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Research Articles

Women and Gender in ICT Statistics and Indicators for Development

Abstract

Issues related to the gender digital divide have been prominent in discussions of the information society. However, the paucity of statistical data on the subject makes it difficult, if not impossible, to make the case for the inclusion of gender issues in ICT policies, plans, and strategies to policymakers, particularly those in developing countries. This paper surveys available gender ICT statistics and indicators and makes recommendations for filling the gaps that exist.

Few gender ICT statistics are available because many governments do not collect ICT statistics consistently and regularly, and rarely are the data disaggregated by sex. The best practices are generally found in developed countries, with most developing countries lagging behind.

Recent work that sheds light on women, gender, and the information society includes a major six-country study on the gender digital divide in francophone countries of West Africa and Orbicom's 2005 research on women in the information society. Although major composite ICT indices do not publish gender and ICT statistics, the potential remains for them to do so, and some indices encourage others to enrich their work with gender data.

The Importance of Gender and ICT Statistics and Indicators

The World Summit on the Information Society (WSIS), held in 2003 in Geneva, saw ICTs as vital tools for women's empowerment:

> We are committed to ensuring that the Information Society enables women's empowerment and their full participation on the basis of equality in all spheres of society and in all decision-making processes. To this end, we should mainstream a gender equality perspective and use ICTs as a tool to that end. (WSIS, 2003a, ¶ 12)

Unfortunately, we know very little about the situation of women and ICTs, particularly in developing countries, because the data—sex-disaggregated statistics and gender indicators on ICTs—in many cases are not there. Collecting and analyzing data on how ICTs impact men and women differently are a necessary prerequisite to achieving a globally equitable information society. Without this information, more than 50% of the world's population may be overlooked.

This article surveys the available quantitative data on women and gender with respect to ICTs, investigates the problems that arise from the paucity of data, and presents the results of some current efforts to remedy the problem. It concludes with recommendations for further action by gender advocates and policymakers.

To Inform Policy: Without Data, There is No Visibility

Observation and anecdotal evidence have identified a gender component to the digital divide in several developed and many developing countries, but there are little data to document it. The paucity of data makes it difficult, if not impossible, to make the case to policymakers for the inclusion of gender issues in ICT policies, plans, and strategies. "Without data, there is no visibility; without visibility, there is no priority" (UNDP, 1995; Huyer & Westholm, 2000).

The Measuring the Digital Divide project put it succinctly: "Comprehensive ICT data with a gender dimension across a large number of countries do not currently exist" (Huyer, Hafkin, Ertl, & Dryburgh, 2005, p. 137). WSIS recognized this gap and recommended the following corrective action:

Gender-specific indicators on ICT use and needs should be developed, and measurable performance indicators should be identified to assess the impact of funded ICT projects on the lives of women and girls. (WSIS, 2003b)[1]

Regrettably, although paragraph 28a of the WSIS Plan of Action recommends including gender analysis in a digital divide index and details the statistics that should be generated to set up the index, the plan makes no reference to the collection of sex-disaggregated data, which are the basis for developing gender-specific indicators, including project-level performance indicators. The lack of data disaggregated by sex now makes it impossible to assemble gender-specific indicators of ICT in developing countries.

The 2005 International Network of UNESCO Chairs in Communications (Orbicom) report—*From the Digital Divide to Digital Opportunities: Measuring Infostates[2] for Development*—expressed the problem thusly:

Much remains to be done in order to understand better why gender gaps exist and why they matter, as well as to initiate actions as to how best to close the gender digital gaps and how this links to more general disadvantages facing women. To this end, proper quantification and analysis become critical. Such efforts, however, continue to be hindered by a dearth of adequate and reliable statistical information. Much like the digital divide, a statistical divide exists where the need is greatest—in developing nations. (Huyer et al., 2005, p. 194)

Despite the lack of gender-specific quantitative data, project-level qualitative data have established that ICTs are not gender neutral. ICTs impact men and women differentially, and in almost all cases, women have many disadvantages that result in their having less access to the technology and therefore less use of it.[3] The policy implication of this disparity in information access, especially for developing countries, is that unless special interventions are made, most women will not benefit from the information society to the extent that men do. If ICTs were gender neutral, affecting men and women equitably, it would not be necessary to pay special attention to women, and sex-disaggregated statistics would not be needed for policymaking. Without both of these considerations, women will continue to have fewer opportunities to benefit from the myriad possibilities of the information age.

Data are needed at microeconomic (i.e., project) and macroeconomic levels. Collecting sex-disaggregated data at the project level will help measure if men and women are benefiting differently from project interventions. If that is the case, the data will help project leaders take corrective ac-

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1. See also Hafkin (2004). Gender-specific indicators are variables that are indicative of gender-related changes in society over time. Portions of this section have been drawn from the chapter "Women, Gender, and ICT Statistics and Indicators" in Cinderella or Cyberella? Empowering Women in the Knowledge Society *(Hafkin & Huyer, Eds., 2006)*.
2. A country's infostate is the measure of its uptake and intensity of the use of ICT, based on an aggregated index of information networks, education, and skills. The Infostate index is used to measure the digital divide and was proposed by Orbicom in Monitoring the Digital Divide . . . and Beyond, *which is available from www.infodev.org/en/Publication.20.html. Orbicom, created in 1994 by UNESCO and the University of Quebec at Montreal, comprises 28 chairs in communications and 250 associate members in 71 countries and undertakes many efforts focusing on ICTs.*
3. See Hafkin, N. (2002, July). "Is ICT gender neutral? A gender analysis of six case studies of multi-donor ICT projects." Paper presented at the United Nations INSTRAW Virtual Seminar on Gender and ICT. Retrieved August 30, 2006, from www.un-instraw.org/en/docs/gender_and_ict/Hafkin.pdf See also Jorge, S. & Hafkin, N. (2002, February). Get in and get in early: Ensuring women's access to and participation in ICT projects. In Women in Action: Women and communications [special issue]. Isis International-Manila.

tion. At the macroeconomic level, data are needed for ICT planning, policy, and strategies. Unfortunately, neither national level nor project level sex-disaggregated data are being collected regularly in most countries.

The paucity of sex-disaggregated information on the information society, which is the norm in developing countries, reflects the more general dearth of statistical information on women's activities across all sectors that might lead to an improved understanding of the "different worlds men and women live in" in terms of access to education and work, health, personal security, and leisure time. (United Nations, 1995, p. xvii)

Official Statistics and Indicators on ICT: Absence of Gender Issues

In the following passage, Michael Minges explains why there are so little data on gender and ICT:

First, many government organizations do not collect national ICT statistics in a consistent and regular manner. Of those government agencies that compile [ICT] statistics, most do not provide a breakdown by gender. Second, traditional ICT statistics are either obtained from telecommunication organizations (e.g., telephones) or estimated based on shipment data (e.g., personal computers). These organizations have their own operational or analytical reasons for maintaining the data, and gender is not one of them. (2002)

Recently, however, some groups have begun shedding light on women, gender, and the information society.

Gender Statistics and Indicators—Who Collects Them?

