	1.4	0.2	0.1	50.6
		Sudan	45.1	31.3	14.6	6.8	1.8	0.3	0.1	100
	Age and professional level	Executive and legislative	0	0.8	1.2	1.3	0.3	0	0	3.6
		Professional	2.3	14.8	10.5	5	1	0.1	0.1	33.8
		Technical	0.9	4.3	2.1	1.8	0.3	0.1	0	9.5
		Clerks	1.3	5.2	2.7	2	0.3	0.1	0	11.5
		Services workers	2.6	6.4	5.2	2.2	0.5	0	0	17
		Agricultural workers	0.3	1.5	0.8	0.3	0	0	0	2.9
		Craftsmen	1.5	1.3	1.2	0.4	0	0	0	4.4
		Operational workers	0	0.3	0.5	0.1	0.1	0	0	1.1
		Simple jobs	2	3.2	1.7	0.5	0.4	0	0.1	7.8
		Regular workers	1.9	3.6	2.1	0.8	0.2	0	0	8.6
		Total	12.7	41.5	28	14.3	3.1	0.3	0.2	100

(continued)

Table 6.19 (continued)

			15–24	25–34	35–44	45–54	55–64	65–74	75	Sudan (%)
Used the Internet	Age and educational level	Illiterate	0	0	0.1	0	0	0	0	0.2
		Literate	0.7	0.4	0.4	0.2	0.1	0	0.1	1.8
		Basic	7.5	2	1.2	0.6	0.1	0	0	11.4
		Secondary	24	8.2	4.7	1.9	0.5	0	0	39.5
		University	13.4	19.9	8.2	4	1.3	0.2	0	47.1
		Sudan	45.7	30.6	14.6	6.7	2	0.4	0.1	100
	Age and professional level	Executive and legislative	0.1	0.4	0.9	1	0.3	0	0	2.8
		Professional	2.5	12.7	8.9	4.9	1	0.1	0.1	30.1
		Technical	1	3.3	2.3	1.3	0.2	0	0	8.1
		Clerks	1	5.1	2.7	1.5	0.3	0.1	0	10.7
		Services workers	2.7	7.2	5.8	1.9	0.7	0	0	18.4
		Agricultural workers	0.7	1.8	1.2	0.5	0.1	0.1	0	4.3
		Craftsmen	1.5	2	1.3	0.4	0	0	0	5.2
		Operational workers	0.3	0.3	0.6	0	0.1	0	0	1.4
		Simple jobs	2.5	4	2.5	0.6	0.3	0	0.1	10
		Regular workers	2.1	4	2	0.9	0.2	0	0	9.2
		Total	14.5	40.7	28.2	13	3.2	0.2	0.2	100

Source Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

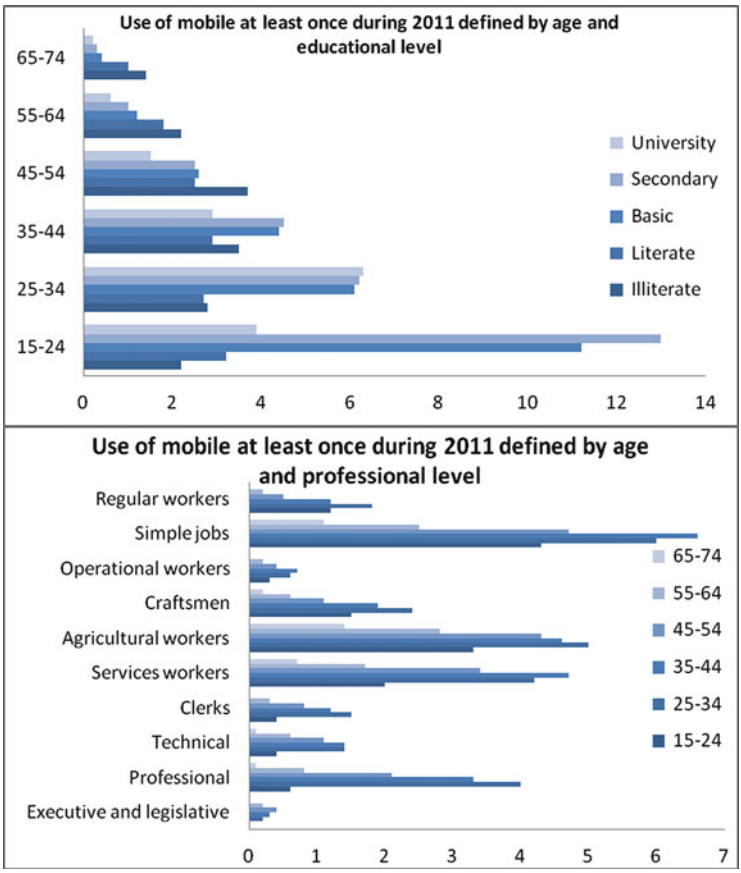

Fig. 6.19 The use of mobile at least once during 2011, computer and Internet defined by age, educational level and professional level in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

relative distribution at home and outside home defined by age is higher for age (25–34), followed by (35–44), (45–54), (15–24), (55–64), (65–74), and (75) respectively (see Table 6.19, Figs. 6.19 and 6.20).[106,107]

We examine the relationship between the use of ICT and educational level appear from the proportions and distribution of individuals used mobile at least once during 2011 defined by age and educational level in Sudan. We find inconclusive relationship between the proportion of individuals used mobile and

[106] As reported by 39.6 %, 27 %, 17.4 %, 9.8 %, 5.7 %, 0.3 %, and 0.1 % respectively for at home.

[107] As reported by 41.5 %, 28 %, 14.3 %, 12.7 %, 3.1 %, 0.3 %, and 0.2 % respectively for outside home.

