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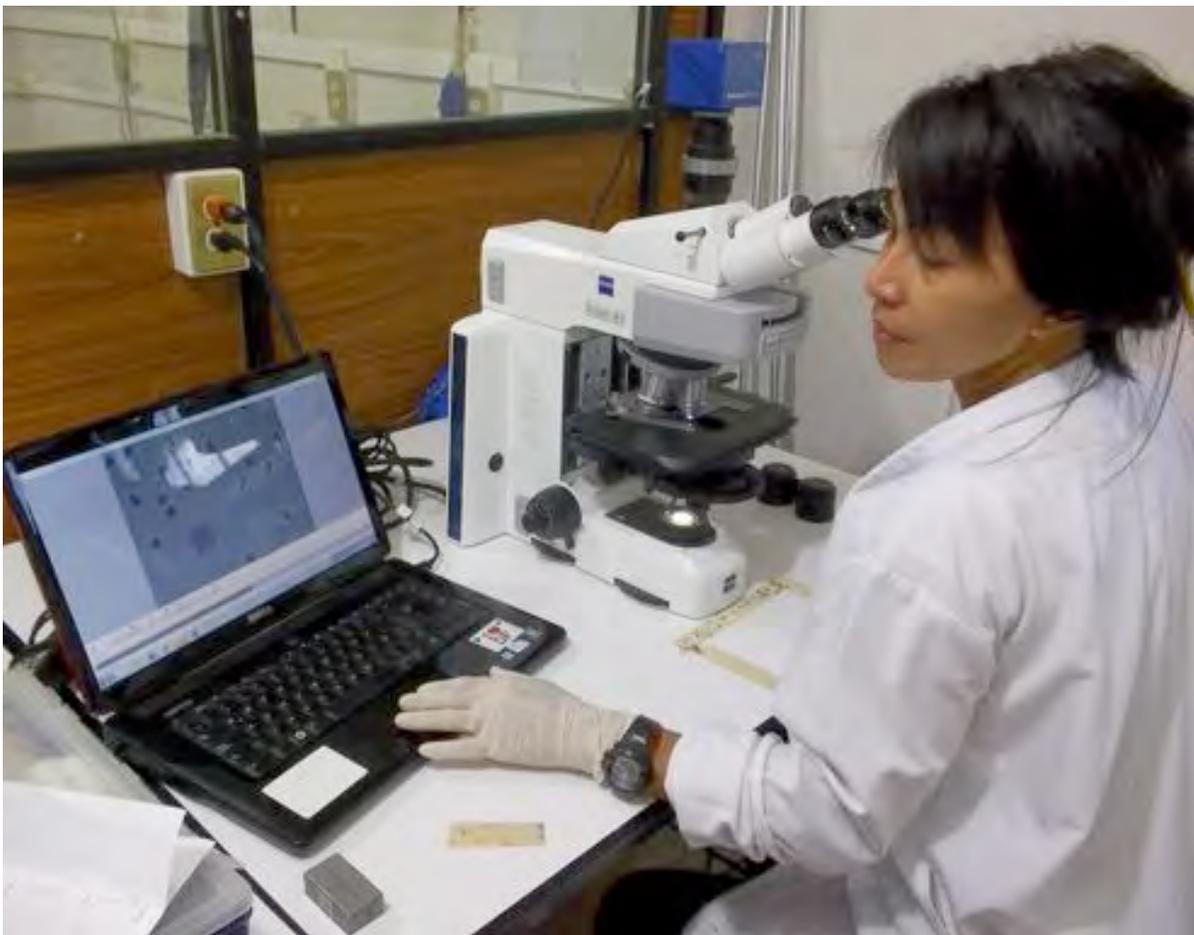
THE ELSEVIER FOUNDATION

National Assessments on Gender Equality in the Knowledge Society

Gender in science, technology and innovation

Global Synthesis Report

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About the National Assessments on Gender and STI:

This project is a joint initiative of Women in Global Science and Technology (WISAT) and the Organization for Women in Science for the Developing World (OWSD). It is supported by the futureInnovate.net software platform and the Elsevier Foundation.

More information on the project, including national reports and the Results Scorecard, are available at: www.wigsat.org/node/49.

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National Assessments on Gender and STI

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INTRODUCTION: The Study

This is the first study to undertake assessments of the status of women in national knowledge societies, with a focus on their representation in science, technology and innovation (STI) systems. The pilot phase covering six countries and one region took place during 2012: Brazil, India, Indonesia, the Republic of Korea, South Africa, the United States, and the European Union. The study will be expanded to other countries in 2013. Countries were chosen on the basis of the status of their national STI systems and policy and the availability of sex-disaggregated data. Countries from both developed and developing worlds were chosen in order to assess trends across regions.

National researchers gathered data from national and international sources to develop a situational analysis that incorporates both quantitative and qualitative data. National level data was entered into an online global analysis platform that produced cross-national comparisons and rankings.

The major finding of this study is that the gender knowledge divide continues to exist in all countries, even those that have a highly-developed knowledge society. Women participate at much lower levels in knowledge society decision-making and the knowledge economy than men. In the science and technology sector only in the health and life sciences, and only in some countries, are they represented equally with men. In all countries, there are fewer women in the science and technology workforce than men. *In all countries in this review – which represents the leading knowledge-based economies in the world – the knowledge society is failing to include women to an equal extent, and in some cases, their inclusion is negligible.*

Gender Equality, STI and the Knowledge Society

Central to sustainable socio-economic development in their roles as food producers and providers, healthcare providers, household managers, educators and natural resource managers¹, women's lack of opportunity and resources in all aspects of society diminishes their country's potential to achieve progress, reduce poverty, and improve the quality of life of all its citizens. It also poses a waste of the resources invested in the education of women and girls.

The capacity of a country to create, acquire, assimilate, use and diffuse scientific and technological knowledge determines its competitiveness in the global economy (David and Foray 2003, OAS 2004). S&T also improves the lives of the poor by enabling better nutrition and health, higher crop yields, cleaner water, providing clean and renewable energy sources and improved soil management. Building national capacity for adoption, adaptation, innovation and technological diffusion of basic and medium technologies is important for job creation and poverty reduction. Increasing capacity in agriculture, health, manufacturing, transport, communications and other technologies will improve health and food security, increase productivity, provide access to new markets, improve management of complex ecosystems and raise individual incomes (Juma and Lee 2005, UNDP 2005).

STI also has an important role to play in supporting women's domestic work, their livelihoods, and natural resource management activities, but often this support is missing. FAO notes that if female farmers were given the same access to productive resources as male farmers (fertilizers, extension services, agricultural information, finance and land), their agricultural yields could increase by 20 to 30 percent, in turn increasing national agricultural production by 2.5 to 4 percent and reducing the number of malnourished people by 12 to 17 percent (FAO 2011).¹ It is estimated that if women's paid employment rates were raised to the same level as men's, the GDPs of the United States, Japan, UAE and Egypt would see increases by 5, 9, 12 and 34 percentage points, respectively (Aguirre et al, 2012). For these reasons, "women's roles as food

¹ UNCTAD, 2011. *Applying a Gender Lens to Science, Technology and Innovation*. Current Studies on Science, Technology and Innovation, No. 5 ed. Geneva: United Nations.

producers, educators of their children, family caregivers and community managers will need to be underpinned by STI resources in order for countries to meet many of the MDG targets (UNCTAD, 2011:3)."

There are many challenges facing countries intending to become knowledge societies. They will need to develop and maintain the highly skilled human resources required to manage national scientific, technological and innovative capacity and promote STI which improves the lives of people. The first challenge is the policy and investment in education and employment required to produce a scientific and technological workforce. It is also necessary to educate citizens through both formal and informal educational strategies to understand and use S&T to improve their lives and livelihoods. *Countries will need to mobilize the active participation of women and other underrepresented groups in the scientific and technological workforce and improve the ability of all groups in society to apply technologies for activities* such as food production, provision of clean water, improved sanitation and use of clean and renewable energy.

Full integration of women into a socially inclusive knowledge society can only be achieved if a society supports the equality and empowerment of all. The picture of women's participation in the knowledge society will be incomplete without some understanding of the context of women's lives in a given country. What are women's economic activities, participation in economic and political decision-making, knowledge and skills, their health, well-being, status and living conditions? No matter what their countries' level of development or GDP, these factors all condition women's ability to participate in the knowledge society, often quite differently from that of men. For example, women's agency is central to gender empowerment in the knowledge society: women can achieve equality only if they are actors in the process of change in their own lives and communities. Women will be in a position to effectively contribute and benefit from the knowledge society if they have the full range of gender equality rights, benefits and opportunities.

Access to education, participation in S&T and ability to earn income are not automatically connected. As this and other studies show, getting more females into science and technology education at secondary and tertiary levels does not automatically lead to increased numbers of females in the S&T/knowledge society workforce or at higher levels of S&T institutions. Similarly, getting more women into the paid workforce does not ensure that they will become senior managers, leaders or decision makers in either the public or private sectors.

The Framework on Gender Equality and the Knowledge Society

The Framework on Gender Equality and the Knowledge Society presented here is an attempt to bring together gender-sensitive data on key areas in the knowledge society (ICTs, science, technology and innovation) with gender indicators of health, economic and social status and other areas.

Gender equality and empowerment are integrated into this framework because they constitute the base conditions without which women cannot successfully participate in the knowledge society. Gender equality involves the improvement of the political, social, economic and health status of both women and men. It is an end in itself as well as essential to the achievement of sustainable socio-economic development. The United Nations definition of "women's empowerment" includes a recognition that women are disadvantaged in access to education and resources and that "the empowerment and autonomy of women and the improvement of their political, social, economic and health status is both a highly important end in itself and necessary for the achievement of sustainable human development." Women's empowerment is made up of five main elements: a sense of self-worth, the right to have and to determine choices, the right to have access to opportunities and resources, the right to have the power to control their own lives both within and outside the home and the ability to influence the direction of social change in order to create a more just social and economic order, nationally and internationally (United Nations Population Information Network n.d.).²

² A more detailed discussion of women's empowerment in the knowledge society appears in Hafkin and Huyer (2006)

Building women's capabilities is another important ingredient. The Nobel Laureate Amartya Sen argues that gender equality is a core development issue, as part of the development mandate to expand freedoms and capabilities for all. As a result, development should produce narrowed gender gaps along with increased capability, expanded agency and choice and the opportunity to improve one's life. Sen took the view that women's well-being depends on their ability to make choices for themselves which includes access to resources and opportunities such as employment, literacy and education, and property rights, and in turns promotes development in other sectors. He noted that in the Indian state of Kerala, where there is a long tradition of women's education and property rights, fertility rates were lowered more effectively than in China where a one-child policy was enforced by the state. Increases in women's agency also proved more effective in increasing longevity rates, which are higher in Kerala than in the richer and more industrialized provinces in the north (Blunden, 2004).