The major sources of sex-differentiated statistics and gender indicators on women and gender and ICT are official government statistics and market research surveys in developed countries where Internet commerce is already or is soon expected to be significant. Recently, the International Telecommunication Union (ITU) has increased its publication of sex-disaggregated ICT statistics. In addition, a major survey has collected gendered ICT statistics for six West African countries, and Orbicom has systematically collected and analyzed gendered data from a

wide range of sources. Finally, some of the compilers of major composite ICT and development indices have recognized the importance of gender statistics.

As with statistics and indicators in general, gender statistics are more developed in rich countries than in poor countries. Where the gender digital divide is generally thought to be most marked, virtually no official statistics are available, and the digital divide is hardest to document. Almost no African countries' official statistics collect ICT gender data and estimates indicate that women comprise 25% or less of Internet users in Africa.

The countries that collect gender ICT statistics are generally those countries where Internet penetration is high and the gender digital divide tends to be the least marked. The United States, Canada, Chile, Denmark, Finland, Hong Kong, Iceland, Korea, Norway, Singapore, Sweden, Switzerland, and Thailand all collect sex-disaggregated ICT usage statistics. Also, all European Union (EU) members agree to participate in Eurostat ICT data collections, which are sex disaggregated. As late as 2004, however, some 10 EU member States did not collect sex-disaggregated data. Among the 10 Commonwealth of Independent States countries, only Ukraine collects sex-disaggregated ICT data (Me & Sicat, 2003). In most OECD (Organisation for Economic Cooperation and Development) countries, sex-disaggregated data are well developed on computer education, ICT use, and participation in the labor force, both in ICT-using occupations and in the ICT sector (Montagnier & van Welsum, 2006).[4]

Korean Work on Gender and ICT Statistics

Some of the most interesting and substantial work in gender and ICT statistics has come from Korea. Since the first quarter of 2000, the Korean Network Information Center (KRNIC)[5] has undertaken and published quarterly surveys of Internet use by approximately 5,700 people. In the surveys, 17 data categories are collected and disaggregated by sex, and in most cases, also by age. KRNIC's survey categories for which data are available by sex are shown in the Appendix.

In 2001, the Ministry of Gender Equality released a *Study of Women's Informatization Survey and Index Development* (Republic of Korea, Ministry of

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4. The OECD has 30 member states, 24 of which The World Bank classifies as rich countries.
5. See http://www.krnic.or.kr for more information.

Gender Equality, 2001)[6] to document and examine the gender digital divide in Korea. The ministry based its research on five categories, from which it developed an index of women's rate of *inform-atization.* (Informatization is defined as the extent to which women are part of the process by which information technologies have transformed economy and society.) The categories covered are *awareness, access, utilization, skill,* and *effects,* and they are disaggregated by sex to measure comparative informatization. The results showed that women's informatization measured 88.0% compared with that of men. Although women scored very highly on awareness, skills, and effect, overall women were less involved with ICT than men—particularly in terms of access and usage: the access rate for women was only 22.9% compared with that of men and their use of the Internet was 28.2% compared with that of men.

After the index was developed, a report was published comparing the informatization rates of men and women (Republic of Korea, Ministry of Gender Equality, 2001). The findings indicated a serious digital divide by age, with women's scores on all categories of the index decreasing with age beginning at 20 years old. Moreover, it identified a serious gap in informatization among those women older than 50 years. Not surprisingly, women who earned higher incomes reported a higher informatization rate than those with lower incomes.

In 2002, the Asian Pacific Women's Information Network Center of Sookmyung Women's University, the leader of this research, organized a workshop entitled "Survey of Women's Informatization in Asia and the Pacific." The intent was to develop indicators for the extension of the survey on women's involvement in information technologies throughout Asia and is ongoing (Asian Pacific Women's Information Network Center, 2002).

Market Research Surveys

Among the major market research firms engaged in sex-differentiated data collection are Ipsos-Reid, comScore Media Metrix, and Neilsen/NetRatings. However, these firms carry out their research only in a few developed countries and in developing countries with major markets, such as India and China.

ITU Activities in Gender Statistics

Until 2003, the only sex-disaggregated ICT data that the ITU published was the percentage of female employees in telecommunications administrations. This in itself was a relatively recent addition to the ITU's annual questionnaire. Only one-third of all countries supplied these data, and many developed nations, including France, Germany, Japan, and the United States did not. However, these data are not very significant because they simply reveal that, in most countries, most positions within the public telephone companies—those of telephone operators—are held by women. The percentage of female personnel among telecommunications staff is not an indicator of gender equality in employment in the telecommunications or ICT industry as a whole. Many of the reporting countries maintain old telephone networks that require heavy operator intervention, and telephone operators have traditionally been women, except in places such as the Gulf States where cultural prohibitions restrict women from most employment outside the home. These data on female employees say nothing about the level of employment in the sector as a whole or about the comparative access to or use of ICTs by men and women.

Since 2003, the ITU has increased to three the number of sex-disaggregated indicators included in its annual questionnaire to member states and in its *Telecommunications Indicator Handbook* (ITU, 2005). The two new indicators are:

- Female Internet users as a percentage of total users
- Female Internet users as a percentage of females

Table 1 includes the definitions adopted for these indicators. Additionally, the United Nations Millennium Development Goals monitoring report and database have also begun to include female Internet users as a percentage of total Internet users.

In 2003, the ITU presented data on female Internet use for 39 countries (see Figure 1). Of the data from these countries, only 13 instances come from country-level sources, presumably national statistics offices that collect sex-disaggregated data. There were disappointingly little data available on female Internet use in developing countries. Al-

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6. The study is not available electronically in English.

Table 1 *Key Gender Indicators of the Telecommunications/ICT Sector*

ITU Code	Indicator	Definition
16.1	Percent female Internet users	Share of females in the total number of Internet users— calculated by dividing the number of female Internet users by the total number of Internet users
16.2	Female Internet users as percentage of female population	Share of female Internet users in the total number of females— calculated by dividing the number of female Internet users by the total number of females

though nearly half of the countries listed are outside of Europe and North America, data are available on only one African country—South Africa, a country atypical of the region. Only five Latin American countries are represented, and they, too, are the richest countries of the region (Argentina, Brazil, Chile, Mexico, and Venezuela). Of the Middle East countries, only Israel is represented. In regions outside of Europe and North America, the most countries are from Asia. The list is heavily weighted toward wealthy countries and does not include India—an important omission in light of the country's initiatives in gender and ICT.

Statistical Data Collection and Gender

The types of statistical data collection also influence, to a large extent, the availability of gendered ICT statistics. The most obvious sources for national-level ICT statistics are population censuses; administrative data sources; and household, enterprise, and education surveys. Given the scope, expense, and periodicity (generally every 10 years) of population censuses, it is unlikely they would contain many ICT-related statistics, particularly in developing countries. If they have any such statistics, they probably are questions about basic access to ICTs. However, because population statistics operate at the individual level and identify the sex of the respondent, they are a good potential source of gendered ICT statistics. The 2010 round of national population censuses should prove valuable in securing increased data on gender and ICTs. Administrative sources—such as those maintained by telephone companies, Internet service providers, and cable and television companies for billing and marketing—generally do not collect socioeconomic information on their subscribers. In addition, administrative sources do not cover public access to ICT, which is the norm for both men and women in developing countries.