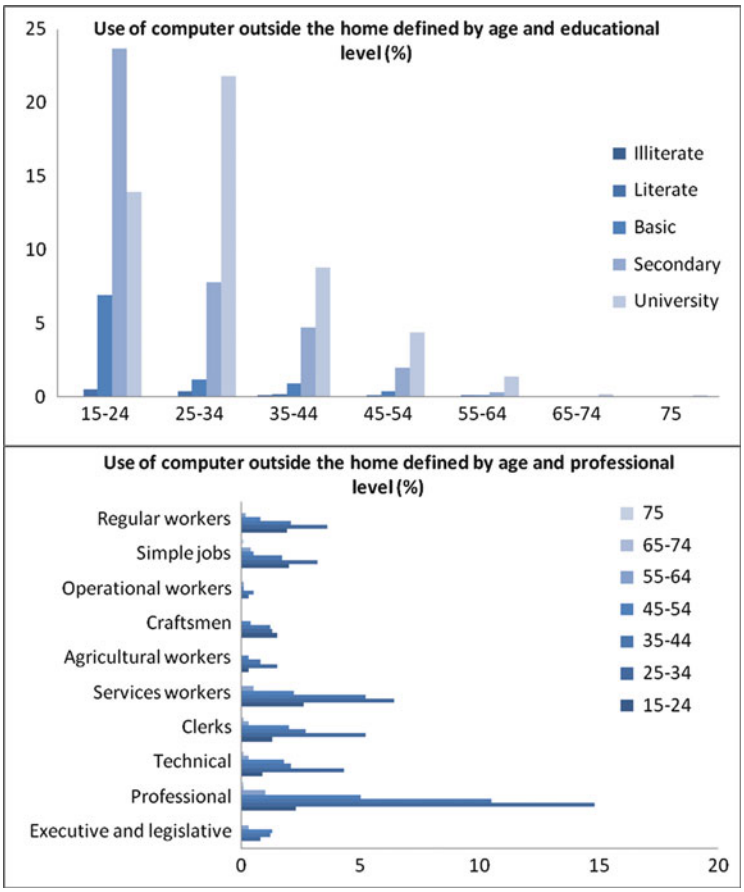

Fig. 6.19 (continued)

educational level that implies higher use of mobile for secondary level, followed by basic, illiterate, university, and literate respectively.[108] We find negative relationship between the use of mobile and age that implies the use of mobile decreases with the increase of age, it is higher for age (15–24) followed by (25–34), (35–44), (45–54), (55–64), and (65–74) respectively (see Table 6.19, Figs. 6.19 and 6.20).[109]

We examine the relationship between the use of ICT and professional level appear from the proportions and distribution of individuals used mobile at least once during the year 2011 defined by age and professional level in Sudan. We find

[108] As indicated by 27.6 %, 26 %, 16.4 %, 15.5 %, and 14.5 % respectively.

[109] As reported by 33.5 %, 24.1 %, 18.1 %, 12.9 %, 6.8 %, and 3.3 % respectively.

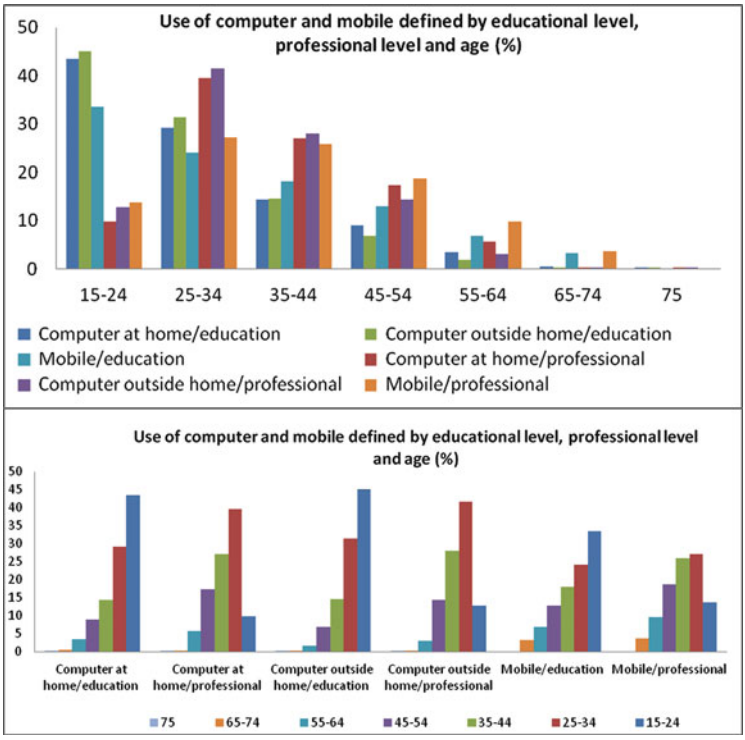

Fig. 6.19 (continued)

that inconclusive relationship between the proportion of individual used mobile and professional level that implies that the distribution defined by professional level is higher for simple jobs, agricultural workers, services workers, professional, craftsmen, technical, regular workers, clerks, operational workers, and executive and legislative respectively.[110] We find negative relationship between the use of mobile and age that implies that the use of mobile decrease with the increase of age, it is higher for age (25–34), followed by (35–44), (45–54), (15–24), (55–64), (65–74), and (75) respectively (see Table 6.19, Figs. 6.19 and 6.20).[111]

The above results are consistent with the OLS regression using E-views program reported in Table 6.20, which indicates the correlations between the use of ICT and

[110] As indicated by 25.4 %, 21.6 %, 16.8 %, 11 %, 7.6 %, 5 %, 4.9 %, 4.2 %, 2.2 %, and 1.2 % respectively.

[111] As reported by 13.8 %, 27.2 %, 25.9 %, 18.8 %, 9.7 % and 3.7 % respectively.