Applying the concept of gender equality to a knowledge society involves women's ability to make decisions, exercise control and choices and manage resources in a way that allows them to affect events and circumstances around them. It can include the pursuit of scientific and technological design and innovation, use of science and technology to advance life and livelihood goals, or the use of skills and knowledge for entrepreneurial activities.

To connect up these dimensions of women's participation in the knowledge society, the Gender Equality-Knowledge Society framework highlights the close connections among gender equality, the knowledge society, and sustainable socio-economic development. Comparative analysis of the indicators will help to arrive at identification of sex-specific trends which can lead to better research, practice, assessment and evidence-based recommendations that will shed light on the closing of knowledge divides.

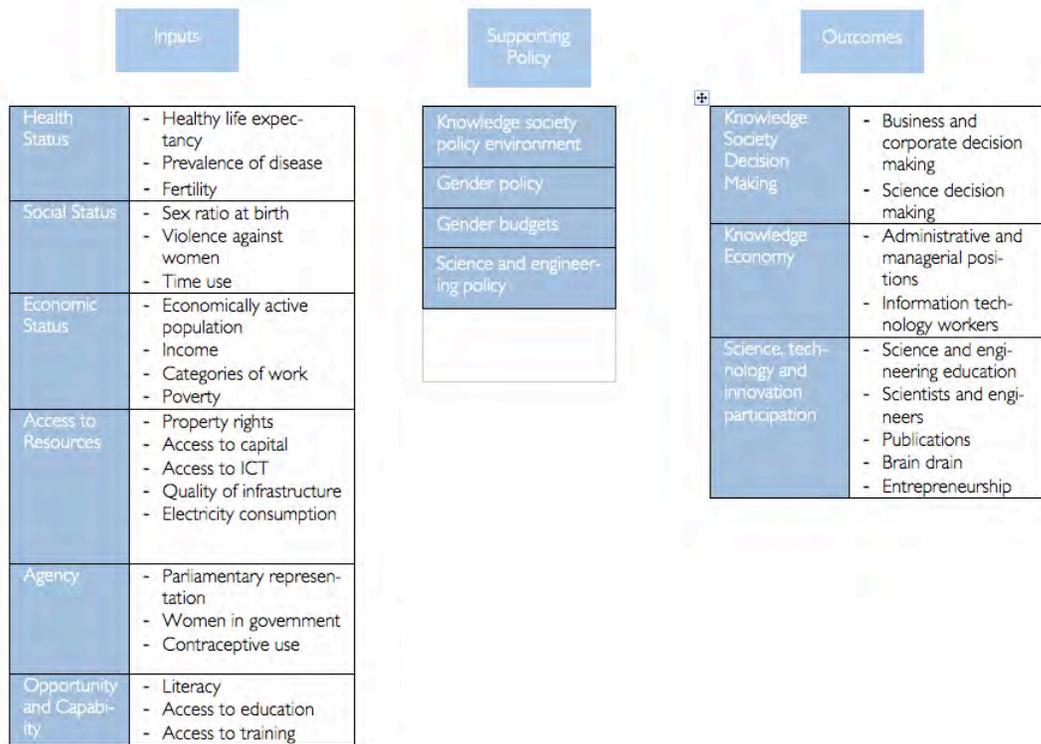
In constructing the framework, a small number of indicators was identified that would be relevant to key policy issues, comparable and feasible to collect. The importance of developing a framework that could be used and adapted by national statistical offices across a wide variety of countries was taken into account (Moser, 2007). The statistical indicators were revised during the process of collecting data in this survey both in order to use cross-national comparable data to the greatest extent possible and as a result of the findings of the national studies.

An additional characteristic of the framework is an examination of the role of enabling government policy and its implementation, including the presence of national legislation to reinforce international conventions. Among the dimensions measured in the GE&KS framework are the inclusion of gender issues in key knowledge society areas of science and technology, ICTs, labour and education. This is done to measure the extent to which the inclusion of gender issues in government policy facilitates the participation of women and the flourishing of their innovative and entrepreneurial capabilities.

It is also important to examine the existence of gender-specific policies that cover preconditions for women's participation in the knowledge society: childcare, accessible healthcare, flexible work hours, transportation and other gender-specific policies that enable women to leave the home and enter the workforce. Particularly important is a country's accession to the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW), an indicator that signals the existence of legislation ensuring equal access, opportunity and freedom from discrimination in all areas of life.

And finally, the existence of arrangements to institutionalize inter-ministerial relations on gender will determine the degree of progress of gender mainstreaming in government policies and services – and the degree to which gender analysis is integrated into the implementation of policy and programming.

Gender Equality – Knowledge Society Framework



SECTION ONE: Comparisons with other indexes

For a variety of reasons, the major gender indexes do not address the full implications of gender equality for knowledge and innovation – or vice versa – in their assessment of women's status.

The UNDP Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM) were the result of the first large-scale international attempts to measure gender development and empowerment. They are regarded as the basic international comparative references of gender status and form the starting point for many other indexes. They are constructed from readily available data using internationally accepted indicators from international sources. Both are part of the UNDP Human Development Report and Index. One of the most powerful uses of these indexes has been, in juxtaposition with the Human Development Index (HDI), to show that countries with a high rating on the HDI do not necessarily treat their women equitably.

The GDI focuses on capabilities (inputs) while the GEM focuses on opportunities and achievements (outcomes). The GDI looks at:

- (1) Inequalities between men and women in long and healthy life spans (indicator: life expectancy at birth);
- (2) Knowledge (indicators: adult literacy rates and combined primary, secondary and tertiary education gross enrolment ratios, later adult literacy rates (M/W), combined gross enrolment ratios, primary, secondary and tertiary enrolment for males and females). The MDG indicators of youth literacy and net primary, secondary and tertiary enrolments have been added recently, with women's rates as a percentage of those for men added for all indicators.
- (3) A decent standard of living, measured by earned income, expressed in USD Purchasing Power Parity (PPP).

The GDI incorporates the same variables as the HDI, which uses GDI ratings to adjust a country's average score for gender disparity. Critics maintain that neither the GDI nor the GEM measure gender inequality but rather but an "odd combination of absolute welfare levels and gender equality that is not easy to interpret" (Geske Djistra, 2006) and that the GDI is actually a measure of human development corrected for gender inequality (Schuler, 2006). The GDI also does not capture gender inequalities linked to pay and promotion in employment and in the quality of education, both of which are important issues for consideration in the knowledge society.

A new generation of international composite indexes to measure gender inequality has been developed which attempt to correct, complement and expand on UNDP's efforts (Moser, 2007). Among these are the Social Watch Gender Equity Index (GEI) and the World Economic Forum Gender Gap Index. In its position that economic development does not automatically bring gender equality, but rather it is dependent on a commitment to transformation of cultural patterns and distribution of power, the GEI covers education, economic activity and participation in political and economic decision-making. However it does not adequately incorporate other important dimensions such as health, life expectancy or standard of living.

The 2011 World Economic Forum Gender Gap Index (GGI) has become increasingly global — covering 134 countries, a major increase over the prior year's index (Hausmann et al., 2011). An attempt to address the inequality issue, the WEF index looks at gaps in access to resources and opportunities between men and women rather than levels of available resources and opportunities. The index uses the following categories: (a) economic participation and opportunity, (b) educational attainment, (c) health and survival and (d) political empowerment. Together these categories cover essentially the same topics as the GDI and the GEM, using many of the same indicators but arranging them differently. Despite its emphasis on gaps rather than on levels of national development, the GEI finds a positive correlation between gender equality and a country's development – thus promoting the assumption that economic development automatically benefits women and men equally. This is a result of its economic focus: economic factors (such as efficiency) are seen as the primary determinants of the status of women. Gender equity is assessed overall in terms of equal access to jobs and education.

While the GGI claims to measure gender equality, it actually measures economic efficiency and does not sufficiently emphasize access to resources and opportunities. Its indicators on women's empowerment measure only a tiny fraction of women's participation in public decision-making and have very little to say about the status or opportunities of the vast majority of women in the country.

The OECD Gender, Institutions and Development (GID) Data Base is an attempt to measure the sociocultural factors that affect women's status and participation in social, political and economic life, but are difficult to quantify with any precision. The OECD position is similar to that of the Social Watch GEI — that wealth is not a guarantee of gender equality, and women's empowerment and cultural change are necessary elements for its achievement. The GID argument, on the other hand, is that one cannot necessarily expect an improvement in the economic role of women as aggregate income rises and that, unless explicitly addressed, cultural and traditional practices and patriarchal institutions will prevent gender equality even in the presence of strong economic growth. One contribution of the GID is to measure the level of discrimination against women at the country level, with a system to code quantitatively a large volume of qualitative information on cultural and traditional practices. This is a very important addition to gender and development statistics since gender discrimination is a variable not addressed in most indexes and a crucial barrier to women's inclusion in national STI.

The GDI index differentiates between input (social institutions and the underlying reasons for discrimination) and outcome variables (participation of women in the labour force and the extent to which women suffer discrimination in the labour force) where paid labour force participation outside the home is the major output variable. The OECD constructed this indicator using ILO and UNSD data on female share of the paid non-agricultural labour force, supplemented by the percentage of women in professional and technical positions and percentage of women among administrative workers and managers plus the difference between men's and women's wage levels.

The social institutions indicator includes:

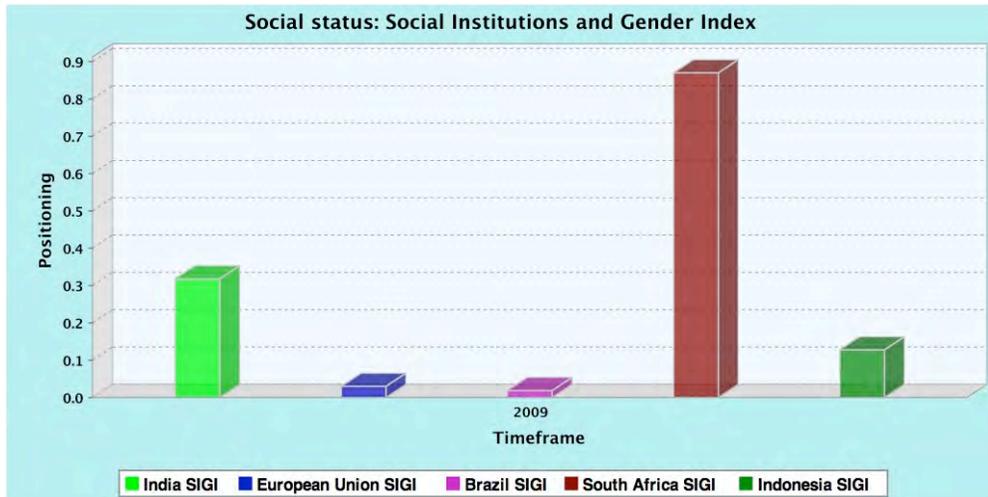
- Family code (marriage age, unilateral marriage repudiation, equal parent authority, prevalence of polygamy)
- Physical integrity (female genital mutilation, laws on violence against women)
- Civil liberties (women's freedom to leave the house, need to wear a veil in public, representation in parliaments)
- Ownership rights (access to bank loans, right to acquire and own land and other property)
- Education, health and birth control.