Although Eurostat work demonstrates that household ICT surveys can provide sex-disaggregated data (Me & Sicat, 2003), such surveys in general tend to regard the household as a unit and to assume that the response for the household pertains equally to both males and females. Particularly with regard to ICTs, this is often not the case. Evidence from several developing countries points out that the presence of ICTs in a household does not guarantee that women in the household have equal access to them (including radios, televisions, telephones, and computers). In Western Asia, there is no record of gender in household surveys, and the observation unit is generally the household (Partnership on Measuring ICT for Development, 2005). Enterprise surveys, which could easily be disaggregated by sex when looking at individual employees, would be very useful for knowing the relative use by men and women of ICTs in their work. In education surveys, of course, disaggregation by sex of questions regarding individual students would help us to know the fields of study related to ICT skills for boys and girls at all levels.

Efforts in Gender Statistics and Indicators in ICT

Two efforts completed in 2005 brought significant advances to the collection and analysis of statistics and indicators of gender and ICT. They are the West African Gender and ICT Network *(Réseau genre et technologies de l'information et de la communication—Régentic)* and work on the gender digital divide undertaken as part of the Orbicom project to measure information society development.

The Gender Digital Divide in Francophone West Africa

Researchers in West Africa recently completed pioneering field research attempting to measure the gender digital divide (Gender and ICT Network, 2006). Under the sponsorship of the International Development Research Center (IDRC), *Régentic,* the Gender and ICT network,[7] undertook research in six francophone countries of West Africa (Benin, Burkina Faso, Cameroon, Mali, Mauritania, and Senegal) that are among the region's leaders in the widespread use of ICTs. The survey comprised 6,743 individuals and 380 institutions. Respondents were equally divided among men and women and representative of the population distribution by sex, age, and residence. The study covered only those areas that were served by ICTs: 63.0% of those surveyed lived in urban areas, 18.6% peri-urban, and 19.0% rural. Because of the topic, those with more education were overrepresented: 52.0% had achieved at least secondary-level education, and 29.2% had gone beyond that. The research, undertaken in the fourth quarter of 2004, gathered data on 18 indices relating to the use of computers in general, Internet, and cell phones (Table 2).

The study defined and constructed a composite indicator of the gender digital divide, based on four components (decision making and policy, content, skills, and connectivity). While the Republic
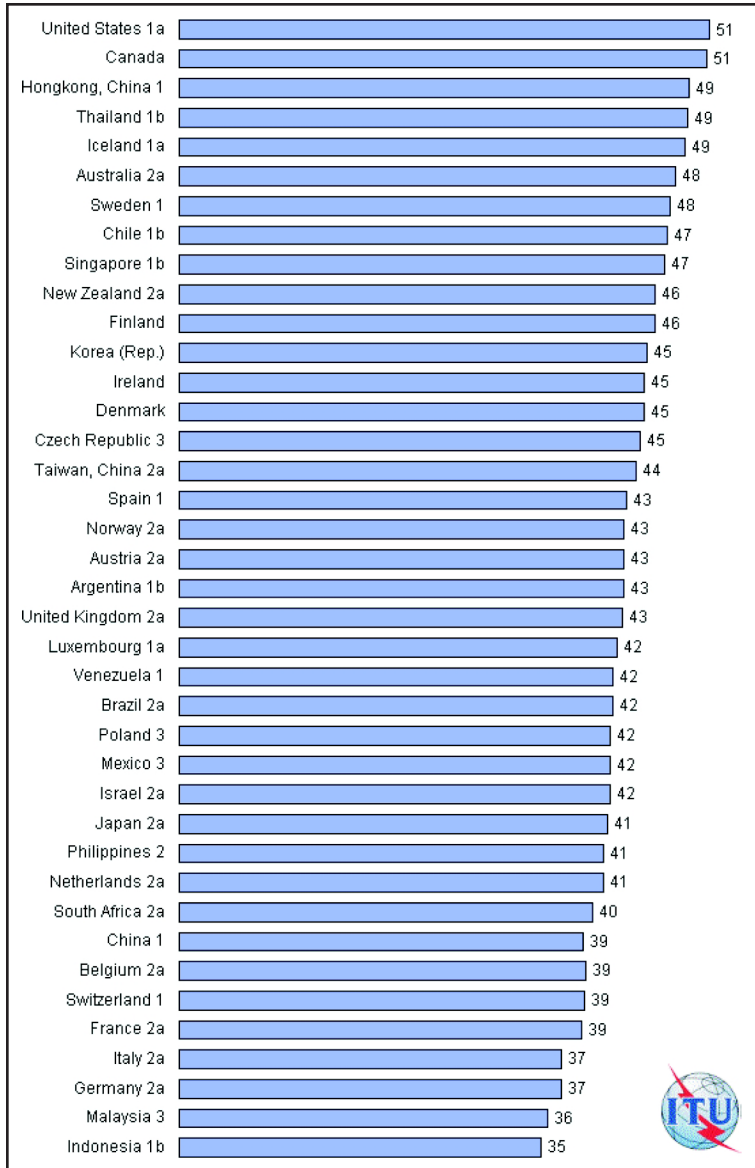

Figure 1. Female Internet users as % of total Internet users, 2002.

Note. From *World Telecommunication Development Report 2003: Access Indicators for the Information Society,* by the International Telecommunication Union, 2003. Geneva, Switzerland: ITU. Copyright 2003 by the ITU. Reprinted with permission.

of Korea index previously described also assembled a composite indicator of women's informatization,

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7. *The Gender and ICT network, Régentic, is a joint initiative of Environment and Development in the Third World (ENDA), the Observatoire des systèmes d'information, réseaux et inforoutes du Sénégal (OSIRIS), and the Senegalese Telecommunication Regulation Agency. Its members are individuals and organizations working to promote gender justice in national, African, and global information society in partnership with public, private, national, and global development cooperation actors.*

Table 2 *Components of the Régentic Gender Digital Divide Indicators*

Components	Indicators and Their Definitions
Decision making and policy	Gender disparities in the higher echelons of ICT policy-making bodies
	Gender disparities in the higher echelons of ICT economic bodies
	Gender disparities in the higher echelons of civil society organizations
	Number of civil society organizations active on ICT and gender issues
	Explicit reference to gender considerations in ICT policy and regulation
	Disparities in gender training in ICT institutions
Content	Gender disparities in the use of virtual products
	Percentage of electronic products (lists, websites, telephone services) in the country dealing with gender, in French or the national language
	Adaptation of virtual content to needs expressed by women
Skills	Gender disparities in literacy/school enrollment at all levels, irrespective of language
	Gender disparities in ICT training
	Explicit consideration of gender issues and ICT policies in ICT training
	Gender disparities among ICT professionals
Connectivity	Gender disparities in the use of computers, Internet, and mobile telephones
	Gender disparities in access to computers and the Internet, according to access locations
	Gender disparities in mobile telephone or e-mail subscriptions
	Gender disparities according to ICT use methods: personal, professional, public
	Gender disparities in Internet and mobile phone access and accessibility

and both examined content and use, the *Régentic* index uniquely looked at the elements of content and representation in decision making and policy. The research concluded that overall, men in Africa have greater chances than women to benefit from ICT.