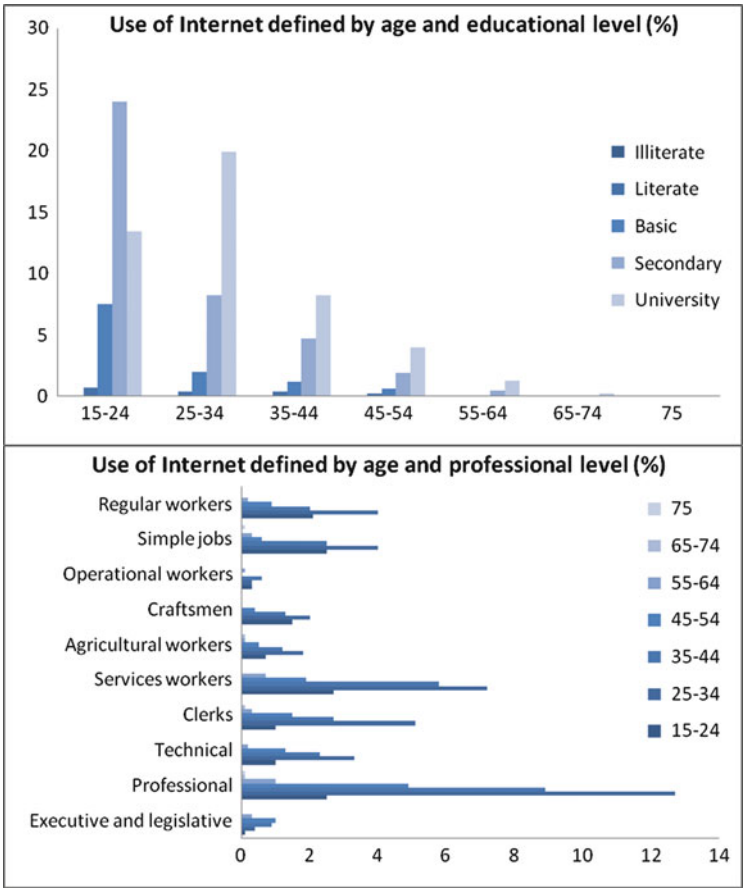

Fig. 6.19 (continued)

education level and age For instance, Table 6.20 illustrates plausible positive significant correlations between the use of ICT (mobile, computer and Internet) and education level and plausible negative significant correlations between the use of ICT (mobile, computer and Internet) and age. Our findings support our results from Table 6.19 that indicate that the increase in education level and decrease in age would imply increase in the use of ICT in Sudan and therefore, the use of ICT is increasing in education and decreasing in age. Our results are consistent with the results in the international literature (See Chinn and Fairlie 2004; Dasgupta et al. 2001; ITU 2013; OECD 2001). Our results in Table 6.20 imply that the correlations

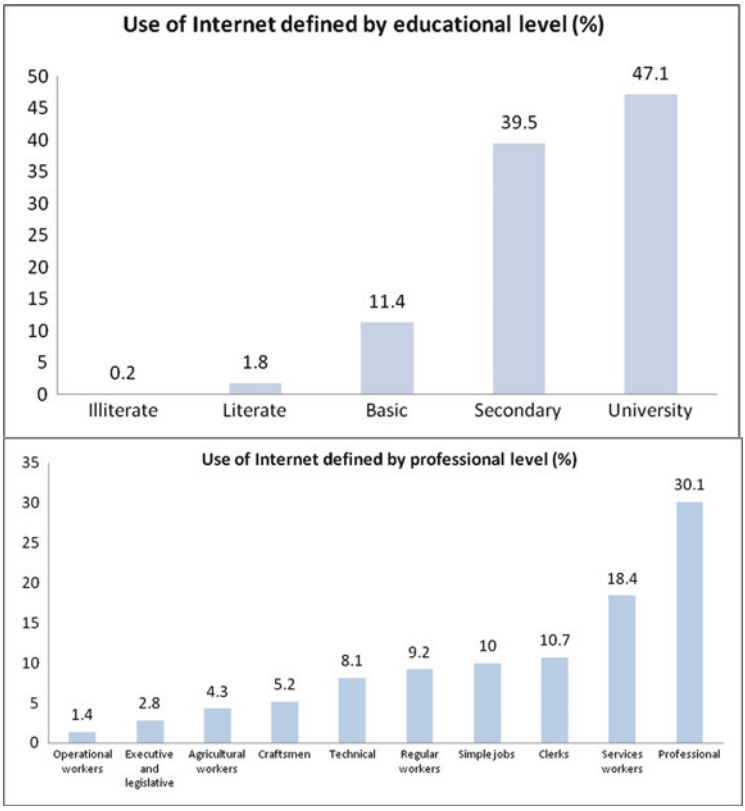

Fig. 6.19 (continued)

between education and the use of computer seem more significant than the correlations between education and use of Internet and use of mobile respectively These results are plausible and seem consistent with the findings in the literature that imply that according to computers may require substantial levels of education for use, but telephones and the Internet may require very little (cf. Dasgupta et al. 2001). Our results in this chapter presented in Tables 6.19 and 6.20 confirm the seventh hypothesis in Chap. 1 about the relationship between the use of ICT and the incidence of the digital divide defined by age and educational level in Sudan.

We use the OLS and the data in the data from Table 6.21. We examine the relationship between the use of ICT and net enrolment rate in primary education, literacy rate and the share in total population: Table 6.22 illustrates plausible

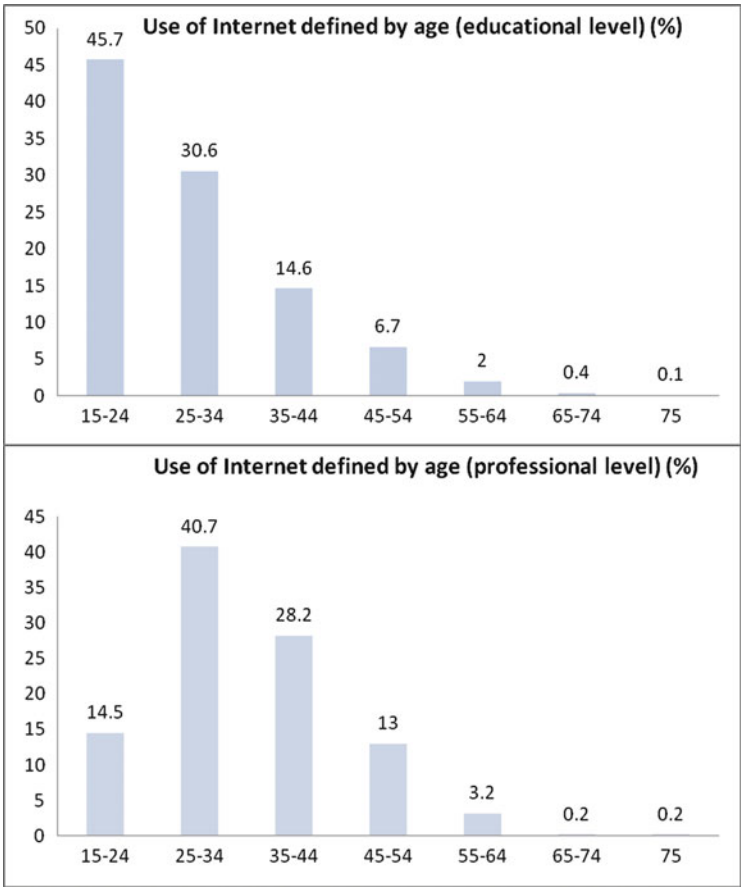

Fig. 6.19 (continued)