None of these indexes, nor the major regional ones – Africa Gender Development Index or the Economic Commission for Latin America and the Caribbean (ECLAC) Gender indicators for follow-up and evaluation of the Regional Programme of Action for the Women of Latin America and the Caribbean, 1995-2001, and the Beijing Platform for Action – incorporate ICT, S&T or knowledge society issues. Despite some interesting steps forward, such as the Africa Gender Development Index and attempts by the UN ICT Task force, there has been no real attention paid either to the challenges of measuring women's participation in the knowledge society or to the social, cultural and economic opportunities lost for both women and the larger society due to this failure in failing.

As a result of these differences between indexes, the countries in this study showed different rankings in the GE&KS framework than in the main international rankings and indexes shown here (see Table 3 below).

Social Institutions and Gender Index

OECD Social Institutions and Gender Index (SIGI) composite score of gender equality in 2009.



South Africa ranked highest of the countries on the OECD index for which data is available. India ranked highest of the countries surveyed for which data is available on the Gender Inequality section of the Index. The value for Brazil puts it last.

Gender-related Development Index

UNDP Gender-related Development Index (GDI) ratings)

GDI data for the Human Development Report 2009 are based on 2007 data. From the GII, the Gender Inequality Index rankings are shown in Table 1 (highest score means greatest existence of gender inequality).

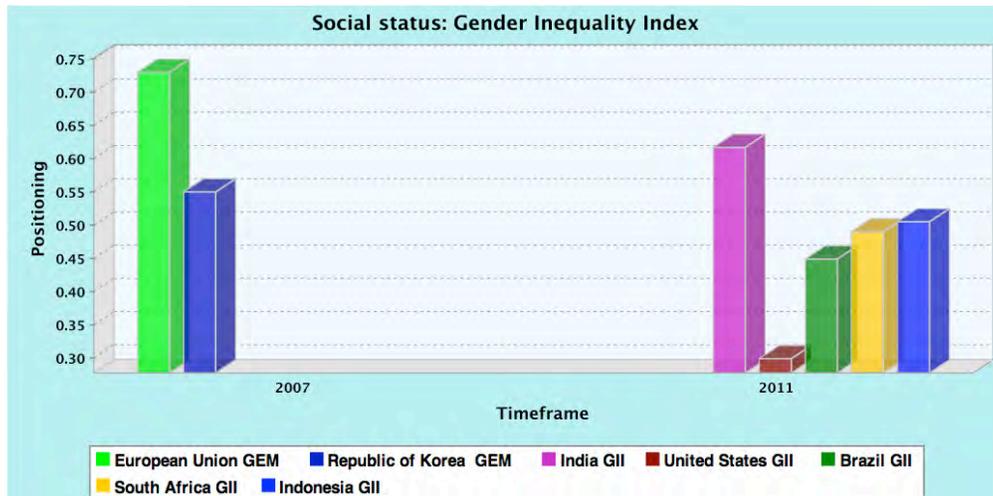


Table 1. GII Rating

Country	GI Rating
India	.62
Indonesia, Republic of Korea	.51
South Africa	.49
Brazil	.45
US, EU	.30

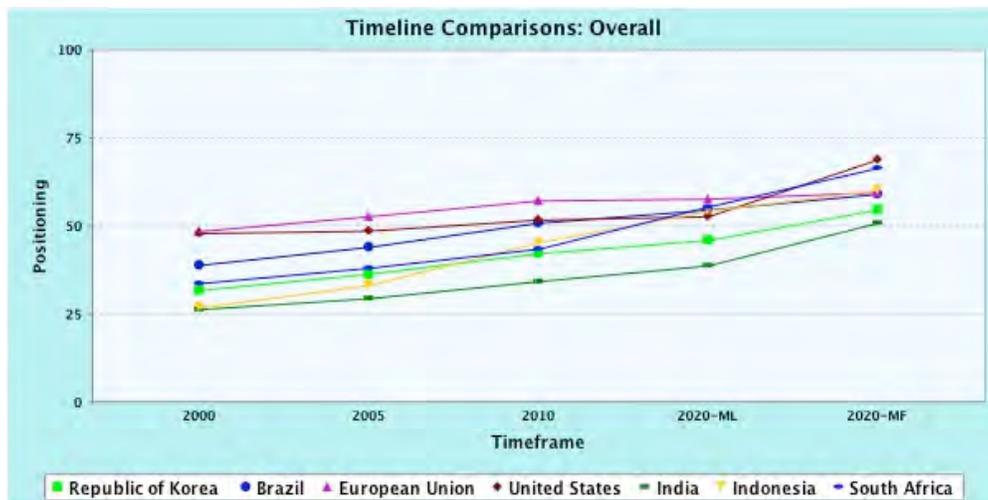
In comparison, country rankings are from the just-released *Global Gender Gap 2011* (Hausmann et al, 2011) are found in Table 2, based on the GGP dimensions of economic participation and opportunity, educational attainment, health and survival, and political empowerment.

Table 2. Global Gender Gap Rankings

2011 Global Gender Gap (WEF) Rankings	GEF Rating	Country rank
South Africa	0.748	14
USA	0.741	17
EU *	0.725	38
Brazil	0.668	82
Indonesia	0.659	90
Korea, Rep of	0.628	107
India	0.619	113

* EU includes 6 of the 7 highest ranking countries (all except New Zealand), with none of the study countries in this group.

GE&KS Framework rankings (2010)³:



In comparison with these other major gender indexes, factoring in STI and knowledge society considerations changes the ranking of some of the countries in this study considerably. India and the Republic of Korea come out last and second last in the GE&KS framework, as well as in comparative rankings in the other gender indexes. The EU and US come in first and second in

³ Future rankings are estimates only and will be further developed at later stages of this assessment.

the GE&KS framework and are tied for last in the GII framework, with the US (17th) coming in above the EU (38th) by a considerable margin in the Global Gender Gap index. Interestingly, South Africa takes the top ranked position in the GGG-WEF index in comparison to the other countries studied, at 14th. Brazil does not do nearly as well in the other indexes in spite of women's strong participation in the labour force in the country as well as recent advances in equality in the country. It is likely that the high level of poverty in the country affects its ranking – it should be noted that the GE&KS framework measures both the existing participation of females in the current knowledge society as well as its potential for improvement. In both of those cases, Brazil ranks highly. Indonesia is another country that ranks more highly in GE&KS than in the other indexes, primarily because of its positive enabling policy environment in knowledge society areas. Lack of sex-disaggregated data in key areas may result in an overly positive picture of the situation there, however. Table 3 provides a comparison of GE&KS rankings versus other major gender indexes. Differences in ranking derive from difference emphases of the gender equality indexes, as discussed above.

Table 3. GE&KS Rankings compared to other gender indexes

Country	GE&KS	GGG-WEF	SIGI	GI
EU	1	3 (38)	N/A	5 (.30)
USA	2	2 (17)	N/A	5 (.30)
Brazil	3	4 (82)	5	4 (.25)
Indonesia	4	5 (90)	3	2 (.41)
South Africa	5	1 (14)	1	3 (.49)
Rep. of Korea	6	6 (107)	N/A	2 (.51)
India	7	7 (113)	2	1 (.62)

SECTION TWO: Cross country comparisons

Table 4. Gender Equality – Knowledge Society Framework

A. Health status	B. Social status	C. Economic status	D. Access to resources	E. Agency	F. Opportunity and capability	G. Enabling policy environment	H. Knowledge society decision-making	I. Knowledge economy	J. Science, technology and innovation participation
A1. Health status policy environment	B1. Social status policy environment	C1. Economic status policy environment	D1. Access to resources policy environment	E1. Agency policy environment	F1. Opportunity and capability policy environment	G1. Knowledge society policy environment	H1. Business decision-making	I1. Administrative and managerial positions	J1. Science and engineering education
A2. Healthy life expectancy	B2. Sex ratio at birth	C2. Economically-active population	D2. Property rights	E2. Lower houses of parliament	F2. Literacy	G2. Knowledge society policies	H2. Science decision-making	I2. Information technology workers	J2. Scientists and engineers
A3. Prevalence of disease	B3. Violence against women	C3. Income	D3. Access to capital	E3. Women in government	F3. Access to education	G3. Gender policy			J3. Publications
A4. Fertility	B4. Time use	C4. Categories of work	D4. Access to ICT	E4. Contraceptive use	F4. Access to training	G4. Gender budgets			J4. Brain drain
		C5. Poverty	D5. Quality of infrastructure			G5. Science and engineering			J5. Entrepreneurship
			D6. Electricity consumption						

The GE&KS framework is organized into two categories of indicators – inputs and outcomes. Input indicators assess the base conditions affecting the ability of women to participate in the knowledge society (see Table 4). Input indicators are organized into seven main dimensions: health status; social status; economic status; access to resources; women’s agency; opportunity and capability; and enabling policies. Outcome indicators, which measure the degree of women’s

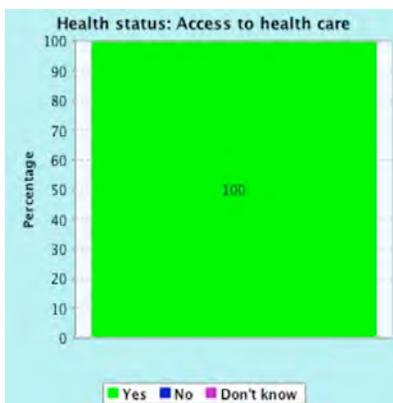
participation in the knowledge society, comprise knowledge society decision-making; participation in the knowledge economy; participation in science, technology and innovation systems; and lifelong learning. This section outlines the indicators used in each section, as well as the comparative rankings of the countries studied.

HEALTH STATUS

Good health is a prerequisite for the development of educated, creative, skilled women participating in the knowledge society. Without good health and wellbeing, educated, creative, and skilled women will not be able to participate effectively in the knowledge society. Health status also reflects women's status in society: malnutrition, life expectancy and disease rates are all conditioned by social as well as physiological factors.

Access to Health Care

Key issues here refer to access to maternal and reproductive health, which has been a primary focus of the MDGs and much development programming. However, access to health care also involves the ability to address a wide range of health concerns and diseases, as well as preventative care. This is particularly true as incidence of disease is increasing in many countries, and climate change influences the introduction of insect-borne infectious diseases into new areas.