Additional findings from the study included the following:

- A gender digital divide exists in the six francophone countries. The composite indicator of women's participation in the information society was 0.65, meaning that women have 35% fewer opportunities and benefits than men with regard to ICT. The summary index, however, masks some larger disparities in certain areas of the study. While there was some gendered disparity in access (approximately 10%), it was much larger in terms of capacity to use ICTs and the knowledge conveyed by content, and larger still in participation in ICT decision making.

- There was no negative gender gap in connectivity or usage among young women educated to secondary school level and beyond. These girls and women were more likely to undergo training in computer use and more likely to go on to work in a computer-use field than young men. But they differed from men who used computers in levels of skills; the women tended to work at entry-level positions and, while they were educated in computer use, that training tended to be at elementary levels. These young women generally were not involved in creating content or using it at high levels and were not involved in developing systems.

- While young women who are secondary school graduates have become the *majority* of those working using ICTs in these countries, they tend to remain at the level of users and do not become managers or technical analysts. They gain computer skills as an entry tool for secretarial or data-entry jobs but rarely advance beyond this level.

- Women tend to use the Internet and cell phones more for personal and social use in the six West African countries, while men use them more for professional or work-related reasons.

- Men in West Africa tended to feel threatened when women used cell phones and accessed the Internet, seeing it as destabilizing to relationships and viewed such unsupervised activity by women as inappropriate. Many cases were reported of men monitoring the cell phone and Internet use of their partners. According to one woman from Cameroon: "My husband won't let me have a cell phone; I have asked him several times to get me one. He answers that if I want a divorce, I just have to say so"(Gender and ICT Network, 2006, p. 56).

- The major connectivity obstacles for women relate to place of access (particularly safety and security of location), time constraints, and technophobia.

- Very little local content was available on gender issues.

- Few people were aware of gender issues in ICT.

The study made the following recommendations:

- Universal access strategies should be implemented to enable access to ICTs for adult women in low-income and rural areas. These areas were not covered in the study because of limited ICT availability.

- To reduce the gender digital divide, ICT policy should move beyond access—where the gender gap was not large—to the areas of decision making, content, and capacity building.

- Young women should be encouraged to upgrade their computer skills and enroll in advanced computer training.

- Before gender-equitable ICT policy can be elaborated, tools need to be developed to monitor and evaluate differential impacts of ICT on men and women.

Measuring the Digital Divide

Orbicom released its second report in September 2005 on measuring the infostate of 192 countries in the world.[8] Its initial research effort, *Monitoring the Digital Divide . . . and Beyond,* published in 2003,

developed an instrument to quantify the digital divide and monitor its evolution across countries. The second publication of its ICT composite index in 2005, *From the Digital Divide to Digital Opportunities: Measuring Infostates for Development,* set forth an ICT opportunity index based on the Infostate index frame and model. Also, in response to calls for work on statistics and indicators on gender and ICT from the Geneva phase of WSIS in 2003, Orbicom added a component on women in the information society. The report notes that while "it is not possible to quantify the gender digital divide in a way comparable to the systematic measurement of countries' Infostates due to the scarcity of data, both in the scope of coverage and the degree of detail available," the use of existing quantitative data and qualitative research provides "a compelling analysis of the gender digital divide" (Sciadas, 2005, p. vi).

Project Rationale and Structure

The women and the information society component of the 2005 Orbicom report consisted of two parts. The first part attempted to compile existing sex-disaggregated statistical data and offer a quantitative analysis of the gender digital divide. It provided a macro-level view of its magnitude and evolution and also examined key aspects of the data, particularly access and patterns of use; ICT literacy, education, and skills; ICT-related employment; and the gender digital divide's relationship with other digital divides. It furthermore contained statistical evidence and analysis of women's experience in both developed and developing countries in addition to a section that quantified the gender digital divide by constructing a pilot statistical database based on existing pockets of gender ICT data. Problems encountered in the course of the work included a lack of consistent gender statistics in many countries, lack of common definitions and concepts, and a mixture of public and private data sources.

The specific country context emerged from the statistical data as a crucial variable for assessing gender and ICT use. Other important variables included access options (home, office, or other public access), labor force participation, government policies, and sociocultural norms. It was found that while the gender divide tends to narrow at higher levels of education, a gap remains nevertheless. In addition to

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8. The full report is available from http://www.orbicom.uqam.ca/projects/ddi2005/index_ict_opp.pdf

education, other factors that were found to affect ICT use by gender were age and location (urban versus rural). It was also clear that the proportion of female Internet users declined steeply with age (Huyer et al., 2005).

At the same time, a clear recognition emerged that more than statistical data were needed to address gender disparities in the context of the information society. The second part of the Orbicom gender report was based on a comprehensive framework that defined important elements of the main gender issues in ICT and summarized the qualitative data on the topic culled from

Figure 2. Proportion of computer and Internet use by gender, Turkey 2004.
Note. From Sciadas, G. (Ed.). (2005). From the digital divide to digital opportunity: Measuring infostates for development. Montreal, Canada: Orbicom. p. 144.

fieldwork experiences, case studies, and anecdotal and contextual evidence (Hafkin, 2003b). Taken in its totality, the project developed a more holistic view of the gender digital divide than had previously been possible.

Statistical Evidence and Analysis of the Gender Digital Divide

As we have noted above, comprehensive sex-disaggregated ICT data across many countries do not currently exist. However, the data on access to and use of ICTs that are available indicate that women's participation in the information society, particularly in the poor countries of the world, lags behind that of men. What is not known, though, is the magnitude of this divide, its evolution, and its many nuances—all are matters of importance for the design, implementation, and evaluation of programs.

The size and the evolution of the gender divide refer largely to ICT access and penetration, which are the first and most basic requirements for their effective use. However, the issue of the gender divide is much broader. Even in countries where access is no longer much of an issue and penetration is high, inequalities in actual use can hamper women's development opportunities on both the economic and social fronts. So, although the Orbicom study begins to identify where and how big the ICT access and penetration gaps are, the data are insufficient to draw conclusions on women's equal and active
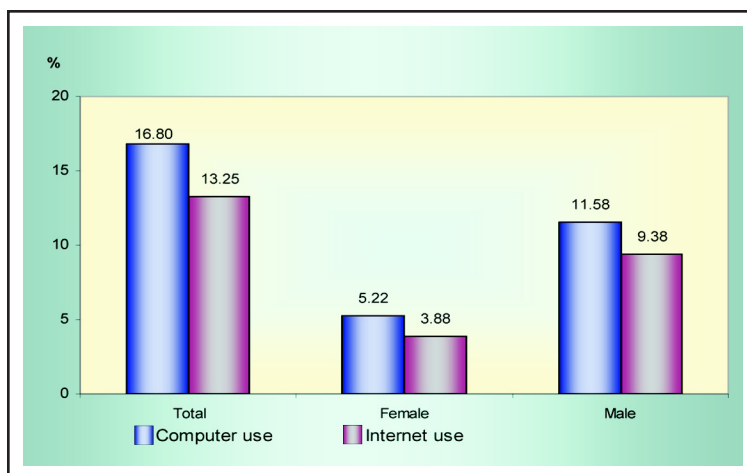
participation in the information society. Access is a necessary, but not sufficient, condition to closing the gender digital divide. In going beyond access, the issues of ICT literacy and skills are central to including and encouraging women to fully participate in, benefit from, and contribute to the information society.