positive significant correlations between the use of ICT and net enrolment rate in primary education, literacy rate and the share in total population. We find positive significant correlation between ownership of mobile and computer, use of mobile, computer and Internet, knowledge of computer and Internet and provision of computer and both net enrolment rate in primary education and literacy rate. We find positive significant correlation between the use of Internet and the share in total population. Our findings imply that the increase in net enrolment rate in primary

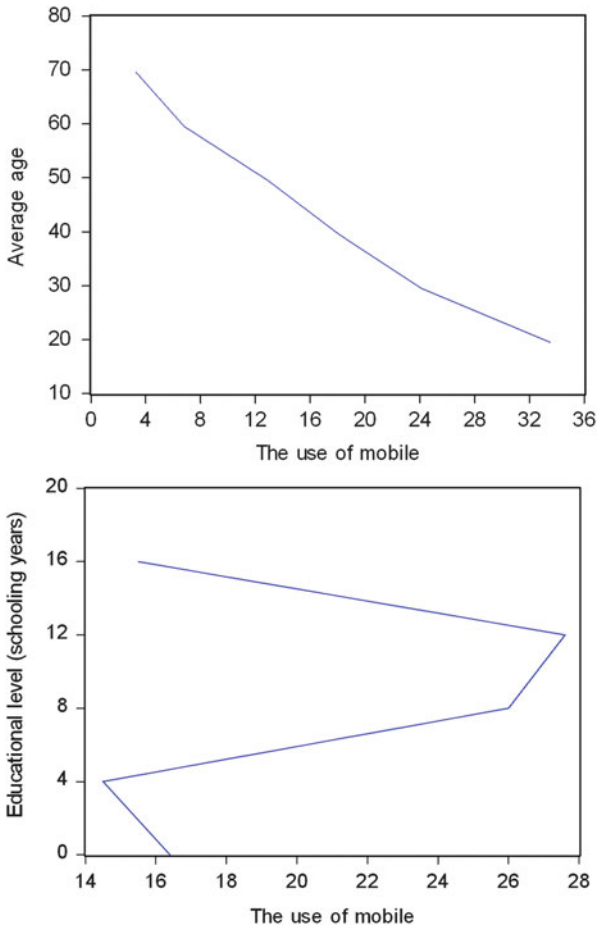

Fig. 6.20 The use of mobile at least once during 2011, computer and Internet defined by age and educational level in Sudan during 2011 (*Source* Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012")

education and literacy rate would imply increase in the use of ICT in Sudan. Our results are consistent with the results in the international literature (See Chinn and Fairlie 2004; Dasgupta et al.2001; ITU 2013; OECD 2001).

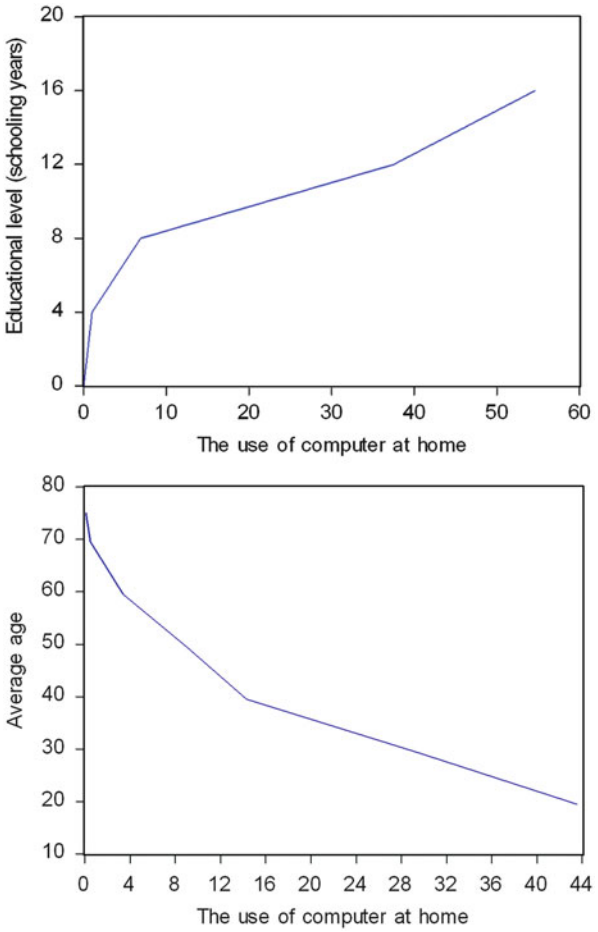

Fig. 6.20 (continued)

6.5.2 Relationships Between the Use of ICT, Per Capita Income, Poverty and Urbanization

We examine the relationship between the use of ICT and per capita income, poverty gap ratio and rate of urbanization: Table 6.23 illustrates plausible positive significant correlations between the use of ICT and both per capita income and rate of urbanization and negative correlation between the use of ICT and poverty gap ratio. We find positive significant correlation between ownership of mobile and