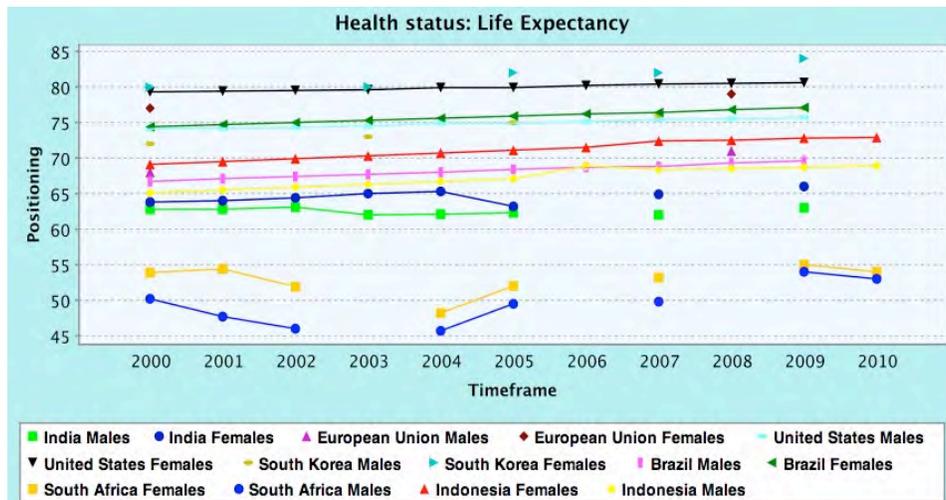


Except for South Africa, which is formulating a national health insurance policy, virtually all the countries surveyed have some universal or affordable health care. It should be noted that the US policy is very new and based on private insurance.

Health status: Life Expectancy

Life expectancy at birth for females and males.

A long life in and of itself does not necessarily mean a healthy life, particularly in developing countries with high rates of infectious diseases. The following indicators measure women's and men's comparative life expectancy and healthy expectancy rates.



As expected, women live longer than men in all the countries covered. Given the burden of HIV/AIDS and maternal mortality, the life expectancy at birth for women in South Africa is significantly below that of the average woman in the world. Also, the life expectancy of women in South Africa is only marginally higher than that of their male counterparts whereas, in terms of world averages, the sex difference is more pronounced. For instance, internationally there is a 3-year average difference between women and men with regard to healthy life expectancy (61 versus 58 years) whereas in South Africa this is reduced to only one year difference (48 versus 47 years).

Korean women are the longest living of the groups included in the study —three decades more than women in South Africa. Both male and female life expectancy is rising in Brazil, with the gap between the two remaining about the same. Women live eight years longer than men in Brazil (77 vs 69 years), in South Korea seven years – 89 to 77 and in EU, six years: 83 vs 77 years. The differences in life expectancy are lower in the US and Indonesia, at five (81 vs 76) and four years (73 to 69) respectively.

Data from Brazil indicate the importance of disaggregating data not only by gender but also by race. Black women and men in the country have substantially lower life expectancy rates than white females and males. In 2000, the life expectancy at birth for white women was 73.8, compared to 69.5 – although interestingly this figure is higher than the life expectancy for white males (Oliveira et al, 2011). See Table 5 below.

Table 5. Life expectancy at birth by sex and color/race, Brazil, 1991-2000

Year	Women		Men	
	White	Black	White	Black
1991	71.8	65.6	64.3	58.1
2000	73.8	69.5	68.2	63.2

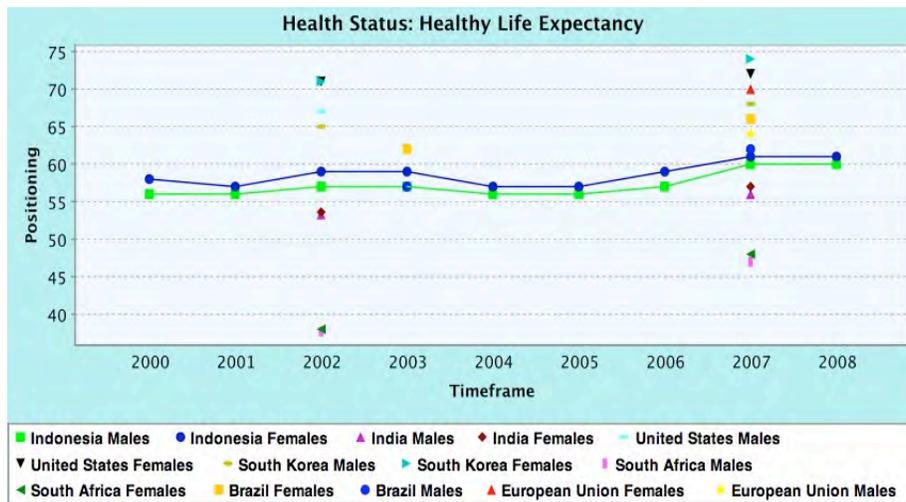
Fonte: PNUD, Atlas Racial Brasileiro 2004
http://www.pnud.org.br/publicacoes/atlas_racial/textos_analiticos.php

Healthy Life Expectancy

Healthy life expectancy for females and males.

Healthy life expectancy is the average number of years that a person can expect to live in "full health" by taking into account years lived in less than full health due to disease and/or injury.

Data are not available for all years or countries – only Indonesia has data on healthy life expectancy for all years.



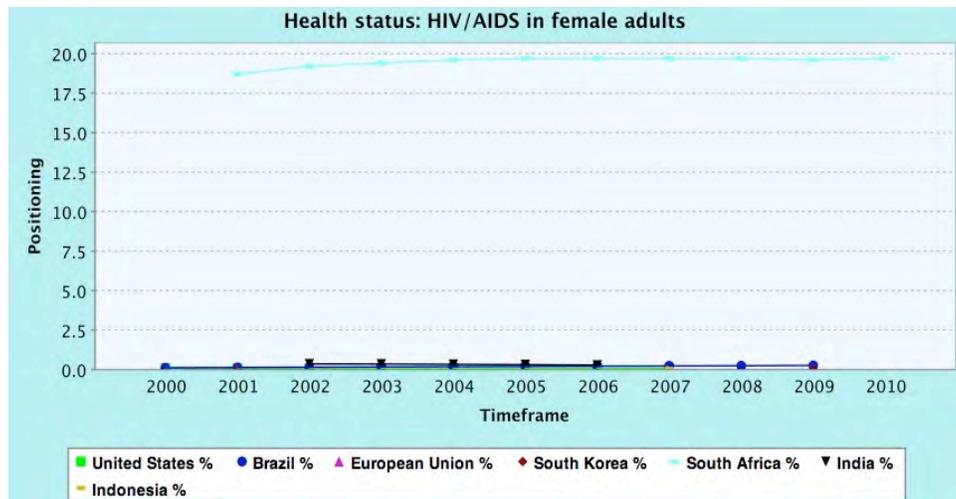
As with life expectancy in general, women in the Republic of Korea are the healthiest overall with an average expectancy of 74 years, with the US at 72 and 68 and EU with a very small gap at 63 and 62. In South Africa women were doing much better at the beginning of the decade, but the situation of men has improved, leaving both at almost the same low level (48/47 years) at the end of the decade. Both Brazil and the Republic of Korea see large gaps between women’s and men’s life expectancy—4 and 6 years, respectively.

Rate of infectious diseases are one key factor in determining the quality of life, or healthy life expectancy, along with poverty and violence. We use rates of HIV/AIDS infection as a bellwether indicator of women's exposure to infectious disease. Of the key health data issues, we have found there is no comparable data on infection rates or infection rates by age group across all countries. Comparing rates for female infections against male will indicate the trends of the disease in a country.

HIV/AIDS rates are an indicator of level of education, access to reproductive support, and gender-based violence. Abusive men are more likely to have HIV and to impose risky sexual practices on their partners. They are more likely to have multiple partners, sex more often and transactional sex, to practice anal sex and to report symptoms of sexually transmitted infections. We also know that HIV-infected women are more likely to have experienced physical or sexual violence; and victims of violence are at higher risk of HIV infection (WHO and UNAIDS, 2010).

HIV/AIDS in female adults

Percentage of all women in the total adult population (15 years and above) that are living with HIV/AIDS.



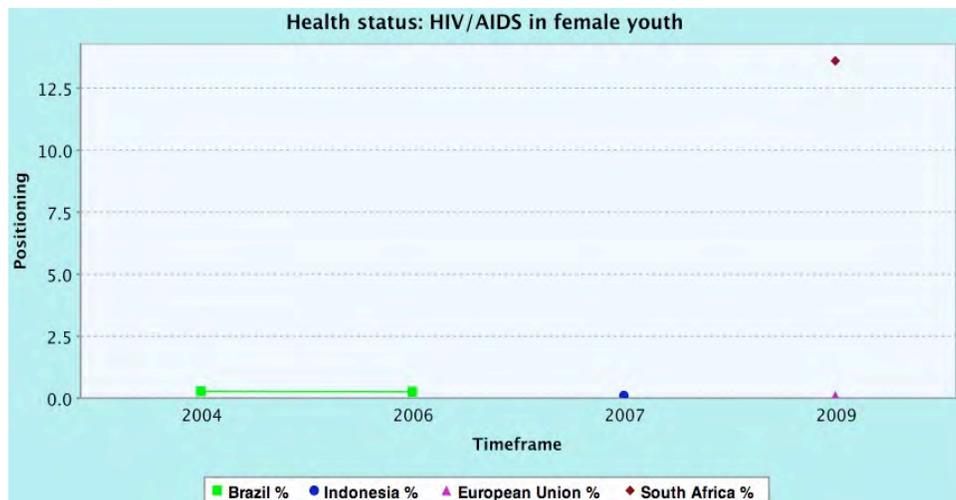
As the statistic measures the prevalence of HIV/AIDS in all adult women, the figure is not high for most countries, except South Africa where it is an alarming 19.7% and showing increases every year of the decade. The rest of the countries in the study show infection rates for females of below 0.1%, except India at 0.28%. While comparatively low, this figure is significant because of the size of the affected population – nearly one million women.

In the hope of decreasing the epidemic in South Africa, the government has developed a comprehensive package of care for those infected and affected by HIV/AIDS. The Prevention-of-Mother-to-Child Transmission programme has the goal of ensuring that by 2014/15 less than 5% of babies born to HIV positive mothers will also be HIV positive. Strategies to achieve this include the integration of antenatal care and HIV/AIDS services, and eliminating the need for travel from one health facility to another to access both types of care. In addition, HIV positive pregnant women receive dual therapy from 14 weeks of pregnancy until post-delivery (MWCPD, 2010). The government also provides antiretroviral treatment (ART) to pregnant women at a CD4 count of 350 or less, to enhance maternal survival and reduce the possibility of vertical transmission (ASSAf, 2011).

Data are not universally available for all countries for all years.

Health status: HIV/AIDS in female youth

Percentage of women between 15 and 24 years of age that are living with HIV/AIDS.