Many studies have found that generally, divides are larger among new ICTs with low penetration, decreasing gradually as penetration increases. For example, data from Turkey, a country with relatively low computer and Internet use, demonstrate the gender gaps that accompany the introduction of newer ICTs (Figure 2). Women are less likely than men to use these technologies. In many countries such gaps become dramatic, putting women at a significant disadvantage. For instance, less than 10% of the Internet users in Guinea and Djibouti are women, less than 20% in Nepal, and less than 25% in India. While overall penetration in these countries is low, equally large gender gaps were observed in countries with higher Internet penetration: women account for less than 20% of the Internet users in Greece and just more than 25% in Portugal.

Compiling data on the proportion of female Internet users to overall Internet penetration rates across many developing and developed countries makes it possible to take a broad look at the gender digital divide associated with this new, powerful medium. These data are shown in Figure 3 by descending order of the proportion of female Internet users.
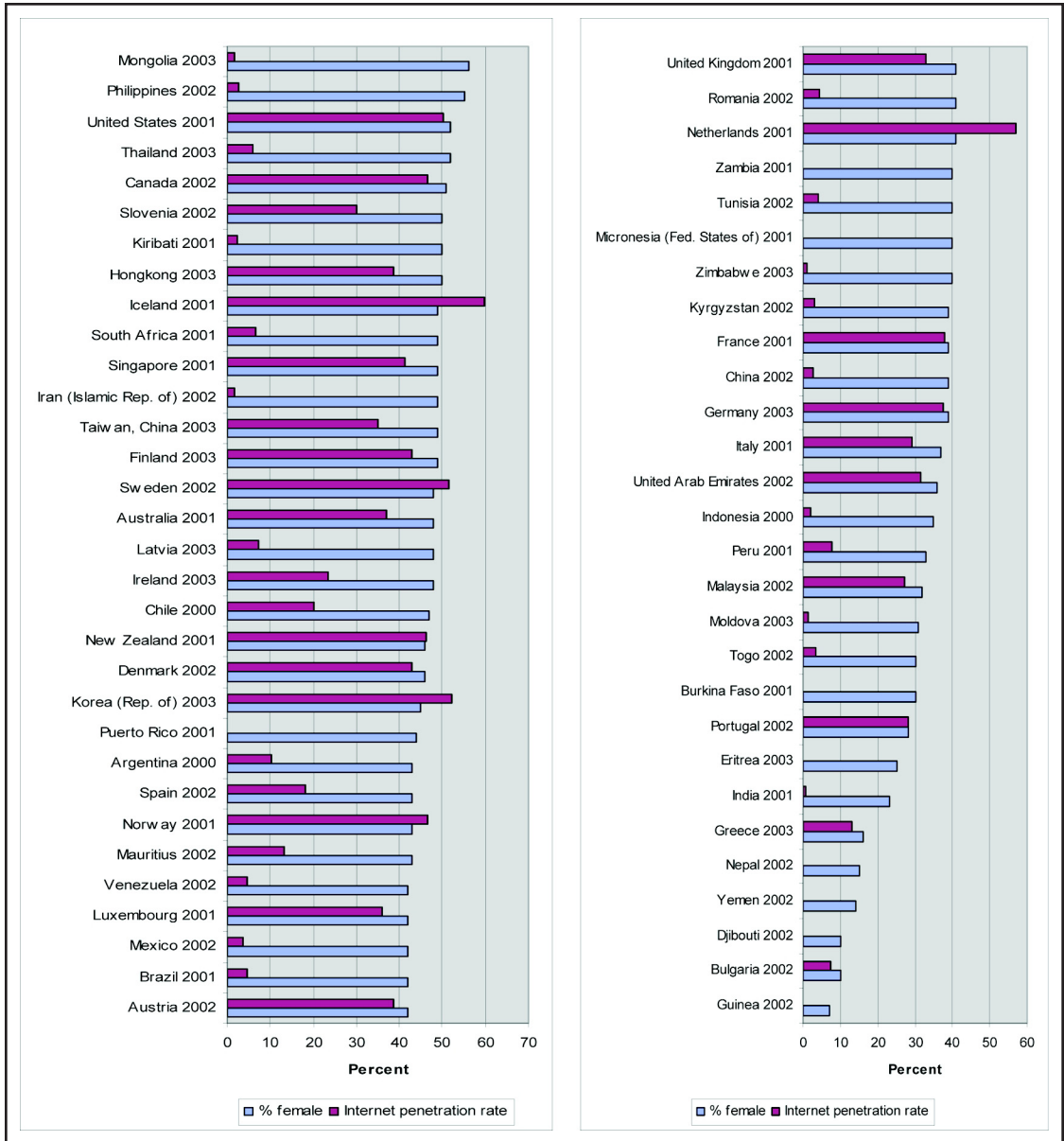
Figure 3. Percent female Internet users in relation to overall Internet pentration by country.

They demonstrate that, with a few exceptions, the gender divide is large and widespread. They also show that the gender divide is generally more pronounced in developing countries—although there are exceptions.

In Figure 4, the Internet penetration rates and the proportion of female Internet users from Figure 3 are rearranged and plotted in descending order of Internet penetration without country identifiers. The following observations become obvious:

- Gaps in Internet penetration across countries are very large—therefore, the general issue of the digital divide pertains heavily to both men and women in underdeveloped countries.

- The gender divide is clear; with a handful of exceptions, the proportion of female Internet users in most countries is below 50%.

- The trend line in the penetration of female Internet users is downward sloping; while this
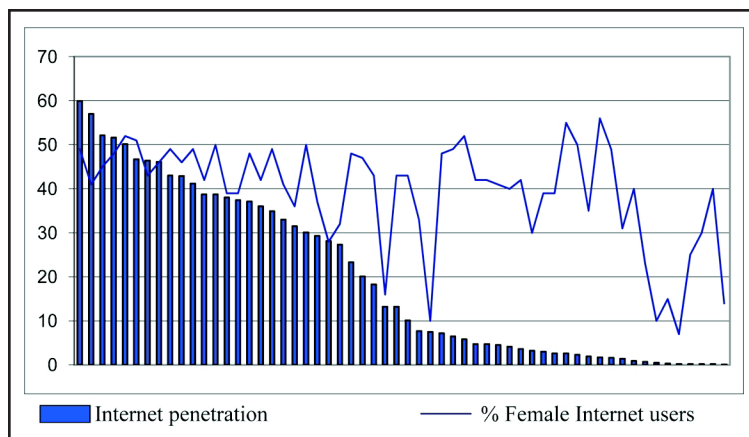
Figure 4. Relationship between Internet penetration and proportion of female Internet users.

several countries with low overall penetration rates have very high gender gaps; this is the case in Guinea, Djibouti, Yemen, Nepal, and India. Still, the gap between developing and developed countries is not clear cut; Portugal and Greece are both fairly close to the bottom of Figure 3, whereas Mongolia and the Philippines are at the top.