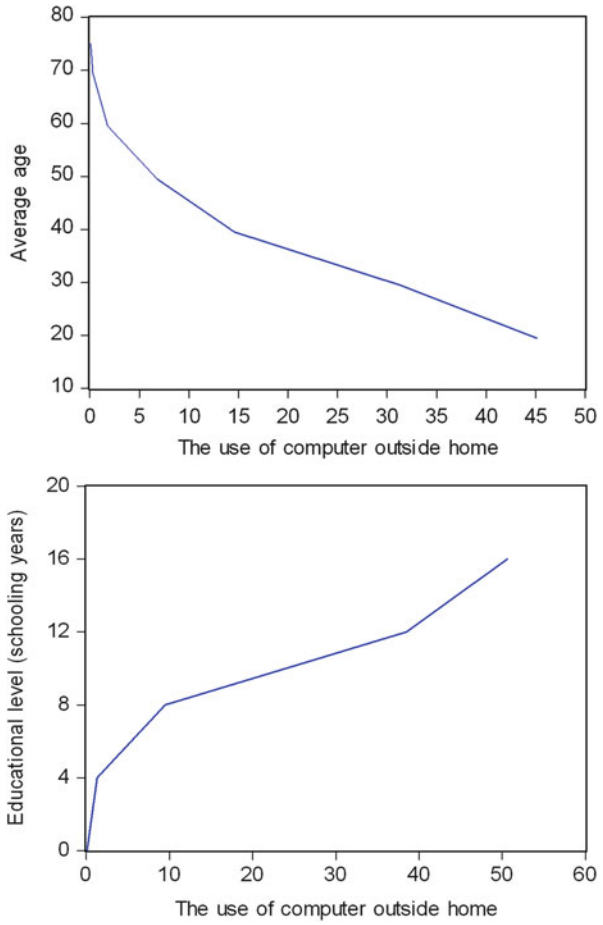

Fig. 6.20 (continued)

computer, use of mobile, computer and Internet, knowledge of computer and Internet and provision of computer and per capita income. We find negative significant correlation between ownership of mobile and computer, use of mobile, computer and Internet, knowledge of computer and Internet and provision of computer and poverty gap ratio. We find positive correlation between ownership and use of mobile and rate of urbanization, and positive significant correlation between ownership of computer, use of computer and Internet, knowledge of computer and Internet and provision of computer and rate of urbanization. Our

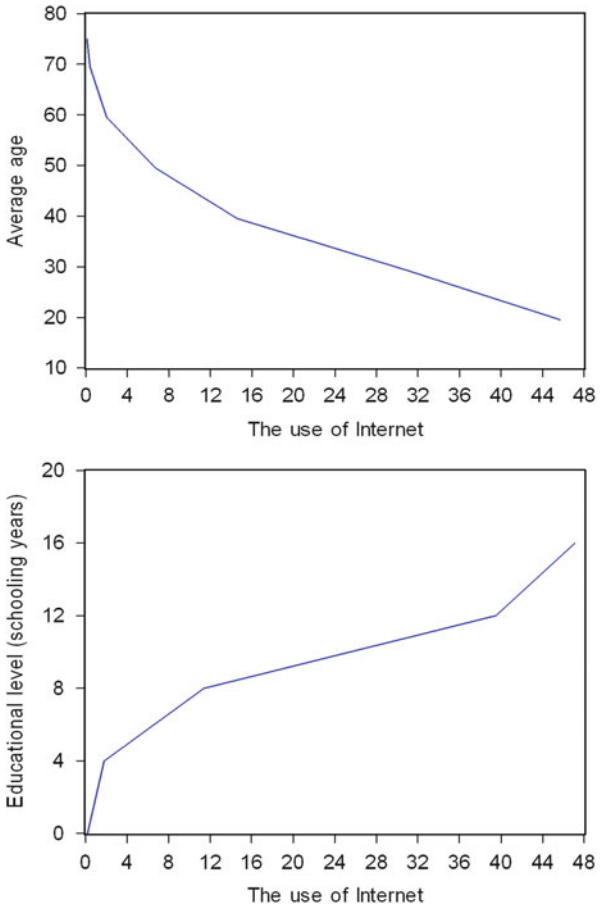

Fig. 6.20 (continued)

findings imply that the increase in per capita income, decline in poverty rate and increase in urbanization rate would imply increase in the use of ICT in Sudan. Our results are consistent with the results in the international literature (See Chinn and Fairlie 2004; Dasgupta et al. 2001; ITU 2013; OECD 2001).

Table 6.20 Correlation between the use of ICT and education and age in Sudan (defined by education, age and region) during 2011

		Coefficient (t-value)				
Independent variables		Education	Age	Constant	R^2	N
Dependent variable (use of ICT)						
Mobile	All Sudan	0.162 (0.428)		2.644 (3.107)	0.083809	4
	All regions	0.053 (0.549)		2.870 (3.063)	0.010648	4
	All Sudan		−1.692** (−5.088)	8.819 (7.102)	0.866168	4
	All regions		−1.675** (−6.053)	7.025 (6.797)	0.566844	4
Computer at home	All Sudan	3.019** (11.311)		−4.196 (−7.010)	0.984608	4
	All regions	2.675** (5.505)		−5.702 (−5.244)	0.602427	4
	All Sudan		−4.020** (−4.148)	16.725 (4.513)	0.774795	4
	All regions		−2.191** (−2.531)	8.129 (2.548)	0.242600	4
Computer outside home	All Sudan	2.763** (10.805)		−3.503 (−6.111)	0.983158	4
	All regions	1.899** (2.898)		−4.108 (−2.729)	0.295703	4
	All Sudan		−4.370** (−4.941)	17.8697 (5.284)	0.830012	4
	All regions		−2.821406 (−3.691551)	10.373 (3.679)	0.393546	4
Internet	All Sudan	2.476** (9.305)		−2.761 (−4.629)	0.977423	4
	All regions	2.088** (3.831)		−4.252 (−3.488)	0.423237	4
	All Sudan		−4.262** (−4.910)	17.511 (5.276)	0.828231	4
	All regions		−2.819** (−4.002)	10.501 (4.042)	0.432679	4

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

Table 6.21 Regional disparity in the use of ICT, per capita income, poverty, education literacy and urbanization in Sudan during 2005–2011