The fact that rates are lower among young women in South Africa (13.6% vs 19.7% for adult women) indicates that progress is being made in educating the young about the dangers of HIV/AIDS transmission. However one of the concerning findings of the 2008 HIV prevalence survey is the sustained high levels of HIV infection among young females. For example, among 15-19 year-olds, female prevalence is 2.7 times higher than that of males (see Table 6 below). In contrast to males, HIV prevalence among females increases even more dramatically in subsequent age cohorts, reaching 21.1% among 20-24 year-olds, and 32.7% among 25-29 year-olds. By age 30-34 the disproportions in HIV prevalence are much smaller, although females still have a higher HIV prevalence (see Table 6) (Shisana et al., 2009).

Table 6. South African HIV prevalence, by sex and age, 2008

Age	Males	Females
2-14	3.0%	2.0%
15-19	2.5%	6.7%
20-24	5.1%	21.1%
25-29	15.7%	32.7%
30-34	25.8%	29.1%
35-39	18.5%	24.8%
40-44	19.2%	16.3%
45-49	8.4%	14.1%
50-54	10.4%	10.2%
55-59	6.2%	7.7%
60+	3.5%	1.8%

Source: Shisana et al. (2009)

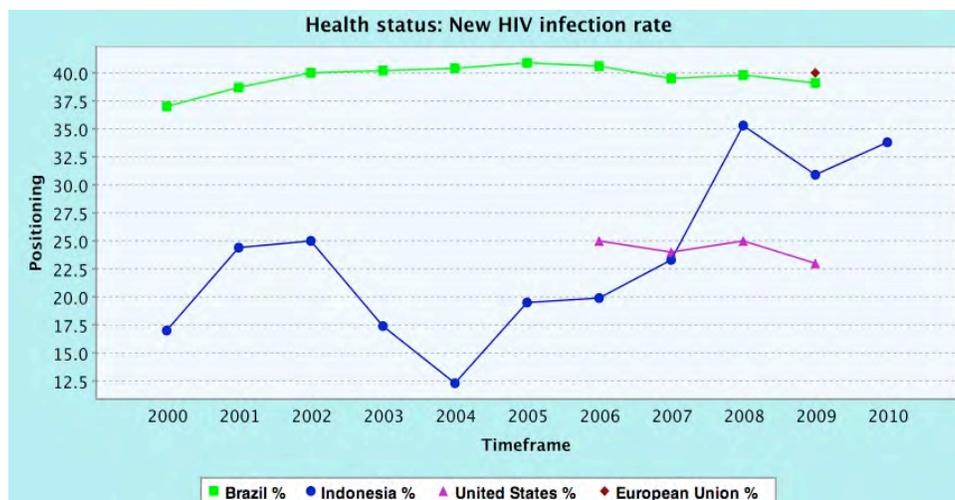
In the EU and Brazil, rates are higher among young women than among adult women, indicating a need for more education among young people. It is unfortunate that Indonesia, the Republic of Korea, and the US do not have data on this indicator, which might alert health practitioners to potential at risk-target groups.

While rates of HIV/AIDS are low in most countries, the case of the US indicates once again the importance of race disaggregation. The US Centers for Disease Control and Prevention found that in 2009 although blacks represented only 14 percent of the U.S. population, blacks overall

accounted for 44 percent of all new HIV infections in that same year. Of that population black women made up nearly 30 percent of new HIV infections (Taylor-McGhee, 2012).

New HIV infection rate

Rate of HIV infection of women as a percentage of total new infections.



This is an important indicator in targeting at-risk groups. Women range from about one quarter (US) to one third (Indonesia), to two-fifths (Brazil and EU) of new infections. Analysis of the Brazil data indicates that although men are the most affected in absolute numbers, infection rates are increasing more rapidly among women. In that country the 13-19 age group is the only group where HIV/AIDS incidence is higher among females. This inverted trend began in 1988 and is generally explained by the early onset of sexual activity for girls with older partners who are more prone to infection. Indonesia has seen a doubling of women’s new infection rates over the decade, with a slight fall in the US rate for women. Unfortunately, data is not available for the other countries surveyed – notably South Africa, the most affected case in our survey group⁴.

Female Genital Mutilation Policy

Does the country have national policy or legislation prohibiting female genital mutilation?

Only Indonesia has such a policy, although the Ministry of Health issued a Regulation on Female Circumcision in November 2010 under which only doctors, midwives, and nurses trained to MOH standards are allowed to carry out the procedure. According to the Minister of Women’s Empowerment, high demand in the country makes it hard to control, so that medicalisation is necessary in order “to avoid further harm.”(Hermawati and Saari, 2012).

Female genital mutilation

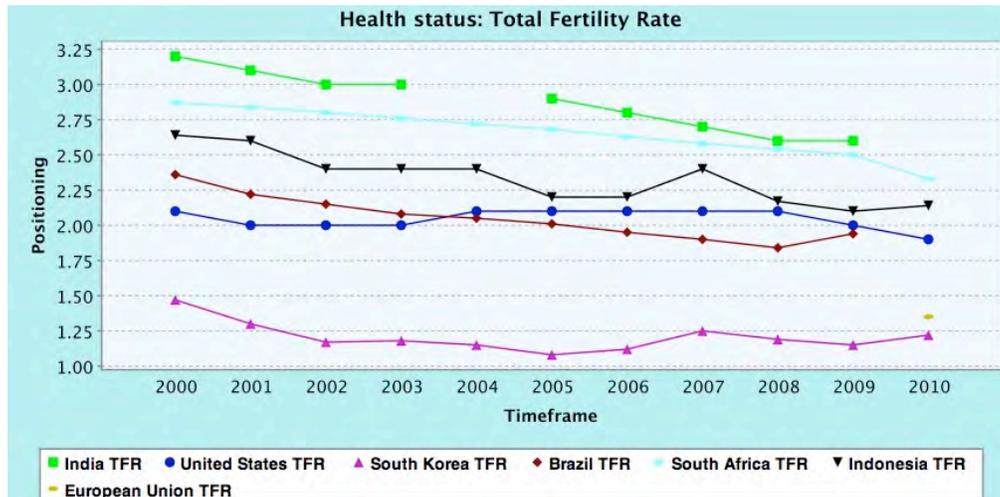
The percentage of girls/women in the total population subjected to female genital mutilation (FGM)

Researchers could locate no data on these in any of the countries included in this study. For further information in this indicator, see the OECD/SIGI database.

⁴ UNAIDS notes that in 2012, new HIV infections overall decreased by 41%, as compared to 73% in Malawi, 71% in Botswana, 68% in Namibia, 58% in Zambia, and 50% in Zimbabwe. South Africa increased HIV treatment by 75% in 2010-2012 so that new HIV infections fell by more than 50 000 during that period. The country also increased its domestic investment in AIDS to US\$ 1.6 billion, the highest of any low- or middle-income country (UNAIDS, 2012).

Total fertility rate

Total fertility rate (TFR) in numbers of children.



This indicator shows positive progress, with rates falling everywhere. They are lowest in South Korea at 1.22, with the EU a close second at 1.35 and the US roughly at replacement level, 1.9. It is an important indicator because falling fertility rates correlate with increased female education and labor force participation as well as improved health. Only in India (the highest at 3.2 in 2000, falling to 2.6 in 2009), Indonesia and South Africa are fertility rates above population replacement level.

SOCIAL STATUS

Social status measures relate to equity in social institutions and cultural/traditional practices that impact women's participation in social and economic development and includes family code and civil liberties (based on OECD GID database). For example, health is affected by cultural practices that may impair women's ability to be equal members of society, such as female genital mutilation, or acceptance of violence against women.

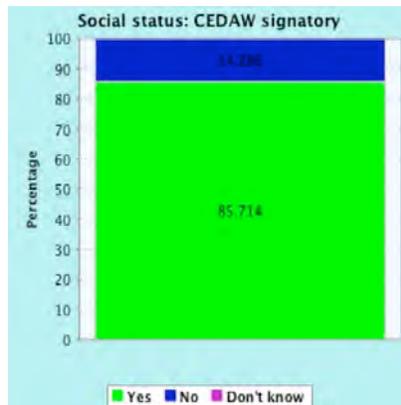
Equal rights policies

Does the country have national policy or legislation concerning equal rights for women?

All the countries surveyed have legal and/or constitutional guarantees of equal rights for women, with the exception of the United States, where an equal rights amendment to the Constitution has been pending ratification since 1972.

CEDAW signatory

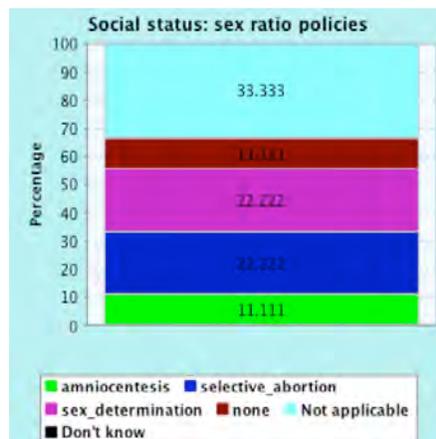
Is the country a CEDAW signatory?



Of the countries surveyed, only the US has not ratified the Convention. A bill to do so is pending in Congress but has not yet come to a vote.

Sex ratio policies

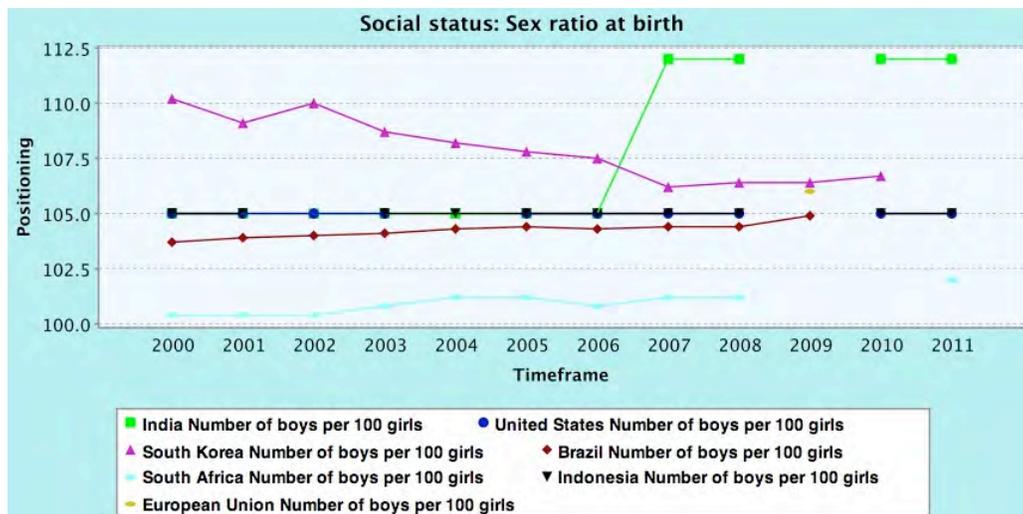
The extent to which government policy or laws exist to prohibit or restrict amniocentesis to determine sex of fetus, gender-selective abortions, infanticide, or determination of sex before birth



India and the Republic of Korea both prohibit determination of sex before birth. The EU countries either prohibit or restrict sex-selective abortions. Abortions are illegal in Brazil, with only rare exceptions. Other countries have no policy on this issue.