This statistical analysis establishes that a gender divide exists even in countries with high infostates. In these countries the gender divide generally tends to be smaller, but this is not always the case. In countries with low infostates, the Internet gender divide can range substantially, from more than 50% to less than 10%. Because the relationship between the gender divide and the overall digital divide is very tenuous, the data do not support the argument that the two move in tandem. Thus, the gender divide cannot simply be expected to improve as overall infostates improve. Clearly, there are factors at play other than those associated with overall infostate development. This is very significant because it provides statistical evidence to support the hypothesis that information technology is not gender neutral. The implication is that the situation of women and ICT will not necessarily improve as infostates grow. Rather, specific actions and interventions will be needed to secure gender equality in the information society.

provides some support at a macro level that the gender divide moves in the same direction with the overall Internet penetration, the relationship is very tenuous at best.

While the gender gap has recently vanished in a few countries with high Internet penetration, such as Canada and the United States, this is not the case among other countries well known for their high infostates, such as Norway, Luxembourg, the United Kingdom, the Netherlands, Germany, and France. Norway, for example, has a penetration rate almost identical to Canada's, but women Internet users represent only 43% compared with Canada's 51%. Moreover, the proportion of female Internet users in the Netherlands (40%) was identical to the figure for Brazil, Mexico, Zimbabwe, and Tunisia despite the Netherlands' overall penetration rate of approximately 60%. (The overall penetration rate of both Brazil and Mexico is now about 25%, and in Zimbabwe it is virtually nonexistent.) Despite Kyrgyzstan's relatively low overall Internet penetration rate compared with Italy (about one-tenth that of Italy), its gender gap is not substantially smaller.

At the same time, there are also many countries with very low overall penetration rates that do not seem to experience a gender divide in the areas of Internet access and use. In the cases of Mongolia, the Philippines, and Thailand, female Internet use exceeds that of males. The gender gap in Iran and South Africa is also very small. On the other hand,

The Many Dimensions of the Gender Digital Divide

The second part of the Orbicom gender project attempted to understand the reasons why women's ICT use does not correlate automatically with a country's level of Internet penetration or Infostate index measure. To do this, it asked the following questions and tried to answer them using qualitative data:[9]

- How do sociocultural customs and infrastructural barriers restrict women from accessing and using ICTs?

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9. *Given the focus of this paper on quantitative data, this paper will not detail the results of the Orbicom qualitative analysis. Interested readers will find this analysis in Huyer, et al., 2005.*

- Do women have the education, training, and skills required to function in the information society?
- How severe are gender disparities in ICT employment? Why do they occur?
- Are there gendered differences in access to and control over financial resources that affect participation in the information society?
- What are appropriate media and content for women and girls? Are they available? Do women and men have different communications patterns?
- What are the gendered patterns of risk to privacy and security brought about by the new ICTs?
- What is the extent of women's representation and participation in ICT policy and governance?
- What is the impact of ICTs on women and girls? Can ICTs contribute to gender equality and women's empowerment?

Assessment of Overall Impact

The Orbicom gender study noted that there has been little systematic investigation of the differential impact of ICTs on men and women. Obviously, ICTs can impact women both positively and negatively. ICTs can be important tools for promoting gender equity and empowering women through easing workloads; increasing knowledge of rights and possibilities; increasing self-esteem, social status, and confidence; and contributing to increased income.

Young girls using computers at school in East Africa stated the following:

> We get our freedom from the Internet since in our society girls have limited freedom of movement. We are not allowed to go wherever we want. The Internet . . . takes us out to other people, places, and other realities. No one controls where we go with Internet. It is for us a way of escaping from our closed society. It is vital to us; it gives us liberty. (Gadio, 2001, p. 2)

In another example of the impact of ICTs, a project leader in the M.S. Swaminathan Research Foundation's Village Knowledge Centre in Pondicherry noted the following:

> The women in the Pondicherry knowledge centre villages have acquired some status and standing in the community. Men—farmers, landless laborers, and traders—come and ask them for information and they provide the answers. They have set up self-help groups and microenterprises. They have taken part in discussions held at our foundation and answered questions posed by many overseas delegates. Only a few years ago, they would not have ventured out of their village unaccompanied by their husbands or in-laws. (UNITeS, 2003, p. 3)

Nevertheless, those seeking to profit from the exploitation of women have also appropriated ICTs. Daly (2003) notes that relatively few applications of the technology will be planned to achieve gender goals, but indirectly ICTs may have profound effects on gender roles, gender equity, and the empowerment of women. What seems relatively clear, however, is that gender issues have to receive frontline attention if ICTs are to promote women's equality and if women are to benefit equally with men from the information society.

Orbicom intends to continue its work on qualitative and quantitative data on women in the information society as part of its ongoing measurement efforts. Part of that work will be to identify variables and develop a set of indicators to characterize and measure female participation not only in the information society but also in the broader knowledge society.

Other Major Indices

In addition to the Orbicom project, there are several other major composite ICT development indices.[10] The major indices are the following:

- Digital Access Index (ITU)
- ICT Diffusion Index (UNCTAD)[11]
- Network Readiness Index (World Economic Forum)
- Digital Opportunity Index (ITU)[12]

However, none of the composite ICT indices incorporates gender data in the main index. Orbicom

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10. The World Information Society Report (ITU, 2006, p. 15) has a very useful table that compares nine ICT for development composite indices.
11. Available from http://www.unctad.org/en/docs/iteipc20065_en.pdf
12. Available from http://www.itu.int/osg/spu/statistics/DOI

alone has collected quantitative and qualitative data and used them to analyze the international gender digital divide.

Digital Access Index (ITU)

ITU's Digital Access Index, last published in 2003, focuses on infrastructure, usage, affordability, quality, and knowledge. While it claims to have a gender sub-index, this appears to be limited to the ITU-published statistics of female Internet users for select countries (Gray, 2004). ITU has offered its composite ICT index methodology to the Partnership on Measuring ICT for Development (see the section on the Digital Opportunity Index that follows).

ICT Diffusion Index (UNCTAD)

The United Nations Conference on Trade and Development's (UNCTAD) global ICT index defines its unit of analysis as countries and it reports only national-level statistics, which are not disaggregated by sex. In its 2005 index (UNCTAD, 2006) the only reference to gender is that even in high-income countries, there are internal digital divides that may affect gender, and thus by implication, make the Internet and other ICTs less affordable to women than men. No statistical evidence, however, is offered for this statement.