Region	Year	Northern (%)	Eastern (%)	Khartoum (%)	Central (%)	Western (%)	Total (%)
Population[a]	2008	1,819	4,534	5,274	7,423	5,922	30,893
	2008	5 %	12 %	13 %	19 %	15 %	100 %
Revenues[b]	2005	14,853	25,382	15,678	19,267	10,087	95,354
	2005	16 %	27 %	16 %	20 %	11 %	100 %
Actual per capita federal Allocation[b]	2005	9,068	2,553	8,497	4,872	3,249	5,248
Urbanization[b]	2005	27 %	43 %	88 %	29 %	25 %	39 %
Poverty gap ratio[c]	2009	9.4	17.7	6.4	13.8	24	16.2
Net enrolment rate in primary education[c]	2009	83	57	85	67	61	67
Literacy rate of 15–24-year olds[c]	2009	88	63	94	77	72	77
Individual used mobile[d]	2011	90.7	77.4	93	85.7	87.9	87.1
Household owned mobile[d]	2011	98.6	79.5	97.6	93.4	92.7	92.2
Household used mobile[d]	2011	97.1	88.8	98.1	95.7	95.5	95.2
Household owned computer[d]	2011	8.8	5.4	34.4	12	10.4	14
Household used computer[d]	2011	23.3	14.3	50.6	27.4	27	29.7
Individual have the knowledge to use computer[d]	2011	14.8	9.2	41.9	15.6	10.9	19.4
Individual provided with a computer at home[d]	2011	6	4.1	28.6	7.4	3.4	10.5
Individual used a computer at home[d]	2011	95.5	94.3	95.5	96.3	96.3	95.4
Individual used a computer outside home[d]	2011	64.9	59.4	59.2	68.3	71.1	64.4
Proportions of households with access to the internet[d]	2011	16.9	14.8	49.4	29	25.4	29.3
Have the knowledge how to use the internet[d]	2011	10.7	9	37	15.5	7.2	17.3
Used internet[d]	2011	86.9	92	96.3	93.1	97.7	94.6
Have e-mail[d]	2011	56.9	40.5	68	50.2	30.9	55

[a]Adapted from Sudan Central Bureau of Statistics Population Census Data (2010), in thousands: The Fifth Sudan Population and Housing Census (2008)
[b]Elbadawi and Suleiman (2008, p 107)
[c]The Sudan Central Bureau of Statistics (2011, p. 12)
[d]Adapted from National Telecommunication Corporation (NTC) (2012) "Households and individuals ICT survey 2012"

Table 6.22 Correlation between the use of ICT and education, literacy and population in Sudan during 2005–2011

			Coefficient (t-value)				R^2
Independent variables			Education	Literacy	Population	Constant	
Dependent variable (use of ICT)							
Mobile	Ownership	Household	0.398** (2.564)			2.834 (4.2999)	0.687
		Household		0.490** (3.645)		2.388 (4.074)	0.816
	Use	Household	0.176** (2.365)			3.808 (12.076)	0.651
		Household		0.222** (3.614)		3.587 (13.407)	0.813
		Individual	0.333** (2.749)			3.048 (5.915)	0.716
		Individual		0.412** (4.195)		2.669 (6.239)	0.854
Computer	Ownership	Household	2.579* (1.615)			−8.502 (−1.253)	0.465
		Household		3.359** (2.201)		−12.189 (−1.832)	0.617
	Use	Household	1.744* (1.674)			−4.133 (−0.934)	0.483
		Household		2.314** (2.446)		−6.814 (−1.652)	0.666
		Individual (at home)	0.009 (0.313)			4.524 (39.255)	0.032
		Individual (at home)		0.019 (0.6496)		4.477 (35.204)	0.123

(continued)

Table 6.22 (continued)

			Coefficient (t-value)				R^2
Independent variables			Education	Literacy	Population	Constant	
	Knowledge of computer	Individual	2.629** (2.343)			−8.3998 (−1.763)	0.647
		Individual		3.146** (2.814)		−10.949 (−2.246)	0.725
	Provision of computer	Individual	3.502* (1.973)			−12.905 (−1.712)	0.565
		Individual		4.0899** (2.137)		−15.863 (−1.901)	0.603
Internet	Use	Household	1.266 (0.941)			−2.170 (−0.3795)	0.228
		Household		1.858* (1.367)		−4.888 (−0.825)	0.384
		Individual			0.072** (2.272)	4.687 (67.899)	0.633
		Individual (use E-mail)	1.465** (2.942)			−2.355 (−1.113)	0.743
		Individual (use E-mail)		1.541** (2.327)		−2.851 (−0.988)	0.644
	Knowledge of internet	Individual	2.463* (1.657)			−7.874 (−1.247)	0.478
		Individual		2.907* (1.808)		−10.087 (−1.439)	0.521

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

Table 6.23 Correlation between the use of ICT and per capita income, poverty and urbanization in Sudan during 2005–2011

			Coefficient (t-value)				R^2
Independent variables			Per capita income	Poverty	Urbanization	Constant	
Dependent variable (use of ICT)							
Mobile	Ownership	Household	0.131** (2.8695)			3.406 (8.734)	0.733
		Household		−0.096** (−1.225)		4.768 (23.426)	0.333
		Household			4.118[a] (0.2498)	90.614 (11.320)	0.020
	Use	Household	0.057** (2.524)			4.066 (21.005)	0.6798
		Household		−0.043* (−1.223)		4.665 (50.532)	0.333
		Household			3.116[a] (0.402)	93.719 (24.896)	0.051
		Individual	0.106** (2.689)			3.563 (10.621)	0.707
		Individual		−0.085* (−1.3699)		4.6796 (29.156)	0.385
		Individual			7.596[a] (0.615)	83.719 (13.956)	0.112
Computer	Ownership	Household	0.763* (1.414)			−4.054 (−0.880)	0.3998
		Household		−0.908* (−1.666)		4.765 (3.367)	0.481
		Household			0.875* (1.558)	3.303 (5.419)	0.447

(continued)

Table 6.23 (continued)

			Coefficient (t-value)				R^2
Independent variables			Per capita income	Poverty	Urbanization	Constant	
	Use	Household	0.526* (1.517)			−1.225 (−0.413)	0.434
		Household		−0.549* (−1.413)		4.671 (4.628)	0.3996
		Household			40.017**, a (2.222)	11.553 (1.321)	0.622
		Household			0.455 (1.066)	3.714 (8.018)	0.275
		Individual (at home)	0.004 (0.431)			4.529 (62.176)	0.058
	Knowledge of Computer	Individual	0.787* (1.989)			−3.942 (−1.169)	0.569
		Individual		−0.985** (−3.059)		5.274 (6.307)	0.757
		Individual			0.860** (2.032)	3.601 (7.834)	0.579
	Provision of computer	Individual	1.039* (1.694)			−6.895 (−1.317)	0.489
		Individual		−1.435** (−3.366)		5.621 (5.079)	0.791
		Individual			1.343** (2.613)	3.274 (5.867)	0.695