Sex ratio at birth

Sex ratio at birth (number of boys for every 100 girls).



This is an important indicator for certain regions – Asia in particular. The World Bank estimates that 3.9 million women and girls go "missing" every year – indicating an excess female mortality rate. Two-fifths of this group are never born, a result of a combination of a strong preference for sons, declining fertility and the spread of technologies that allow parents to know their baby's sex before birth⁵ (World Bank, 2012). The current worldwide sex ratio at birth is 107 boys to 100 girls. Only India, at 112, has a sex ratio higher than the worldwide average of 107:100⁶. The Republic of Korea was at 106.7 in 2011 but dropping, having decreased every year from 110.2 in 2000. The result appears to be influenced by the decline in the average number of births.⁷ However, in 2009 the sex ratio at birth for the third child was 114 in favour of boys, far exceeding the normal sex ratio. This seems to reflect a traditional preference for sons manifested through sex-selective abortions.

All other countries have relatively stable rates that fall below the worldwide average, with South Africa at the lowest – 102. Interestingly, this country has seen a gradual increase in ratio of boys to girls, from 100 in 2000.

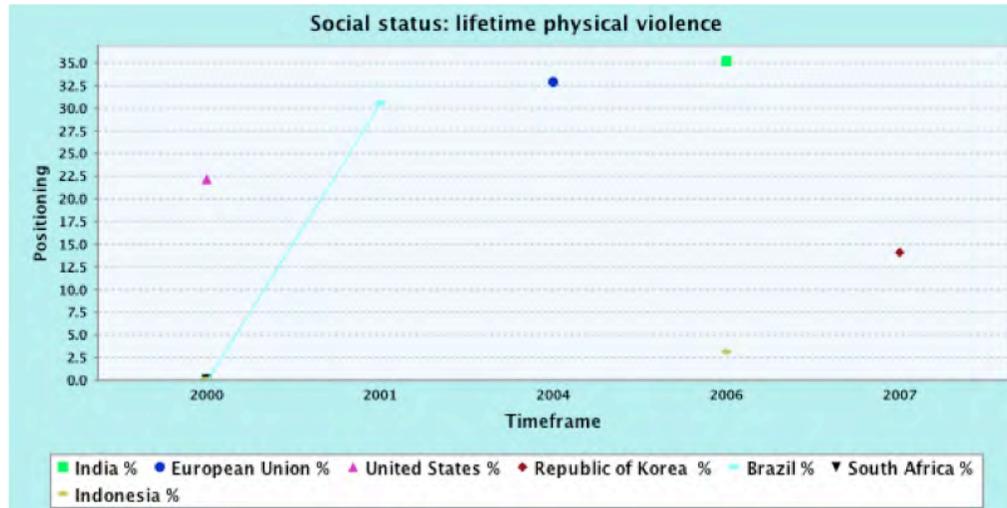
⁵ The remaining deaths are caused by water-borne disease, poor sanitation, maternal mortality, and in Sub-Saharan Africa, higher rates of deaths for females due to HIV/AIDS (World Bank, 2012).

⁶ According to Jha et al (2011), selective abortion of girls, particularly after a firstborn girl, has increased substantially in India. They estimate the number of selective abortions of girls increased from 0–2.0 million in the 1980s to 1.2–4.1 million in the 1990s and 3.1–6.0 million in the 2000s. Most of India's population now live in states where selective abortion of girls is common.

⁷ As the average number of total birth decreases, the percentage of male per female births is showing a similar decline as well. These results also could have been influenced by the number of children per family. In 1970, the Total Fertility Rate (TFR) of Korea was 4.53, but it decreased to 1.15 in 2010.

Lifetime physical violence

Percentage of girls/women in the total population subjected to physical violence by an intimate partner over their lifetime.

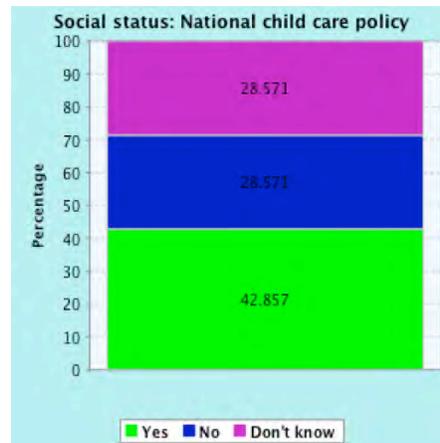


Violence against women by an intimate partner is a major contributor to the ill-health of women and can have devastating consequences not only for the women who experience it, but those who witness it, particularly children. It is both a consequence and a cause of gender inequality – the Millennium Development Goal regarding girls' education, gender equality and the empowerment of women reflects the international community's recognition that health, development, and gender equality issues are closely interconnected (WHO, 2005). It also has strong links to HIV/AIDS, in cases where women are victims of rape or unable to protect themselves from the possibility of contracting HIV through sexual practices.

It is very difficult to find reliable data on this topic, with lack of reporting or under-reporting of incidences of violence common across countries. Only four countries show data for any year, with figures ranging from 22.1% for the US to 30, 32 and 35% for Brazil, India and the EU (less than 1/3 of countries reporting) respectively. All of these figures are quite old and startlingly high. Indonesia has limited data only on sexual violence (3%). With data only on cases that came to legal action, Korea shows 14% for one year, which is undoubtedly an underestimate of incidence, particularly considering that women in counselling report domestic violence at about ten times the rate of the reported incidence (Kim and Moon, 2011). No national level data are available in South Africa, although regional and sector data indicate the problem is widespread. For example, 51% of women in South Africa's Gauteng Province have experienced gender-based violence (Tsedu, 2012). To address this, the South African government has put in place a range of policies and laws to address domestic and sexual violence, while establishing the National Policy Guidelines for Victim Empowerment for inter-sectoral and interdepartmental collaboration to eliminate GBV (ASSAf, 2011).

National child care policy

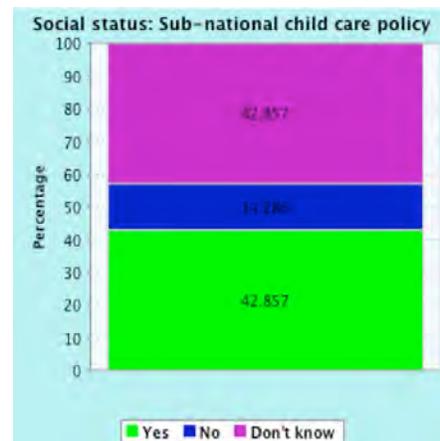
Is there a national policy on child care?



The Republic of Korea appears to have the strongest policy in this area. India also has a policy, but it is not clear whether child-care facilities are widely available. Indonesia's policy references scattered child-care programmes. Other countries have no national policy.

Sub-national child care policy

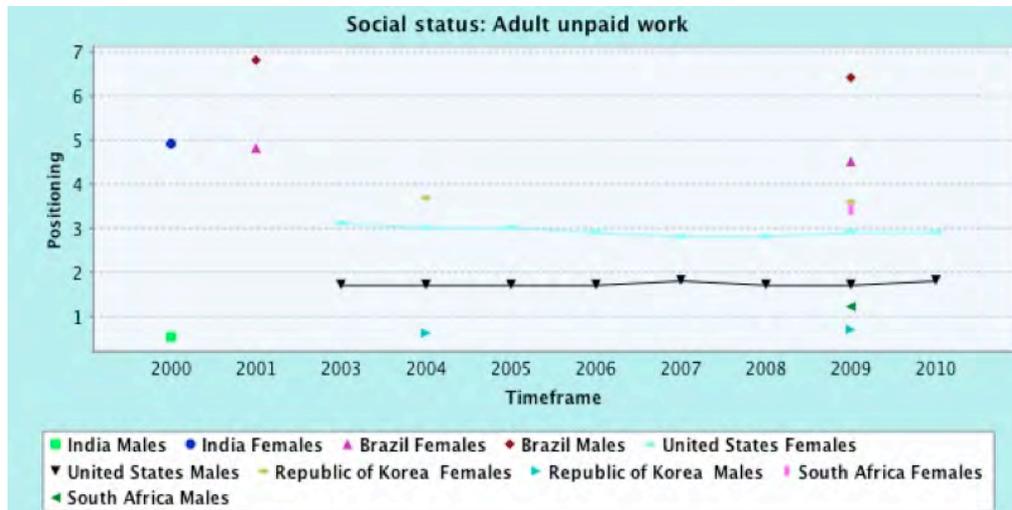
Are there child care policies at state and/or local level?



Brazil provides some local services while the US has many services at state level.

Adult unpaid work

Average daily time in unpaid work for adult females and males (in hours, with one decimal point).



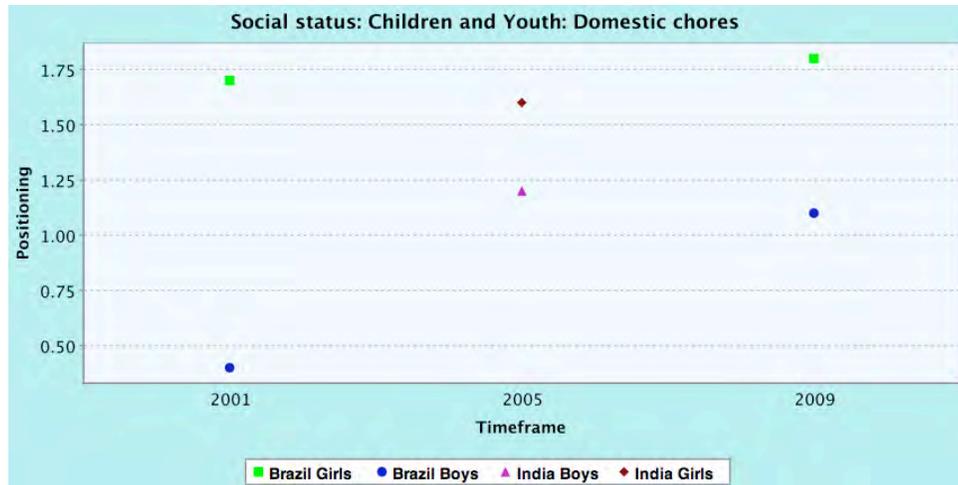
Women's double day of family and productive responsibilities means they work on average longer hours than men worldwide. For example, in Asia women spend 16-18 hours per day in paid and unpaid work. Countries in this survey follow this trend. Women spend more time in unpaid work in all countries with the exception of Brazil where available data indicates that men spend 30% more time in unpaid work than women. (However women continue to spend substantially more time in domestic work) (Oliveira et al, 2011). In Korea, where women are not generally in the paid labor force, women spend more than five times the hours of men in unpaid work, in South Africa women spend 2 1/3 times more and in the US, twice the number of hours that men work without pay.