Network Readiness Index (World Economic Forum)

The World Economic Forum's *Global Information Technology Report* (World Economic Forum, 2005) is also based on national statistics and is not disaggregated by sex. With its emphasis on network readiness, it looks at the economic ICT environment, particularly at market, political, regulatory, and infrastructure factors. Its focus ranges from institutional (i.e., government and business) readiness to individual readiness, and it includes statistics on personal computers, ISDN, Internet, and cable television subscribers per 1000 inhabitants. Although it covers 102 countries, its focus is more pertinent to developed countries, and the data on the indicators—in addition to not being disaggregated by sex—would be unlikely to include many women in the poorer countries that are included in the report.

Digital Opportunity Index (ITU)

The Digital Opportunity Index (DOI) is a product of the Partnership on Measuring ICT for Development, a global multistakeholder initiative that includes the ITU, OECD, UNCTAD, UNESCO Institute for Statistics, UNICT Task Force (now the Global Alliance for ICT and Development–GAID), the World Bank, the United Nations regional economic commissions, and the Statistical Office of the European Communities (Eurostat). The major work on the DOI Index is done by ITU, UNCTAD, and the Korean Agency for Digital Opportunity and Promotion. The DOI launched in 2005 supersedes the previous indices of both ITU's Digital Access Index and UNCTAD's ICT Diffusion Index.

The partnership was established with the explicit aim of encouraging the collection and use of ICT statistics disaggregated by socioeconomic categories such as age, gender, income, and location. In 2004, the ITU published the following statement about the need for the partnership:

> Until recently, infrastructure had been considered as the main obstacle to improving access to ICTs. Existing indicators are therefore often infrastructure-based . . . But there is growing evidence that other factors, such as affordability and knowledge, are an important part of the access picture. It is widely recognized that new indicators are needed. The new environment, with a growing emphasis on reducing the digital divide, requires access and usage indicators disaggregated by socio-economic categories such as age, gender, income and location. To measure the ICT picture in full, new multi-stakeholder partnerships will be required . . . (ITU, 2003, p. 3).

Despite this background, the DOI multi-stakeholder partnership does not use any sex-disaggregated statistics but rather encourages countries to use its core indicators, which lend themselves to disaggregation by sex, and which the DOI partnership identifies as auxiliary variables, to "generate a gender-based DOI" (ITU, 2005). The DOI suggests that its modular structure makes it amenable to breakdowns by sex that could be used for gender analysis (ITU, 2006). In its first report, DOI uses the case of the Czech Republic, which does collect sex-disaggregated ICT statistics, as an example of a gender-disaggregated DOI that other countries could produce (ITU, 2006).

In fact, all of the indicators used in the DOI could be disaggregated by sex. In Table 3, we illustrate how gender could be an auxiliary variable in all of the DOI indicators. DOI is an index based on relatively few indicators (11) thus making it less expensive and more feasible for countries to collect. It is divided into the following three components: opportunity, infrastructure, and utilization.

Table 3 *Potential for Digital Opportunity Index Indicators to be Adapted to Gender Statistics*

Component	Indicator	Gendered statistics
Opportunity	Percentage of population covered by mobile cellular telephony	Percentage of population covered by mobile cellular telephony disaggregated by sex
	Internet access tariffs as a percentage of per capita income	Internet access tariffs as a percentage of per capita income for men and women
	Mobile cellular tariffs as a percentage of per capita income	Mobile cellular tariffs as a percentage of per capita income for men and women
Infrastructure	Proportion of households with a fixed line telephone	Percentage of women in household with access to fixed line telephones
	Proportion of households with a computer at home	Percentage of women in household with access to a home computer
	Proportion of households with Internet access at home	Percentage of women in household with Internet access at home
	Mobile cellular subscribers per 100 inhabitants	Number of women mobile cellular subscribers per 100 inhabitants; number of mobile cellular subscribers per 100 women
	Mobile Internet subscribers per 100 inhabitants	Number of women Internet cellular subscribers per 100 inhabitants; number of Internet cellular subscribers per 100 women
Utilization	Proportion of individuals that used the Internet	Proportion of Internet users that are women; proportion of all women who used the Internet
	Ratio of fixed broadband subscribers to total Internet subscribers	Ratio of women with fixed broadband subscriptions to all women Internet subscribers; ratio of women broadband subscribers to all Internet subscribers
	Ratio of mobile broadband subscribers to total mobile subscribers	Ratio of women with mobile broadband subscriptions to all women Internet subscribers; ratio of women mobile broadband subscribers to all mobile subscribers

It should be pointed out, however, that despite its claim to be "development friendly" the DOI's choice of indicators is geared toward advanced technologies and is thus more relevant to developed rather than developing countries. Few individual mobile Internet, broadband subscribers, or even home Internet users are found in most developing countries.

Challenges in Collecting Gender Statistics and Indicators

New initiatives exist to stimulate the collection and analysis of statistics and indicators on gender and ICT, but much remains to be done in a systematic manner. There are cases where the data exist but are not used; some national surveys have gender data on ICT users but do not do sex-disaggregated breakdowns of the statistics. However, the major

challenge to having sex-differentiated statistics and indicators on ICT is that few sources collect these data. Not many government organizations collect national ICT statistics in a consistent and regular manner; of those that do, very few provide a breakdown by gender. It is vital to all countries to have these data in an increasingly globalized world and to ensure that the information society that develops is equitable.

Ways to Increase Available Gender and ICT Data

How is it possible to encourage countries that do not currently collect sex-disaggregated and gender-specific ICT data to do so? The first phase of the WSIS identified the collection of gendered ICT data as an important area for action by member states. Sex disaggregation of all relevant data—not only

data on female Internet users—related to the information society must be encouraged. For the future, hope lies in encouraging the collection of national-level ICT statistics and disaggregation by sex wherever possible, whether in population censuses or household, enterprise, or education surveys. Multilateral organizations and partnerships need to encourage national statistical offices in this direction. They should also use the publication of their composite indices to promote gender ICT statistics and indicators. Gender equality advocates at the national level need to pressure both ICT policymakers and national statistical agencies to take necessary measures to assure sex-disaggregated data collection and publication.

While efforts are underway to address the situation, it may be years before satisfactory progress is achieved. In the meantime, the best alternative is to compile all existing data, despite their incompleteness and heterogeneity, and combine them with contextual knowledge to deepen understanding, support much needed policies, and monitor progress. Doing so will also have the effect of keeping in plain view the need for better ICT gender statistics and indicators. ∎

Appendix

Sex-Disaggregated ICT Indicators, Republic of Korea

Rates of Internet usage (by sex and age)
Main reasons for Internet usage (10 reasons cited)
Age of first Internet usage
Frequency of Internet usage
Average duration of Internet use
Anticipated (projected one year) Internet use
Modes of Internet access (e.g., LAN, ISDN, DSL)
Time of main Internet usage
Places of primary, secondary, tertiary Internet usage
Average cost of Internet connection
Main purpose of usage
Main purpose of Internet surfing
Number of e-mail addresses
Rate of possession of homepage
Problems with using Internet
Number of hours weekly reading newspapers, watching television
Reasons for not using Internet

References

Asian Pacific Women's Information Network Center. (2002). Survey on women's informatization in Asia and the Pacific.