Internet	Use	Household	0.369 (0.838)			0.064732 (0.017241)	0.1896
		Household		−0.462 (−1.007)		4.385 (3.682)	0.253
		Household			0.547* (1.286)	3.741 (8.098)	0.355
		Individual	0.069** (2.462)			3.952 (16.703)	0.669
		Individual			0.028 (0.581)	4.561 (87.412)	0.101
		Individual (use E-mail)	0.462** (2.823)			−0.075 (−0.054)	0.726
		Individual (use E-mail)		−0.575** (−8.034)		5.332 (28.670)	0.956
		Individual (use E-mail)			0.355* (1.313)	4.210 (14.334)	0.365
	Knowledge of internet	Individual	0.735* (1.467)			−3.6796 (−0.861)	0.418
		Individual		−1.057** (−2.872)		5.278 (5.525)	0.733
		Individual			1.014** (2.513)	3.574 (8.151)	0.678

Correlation is significant *at the 0.05 level (one-tailed); **at the 0.01 level (one-tailed)
Note [a]Linear regression

6.6 Conclusion

This chapter presents an overview of the use of ICT and the digital divide in Sudan and highlights the need for bridging the digital divide to enhance equality in the use of ICT in Sudan. This chapter uses the conceptual and theoretical frameworks presented in Chap. 3 and uses the most recent secondary data to discuss the use of ICT indicators (mobile, computer and Internet) at the macro level and the incidence of the digital divide in Sudan.

Our findings in this chapter seem quite consistent with the results in the international literature on the digital divide, we provide significant contribution and we extend our analysis to compare the digital divide for different modes of ICT in Sudan. We fill the gap in the Sudanese literature and provide a more comprehensive analysis by investigating use of ICT and digital divide according to the conceptual framework: subjects of connectivity (defined by households and individuals); characteristics or attributes of connectivity (defined by geographic location, mode of living, gender, education and age); means of connectivity (fixed telephone, mobile telephone, Internet, DSL/mDSL); and purposes of connectivity (connecting or not connecting) using (or not using) Internet and ICT; and locations of connectivity.

This chapter confirms the seventh hypothesis in Chap. 1 about the relationship between the use of ICT and the incidence of the digital divide defined by geographic location, mode of living, gender, age and educational level in Sudan. Our results are useful to improve understanding about the urgent need to stimulate ICT infrastructure development and support policies that aim to enhance adequacy and equality of use and utilization of ICT in Sudan.

The results concerning significant disparities in the use of ICT and digital divide can be interpreted along with the well-documented massive inequality and disparities between urban and rural areas between regions and between males and females. Our findings are consistent with the findings in Chap. 2 that demonstrates large inequalities with respect to MDG, mainly, gender, rural–urban areas at the regional and sub-regional level in Sudan.

Section 6.2 examines the use of mobile and digital divide in Sudan and shows evidences on the incidence of the digital divide for households and individuals in terms of ownership, use, spending and purposes of use of mobile defined by mode of living, gender and region. For instance, households' and individuals' ownership and use of mobile in urban areas are higher than rural areas and for males are higher than females, and average spending on fixed telephone per month in urban areas is twice average spending in rural areas. The divide also appears from the awareness and knowledge of mobile services prices and knowledge of the terms of contract to buy SIM and purposes of use of mobile. For instance, the purposes of use of mobile to use the Internet and to buy a service in urban areas are more than twice higher than rural areas and for males are nearly twice higher than females. The divide defined by region implies that individuals use of mobile to use the Internet in Khartoum is more than four time higher than in Western region; to transfer

money in Central region is more than twice higher than in Northern region; to buy a service in Northern region is more than thirty times higher than in Southern region.

Section 6.3 discusses the use of computer and digital divide in Sudan and explains evidences on the occurrence of the digital divide for households and individuals in terms of ownership, use and purposes of use of computer defined by mode of living, gender and region. For instance, households' and individuals' ownership and use of computer in urban areas are more than twice higher than rural areas and for males are higher than females, households' ownership and use of computer in Khartoum is more than six time and more than three times higher than in Eastern region respectively. The divide also appears from individuals' awareness and knowledge to use computer and provision of computer at home. For instance, individuals' awareness and knowledge to use computer and in urban areas is more than three times higher than rural areas and in Khartoum is more than four times higher than in Eastern regions. In addition, the divide also appears from individuals' provided with computer at home in urban areas is more than four times higher than in rural areas, in Khartoum is more than six times higher than in Eastern region and individuals' provided computer outside home in Khartoum is nearly twice higher than in Northern region. The divide also appears from the impediment factors hindered the use of computer at home, for instance, the lack of electricity hindered the use of computer at home in rural areas nearly twice higher than in urban areas. The divide also appear from the use of computer at home and outside home for educational purposes that implies that the proportions of individuals used computer at home and outside home for educational purposes for females is slightly higher than males in Sudan. This result implies that the use of computer at home is slightly useful to help to increase educational attainment for females and therefore can be used to reduce the gender gap in educational attainment between males and females in Sudan. This result is consistent with the findings in the international literature that suggest that women tend to use the Internet more than men for educational activities (cf. ITU 2013).

Section 6.4 investigates the use of Internet and digital divide in Sudan and shows evidences on the occurrence of the digital divide for households and individuals in terms of access, use, average spending on the Internet per month, awareness and knowledge to use Internet, locations and purposes of use of Internet defined by mode of living gender, and region. For instance, households' access to Internet and average spending on the Internet per month in urban areas are nearly twice higher than rural areas, households' access and use of Internet in Khartoum is more than six time and more than three times higher than in Eastern region respectively. For instance, individuals' use of Internet in urban areas is higher than rural areas and for males is higher than females. In addition, individuals' awareness and knowledge to use Internet in urban areas is more than three times higher than rural areas and for males is nearly twice higher than females and in Khartoum is more than twice in Southern and Central regions, more than three times in Northern region, more than four times in Eastern region, and more than five times in Western region. The divide also appears from the proportions of individuals' have E-mail, for instance, the proportion of individuals' have E-mail in urban areas is more than four times higher

than rural areas, for males is higher than females and in Khartoum is more than twice higher than Southern and Western regions.