In India women work longer hours than men and carry the major share of household and community work that is unpaid and invisible. The system of national accounts show an average work week of about 42 hours for males as compared to only 19 for females, but much of women's work does not show up in these statistics. Women spend nearly ten times more time than men on household and care-related activities.¹⁵ They spend about 2.1 hours per day on preparing food and about 1.1 hours on cleaning the household and utensils, while men's participation in these activities is nominal. Taking care of children is one of the major responsibilities of women, as they spend nearly ten times the amount spent by men -- about 3.16 hours per week as compared to 0.32 hours by males. In learning, leisure and personal care activities, males spend 8 hours a week more than females on average (Central Statistics Office, 2011; Nair, 2012).

A study of rural time use in Indonesia produced similar findings. Hermawati (2004)⁸ found that domestic work tended to be the sole responsibility of women and considered as their main role, although they also engage in economic activities outside of the household. In terms of working hours per day women who manage additional productive activities on average tend to work longer than men. The data showed that even after adopting new technology, women remained dominant in almost all household responsibilities such as cooking, going to the market, taking care of the children, gardening, and caring for animals (Hermawati and Saari, 2012).

Children and Youth: Domestic chores

Average daily time in domestic chores for girls and boys under 15 years of age (in hours, with one decimal point).



Only Brazil and India collect sex-disaggregated data for this indicator. In Brazil girls spend an average of 1.8 hours per day on domestic chores, while boys put in 1.1 hours. In India girls are engaged in domestic chores for 1.6 hours, while boys spend 1.2 hours.

ECONOMIC STATUS

In South Korea, The Act on Gender Equality in Employment and Work-Family Reconciliation was amended in 2007 with the addition of clauses on maternity protection and work-family reconciliation. It has also adopted an act on Affirmative Action for Women's Employment to eradicate explicit as well as implicit discriminations in promotion. It also provides support for childcare at different levels according to income level.

Equal pay policy

Does the country have legislation or policies relating to equal employment and/or equal pay?

All countries have policies on equal pay for equal work.

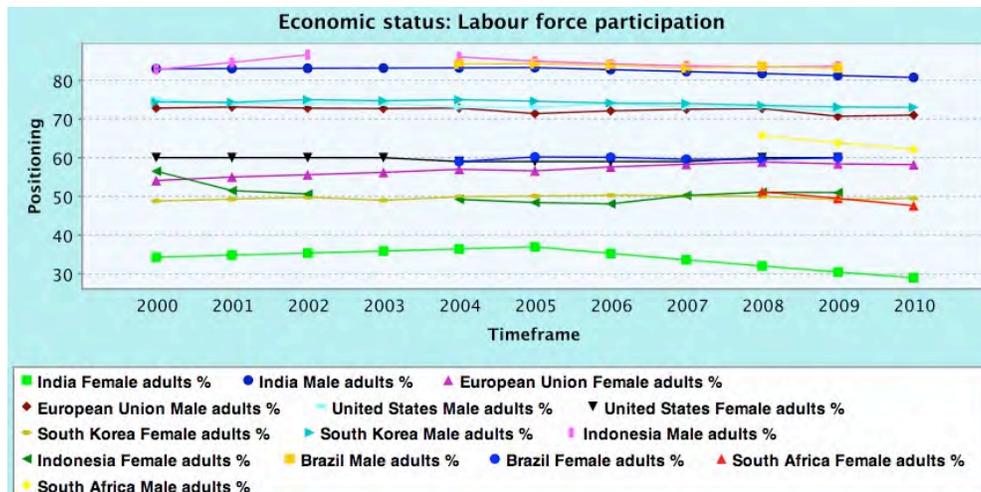
Flexible work policy

Does the country have legislation or policies relating to flexible work/work hours?

No countries have flexible work hours policies.

Labour force participation

Percentage of the total population of female and male adults that participates in the overall labour force.



India has the lowest recent female-to-male labour force participation ratio at 35.9%. Both India and Indonesia show substantial drops in this ratio over the decade (5% for India, 7% for Indonesia). In India, this trend is primarily the result of more females returning to school but may also be affected by higher unemployment among women and women dropping out of the labour force.

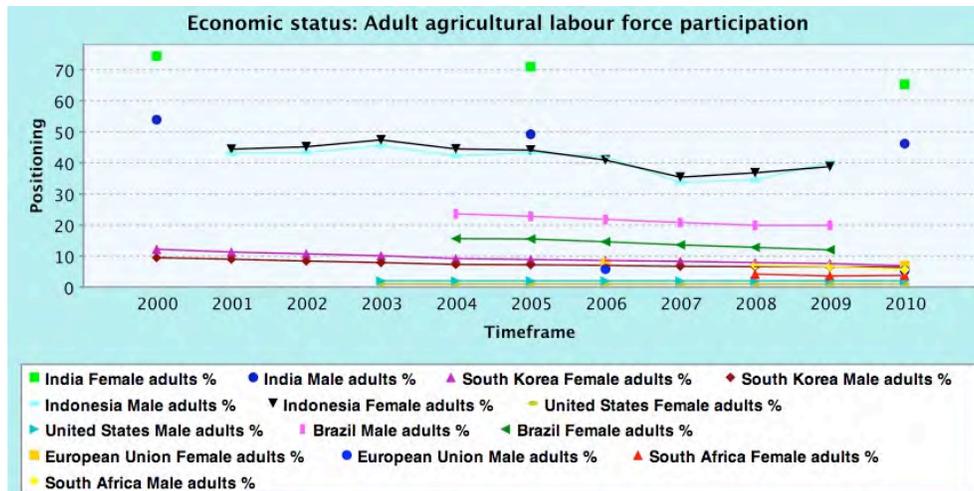
Although the US shows the highest ratio of women to men in the labor force (83.3%), the EU is close at 82% with the largest gains over the decade. Both of these figures appear to indicate that female employment is weathering the economic crisis of the last few years better than male employment. Korea's ratio is surprisingly high at 67.8% (although low by standards of high income countries⁸) given the popular perception of educated Korean woman as housewives; it also grew over the decade, showing that women there fared better in the Asian economic crisis better than men. Non-regular work makes up a large share of Korean women's employment (approximately 40%), which has been increasing over the last decade.

Looking at women's labor participation rate by itself, we see falling percentages in India, South Africa and Indonesia, with the rate growing fast in the EU and Korea while remaining comparatively stable in Brazil and the US over the last decade. Overall rates for women alone are lowest, again, in India (29%) and highest in Brazil and the US (60%), followed by the EU, Indonesia, South Africa, and the Republic of Korea. The US maintained a very stable rate through a decade, varying only by one percent. In all countries and regions, women make up a larger percentage of irregular, part-time and casual workers.

⁸ Based on World Bank Development Indicators of \$12,276 GNI per capita.

Adult agricultural labour force participation

Percentage of the total population of female and male adults that participates in the agricultural labour force.



It is difficult to present an overall picture on this indicator, since the country situations are so different. India has by far the highest percentage of both men and women in agriculture, with substantially (nearly 20%) more women than men working in this sector, primarily in small-scale and subsistence agriculture. Figures for both men and women are falling, though, as is happening globally. Nevertheless, at 65.3% the percentage of women working in agriculture is one of the world's highest.

In Indonesia, agriculture remains a dominant employment sector, with figures in the 40% range for both men and women. There has been relative parity over the decade, although women's participation dropped slightly in more recent years.

As befits a high-income industrialized country, the figure for both men and women in Korea was below 7% by 2010. By the end of the decade, the number of women in agriculture had dropped by nearly 50%. Brazil still has a relatively high percentage of both men and women in agriculture (about 16% overall), with women's participation rate falling 3.6% over the decade. Reflecting an overall average over many countries, rates in the EU are not as low as the US (reflecting averages of many countries), with more women (7%) than men (5.35%) working in this sector.

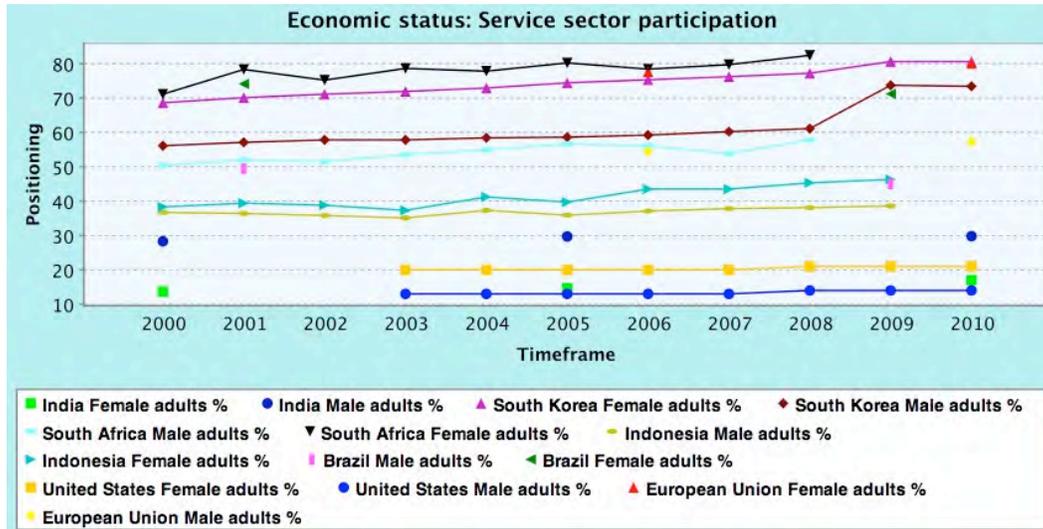
South Africa's figures are surprisingly low for both men and women, showing the remnants of apartheid and the effects of labour migration. There are more men than women, but the overall percentage in the sector is small (3.8% and 5.6% respectively) and falling rapidly.

The US has the lowest percentage of all countries surveyed, with a stable ratio of one percent of women and two percent of men over the years 2003-2010.

India's situation reflects some of the problems concerning sex-disaggregated data collection in this area. Data show that women's contribution to the agricultural labour force is high, but their overall contributions are even higher when subsistence farming and activities in support of agriculture and food processing are included, such as collecting fuel, fodder and water, or growing vegetables, or keeping poultry for domestic consumption. Much of this kind of activity goes unrecorded in the census counts, tending to be categorized under household activities (e.g. household gardens) rather than under agricultural production. As a result, crops produced by men (i.e. cash crops) and male agricultural activities receive the most technology and extension support while women's agricultural activities suffer from a lack of resources and support, including credit, agricultural inputs (such as fertilizers, improved seeds, clean water and insecticides), mechanical power, other technologies to increase production, training and access to labour (Meinzen-Dick et al., 2010).