Daly, J.A. (2003). ICT, gender equality and empowering women. In *Essay series on information and communications technology applied to the millennium development goals.* Retrieved January 14, 2005, from http://topics .developmentgateway.org/ict/sdm/ previewDocument.do~activeDocumentId= 840982

Gadio, C.M. (2001). *Exploring the gender impact of the World Links Program: Summary of the findings of an independent study conducted in four African countries.* Retrieved December 5, 2005, from www.world-links.org/downloads/ task,doc_download/gid,12/?lang=en

Gender and ICT Network. (2006). *The gender digital divide in francophone Africa: A harsh reality.* Retrieved August 28, 2006, from http://www.genderit.org/upload/ ad6d215b74e2a8613f0cf5416c9f3865/africa_ gender_divide.pdf

Gray, V. (2004, September). *Statistics in perspective: ITU's Digital Access Index (DAI).* Paper presented at the Building Digital Bridges Symposium, Busan, Republic of Korea.

Hafkin, N. (2002, July). *Is ICT gender neutral? A gender analysis of six case studies of multi-donor ICT projects.* Paper presented at the United Nations INSTRAW Virtual Seminar on Gender and ICT. Retrieved August 30, 2006, from www.un-instraw.org/en/docs/gender_and_ict/Hafkin.pdf

Hafkin, N. (2003a, January). *Some thoughts on gender and telecommunications/ICT statistics and indicators.* Paper presented at the Third World Telecommunication/ICT Indicators Meeting, Geneva, Switzerland. Retrieved December 5, 2005, from http://www.itu.int/ITUD/ict/WICT02/ doc/pdf/Doc46_Erev1.pef

Hafkin, N. (2003b, December). *Gender issues in ICT statistics and indicators, with particular emphasis on developing countries.* Paper presented at the UNECE/UNCTAD/UIS/ITU/OECD/Eurostat Statistical Workshop: Monitoring the Information Society:

Data, Measurement and Methods, Geneva, Switzerland. Retrieved August 30, 2005, from http://www.unece.org/stats/documents/ces/sem.52/3.e.pdf

Hafkin, N. (2004). Gender issues at the World Summit on the Information Society, Geneva. *Information Technologies and International Development, 1*(3–4), 55–59.

Hafkin, N. & Huyer, S. (2006). *Cinderella or Cyberella? Empowering Women in the Knowledge Society.* Bloomfield, CT: Kumarian Press.

Huyer, S., Hafkin, N., Ertl, H., & Dryburgh, H. (2005). Women in the information society. In G. Sciadas (Ed.), *From the digital divide to digital opportunities: Measuring infostates for development* (pp. 135–195). Ottawa, Canada: Orbicom/ITU. Retrieved November 8, 2005, from http://www.orbicom.uqam.ca/index_en.html

Huyer, S. & Westholm, G. (2000). *GAB/UNESCO Toolkit on gender indicators in engineering, science and technology.* Paris, France: UNESCO. Retrieved November 8, 2005, from http://gstgateway.wigsat.org/ta/data/toolkit.html

International Telecommunication Union. (2003). *World telecommunication development report 2003: Access indicators for the information society. Executive summary.* Geneva, Switzerland: ITU. Retrieved August 29, 2006, from www.itu.int/ITU-D/ict/publications/wtdr_03/material/WTDR2003Sum_e.pdf

International Telecommunication Union. (2005). *Telecommunication Indicators Handbook*. Geneva: ITU. Retrieved August 12, 2006 from http://www.itu.int/ITU-D/ict/material/handbook.pdf

International Telecommunication Union. (2006). *World information society report.* Geneva, Switzerland: ITU. Retrieved August 31, 2006, from http://www.itu.int/osg/spu/publications/worldinformationsociety/2006/report.html

Jorge, S. & Hafkin, N. (2002, February). Get in and get in early: Ensuring women's access to and participation in ICT projects. In *Women in Action: Women and communications* [special issue]. Isis International-Manila.

Me, A. & Sicat, M. (2003, December). *Statistics on women and men and ICT: The ECE region.* Paper presented at the UNECE/UNCTAD/UNESCO/ITU/OECD/Eurostat Statistical Workshop: Monitoring the Information Society: Data Measurement and Methods, Geneva, Switzerland. Retrieved January 20, 2007, from http://www.unece.org/stats/documents/2004/10/gender/wp. 31.e.pdf

Minges, M. (2002, January). *Gender and ICT statistics.* Paper presented at the 3rd World Telecommunications/ICT Indicators meeting, Geneva, Switzerland. Retrieved February 20, 2004, from http://www.itu.int/ITU-D/ict/WICT02/doc/pdf/Doc07_E.pdf

Montagnier, P. & van Welsum, D. (2006, December). *ICTs and gender-evidence from OECD and non-OECD countries.* Paper presented at the UNCTAD Expert Meeting on Using ICTs to Achieve Growth and Development, Geneva, Switzerland.

Partnership on Measuring ICT for Development. (2005). *Measuring ICT: The global status of ICT indicators.* New York: United Nations Information and Communication Technologies Task Force. Retrieved April 11, 2008, from http://www.itu.int/ITU-D/ict/partnership/material/05-42742%20GLOBAL%20ICT.pdf

Republic of Korea, Ministry of Gender Equality. (2001). *Study of women's informatization survey and index development.* Paper presented at the APEC 2nd Ministerial Meeting on Women, Seoul, South Korea.

Sciadas, G. (Ed.). (2005). *From the digital divide to digital opportunity: Measuring infostates for development.* Montreal, Canada: Orbicom.

United Nations. (1995). *The world's women: Trends and statistics.* New York: United Nations.

United Nations Conference of Trade and Development (UNCTAD). (2006). *The digital divide report: ICT diffusion index 2005.* New York and Geneva, Switzerland: United Nations. Retrieved August 29, 2005, from http://www.unctad.org/en/docs/iteipc20065_en.pdf

United Nations Development Program (UNDP). (1995). *Human development report.* New York: United Nations.

United Nations Information Technology Services (UNITeS). 2003. Information Village Research Project—India.

World Economic Forum. (2005). *The global information technology report 2003–2004: Towards an equitable Information Society.* New York and Oxford, England: Oxford University Press.

World Summit on the Information Society Geneva.

(2003a). *Declaration of principles, building the Information Society: a global challenge in the new Millennium.* Retrieved March 28, 2004, from http://www.itu.int/dms_pub/itu-s/md/03/wsis/doc/ S03-WSIS-DOC-0004!!PDF-E.pdf

World Summit on the Information Society. (2003b). *Plan of action.* Retrieved May 18, 2008 from www.itu.int/wsis/documents/ doc_ multi.asp?lang=en&id=1161%7C1160