The divide also appears from the locations of the use of Internet, for instance, the use of the Internet at work place in urban is nearly twice higher than rural and for males is nearly twice higher than females. The use of the Internet from educational institution in rural is higher than urban and for females is higher than males. The use of the Internet from service centre in urban is more than three times higher than rural, for males is more than twice higher than females and in Khartoum is more than twice higher than in Southern and Central regions, more than four times in Eastern region, more than five times in Western region, and 38 times in Northern region. The divide also appears from the purposes of the use of the Internet, for instance, the use of the Internet for educational purposes in rural is higher than urban and for males is higher than females, the use of the Internet for commercial transactions purposes in urban is higher than rural and for females is higher than males. These results seem opposite to the findings in the international literature that suggest that women tend to use the Internet more than men for educational activities (cf. ITU 2013). The divide also appears from the impediment factors hindered the use of the Internet, for instance, non availability of the Internet service hindered the use of the Internet in rural areas nearly twice higher than in urban areas and for males is nearly twice higher than females in Sudan.

Our results concerning the impediment factors impeded and hindered the use of the Internet implies that for the majority of individuals in Sudan other reasons are the most commonly reasons impeded the use of the Internet, followed by the cost, non availability of Internet service and the language respectively. For nearly third of individuals in Sudan, the cost and non availability of the Internet service impeded the use of the Internet.

Our result regarding the language of connectivity and the use of Internet implies that for the majority of individuals in Sudan Arabic is the most widely used language for using the Internet, followed by the English language and the other language respectively. Our finding concerning the means of connectivity and the use of the Internet implies that for the majority of individuals in Sudan mobile cellular telephone is the most widely used mean or method of connection for using the Internet, followed by DSL/mDSL and fixed telephone respectively. The proportion of individuals using mobile cellular telephone is more than 14 times of the proportion of individuals using fixed telephone. Our result regarding the location of connectivity and the use of the Internet implies that for the majority of individuals in Sudan home is the most commonly place for using the Internet, followed by house of other person, work place, educational institution, Internet café, other place, and service centre respectively.

Our finding concerning the cost of connectivity and using the Internet and mobile cellular telephone implies that the viewpoint of the majority in Sudan implies that the cost of using the Internet is reasonable followed by high and low respectively, while the cost of using mobile cellular telephone is high followed by reasonable and low respectively.

Section 6.5 examines the determinants of the digital divide that appears from the relationships between the use of ICT (mobile, computer and Internet) and age, educational and professional levels, and the use of ICT and per capita income, poverty and urbanization. Our results show positive relationship between the proportions of individuals used computer at home and outside home and the Internet and educational level that implies that the proportions of individuals used computer at home and outside home and Internet increases with the level of education, it is higher for university level, followed by secondary, basic, literate and illiterate levels respectively. We find negative relationship between the use of computer at home and outside home, the Internet and mobile and age that implies that the proportions of individuals used computer at home and outside home, mobile and the Internet decreases with the increase of age, it is higher for age (15–24) followed by age (25–34), (35–44), (45–54), (55–64), (65–74), and (75) respectively. Our findings imply inconclusive relationship between the use of mobile and educational and professional levels and inconclusive relationship between the use of computer at home and outside home and the Internet and professional levels. Our results using the OLS regression reported in Table 6.20 illustrates plausible positive significant correlations between the use of ICT (mobile, computer and Internet) and education level and plausible negative significant correlations between the use of ICT (mobile, computer and Internet) and age. Our findings imply that the use of ICT is increasing in education and decreasing in age. Our results are consistent with the results in the international literature (See Chinn and Fairlie 2004; Dasgupta et al. 2001; ITU 2013; OECD 2001).

We examine the relationship between the use of ICT and net enrolment rate in primary education, literacy rate, the share in total population, per capita income, poverty gap ratio and rate of urbanization: Tables 6.22 and 6.23 illustrate plausible positive significant correlations between the use of ICT and net enrolment rate in primary education, literacy rate, per capita income and rate of urbanization and negative correlation between the use of ICT and poverty gap ratio. We find positive significant correlation between ownership of mobile and computer, use of mobile, computer and Internet, knowledge of computer and Internet and provision of computer net enrolment rate in primary education, literacy rate, per capita income and rate of urbanization. We find negative significant correlation between ownership of mobile and computer, use of mobile, computer and Internet, knowledge of computer and Internet and provision of computer and poverty gap ratio. Our findings imply that the increase in per capita income, increase in enrolment rate in primary education and literacy rate, decline in poverty rate and increase in urbanization rate would imply increase in the use of ICT in Sudan. Our results are consistent with the results in the international literature (See Chinn and Fairlie 2004; Dasgupta et al. 2001; ITU 2013; OECD 2001).

Our results in this chapter confirms the seventh hypothesis in Chap. 1 about the relationship between the use of ICT and the incidence of the digital divide defined by age and educational level in Sudan. These results are plausible and seem consistent with the findings in the literature that imply that according to computers

may require substantial levels of education for use, but telephones and the Internet may require very little (cf. Dasgupta et al. 2001).

The major policy implication and recommendation from our findings is that it is essential for policy making in Sudan to enhance adequate and equitable access and use of ICT to bridge the digital divide between geographic locations (regions), urban and rural areas, males and females. It is essential to improve adequate and equitable ICT infrastructure, provision of computer at home and availability of electricity and Internet services, particularly for rural areas in Sudan. In addition to encouraging the effective use of ICT for creation and transfer of knowledge, enhancing the quality and accumulation of human capital education, literacy and skill, improving the degree of urbanization, increasing per capita income, alleviating poverty and offering adequate budget for enhancing ICT in all geographic locations (regions) and in urban and rural areas in Sudan.

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