Service sector participation

Percentage of the total population of female and male adults that participates in the service sector.



Women's participation rate in the service sector is increasing in all countries except Brazil, where it has been decreasing slightly. The greatest increase for women is seen in Korea, where women's participation rate is up from approximately 69% to 81%. The greatest difference between male and female participation occurs in Brazil, with 71.2% women working in service jobs in 2009, compared to 45% men, although the EU and US are close at 23 and 20 percentage points difference respectively. There are more women than men in service jobs in all the countries/areas surveyed except India, where women work in the service sector at slightly more than half the rate of men. In the US service sector, female participation has been fairly consistent over the decade, increasing about 4%, while male participation increased by 8%, reflecting changes in the employment sector overall.

Comparative wages

Average annual earnings for adult females and males in US dollars.

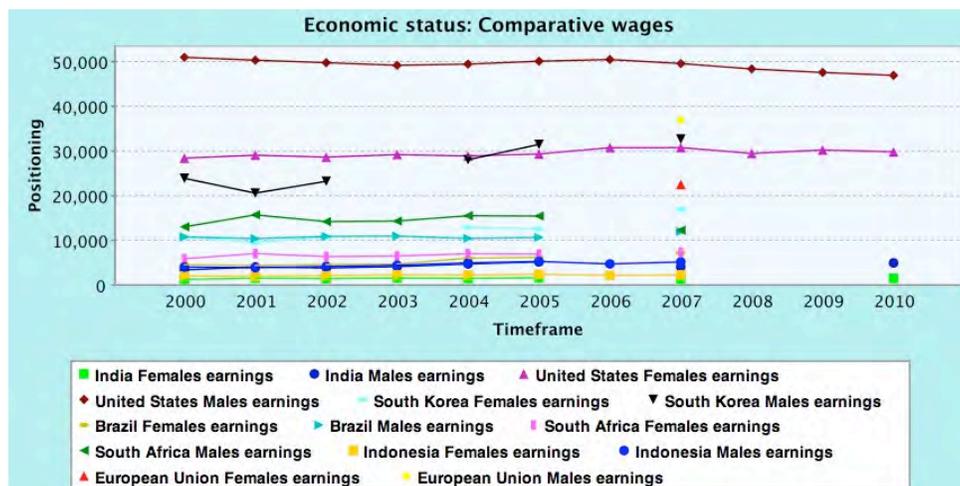


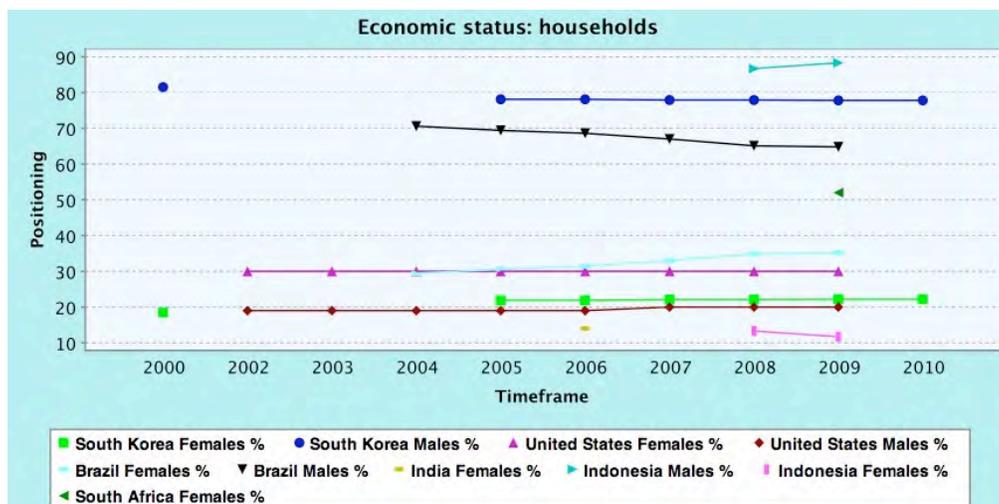
Table 7. Comparative Country Wage Rates, M/F, US\$

Comparative wages		1st year \$	F wages as % of M	Latest year \$	F wages as % of M	% F increase
Brazil	F	4557	42.3%	4704	39.2%	-3.1%
	M	10,769		12,006		
India	F	1267	37.5%	1518	30.6%	-6.8%
	M	3383		4960		
Indonesia	F	2053	51.0%	2263	43.8%	-7.2%
	M	4026		5163		
SKorea	F	10,791	45.2%	16,931	51.8%	6.6%
	M	23,884		32,688		
S Africa	F	5888	45.2%	7328	59.7%	14.5%
	M	13,024		12,273		
US	F	28,396	55.7%	29,810	63.5%	7.8%
	M	50,966		46,927		
EU	F			22,508	60.9%	
	M			36,944		

The best situation for women’s wages in comparison to men’s is in the US, where women’s wages equaled 63.5% of men’s in 2010. EU and South Africa are close behind. The lowest ratio is in India, where women were earning only 30.6% of the wages paid to men for equivalent work in 2010. South Africa showed the most improvement over the decade, with a 14.5% increase in women’s wages as a percentage of those of men. However, in three cases women’s wages decreased compared to those of men over the period: Indonesia, India and Brazil.

Households

The percentage of households headed by females and males.



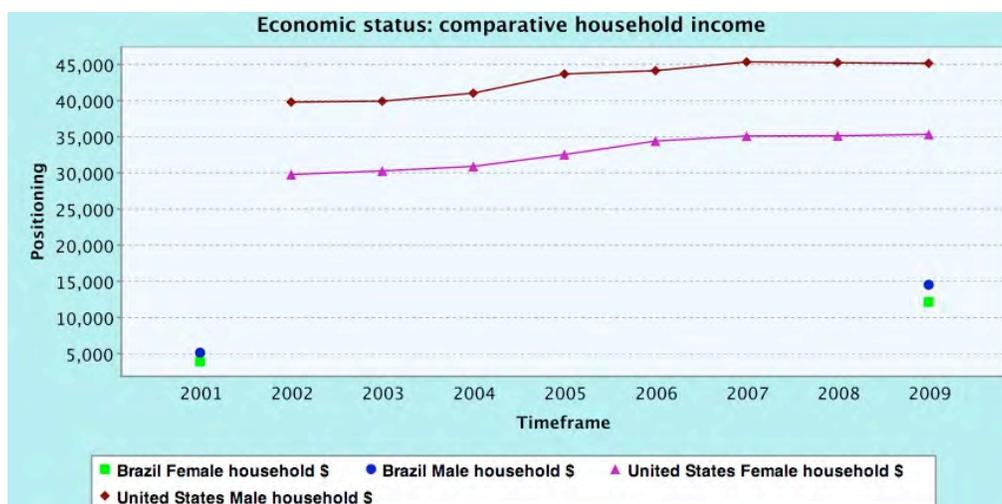
The percentage of households headed by females is normally an indicator of poverty (see next indicator). According to the World Bank, female-headed households are less likely to own and operate land than male-headed households, they own and operate smaller plots, and suffer greater land tenure insecurity. They are also less likely to have received credit than male-headed households, although the difference is not large, at 24% vs 28% of male-headed households. However all these differences in access to land, credit and labour affect the capacity of female-headed households to access markets. They sell a smaller amount of their agricultural output in the market than male-headed households, in 14 of the 16 countries assessed by the World Bank (World Bank, 2012). In more advanced countries female-headed households may not necessarily

experience greater poverty, as more women may choose not to marry or have a family, or as more women choose to work outside of the home.

South Africa and EU do not collect sex-disaggregated data on household heads, while India collects such data only on an infrequent basis. The range indicated by available data is from 11.7% in Indonesia to 30% in the US and 35.2% in Brazil. The Republic of Korea is in the middle at 22%, a consistent percentage since 2005.

Comparative household income

Indicate the average annual income of female-headed and male-headed households in US dollars.



Only Brazil and the US collect sex-disaggregated data for this indicator, with only the US collecting it annually throughout the decade. In the first reported year, female-headed households in both Brazil and the US earned about 3/4 of the income of male-headed households, while in the last reporting year, female-headed household income increased to approximately 4/5 of male-headed households. In the US the increase was slight – 3.4%. While data on amount of yearly income of female and male-headed households is not available in South Africa, other data show that the majority of household income is earned by male-headed households – at least three quarters (75.6%) of total household income in South Africa in 2005-2006. When the various sources of income are examined separately, it is seen that 80% of the total annual household income from work is earned by male-headed households. Male-headed households also outperformed their female counterparts with regard to income from capital (78%); pensions, social insurance and family allowances (59%); other income not elsewhere classified (69%); and income in the form of imputed rent on owned dwellings (76%). Moreover, 78% of total annual household income earned from capital was earned by male-headed households, whereas 69% of income received from individuals was earned by female-headed households (Stats SA, 2008).

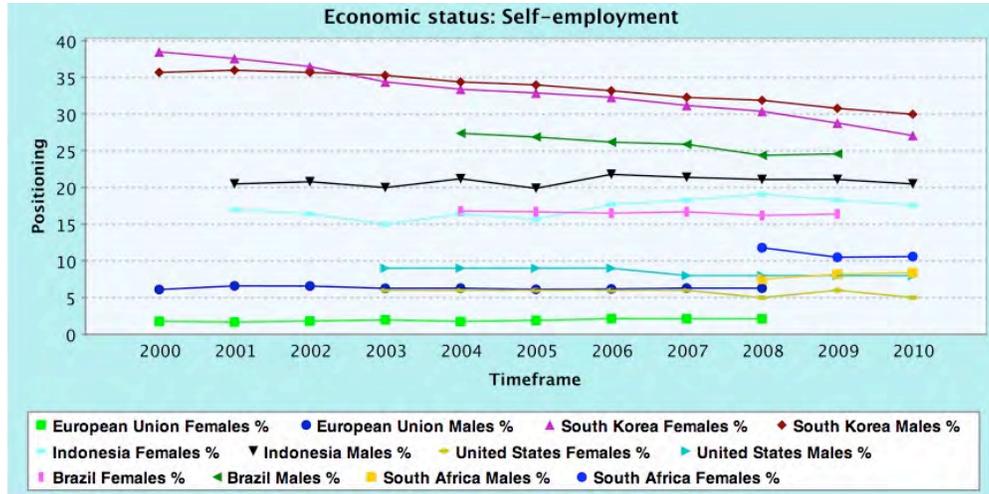
Table 8. Distribution of annual household income by main income source and sex of household head, 2005/06

Source	Female headed households	Male headed households
Income from work	20%	80%
Income from capital	22%	78%
Pensions, social insurance, family allowances	41%	59%
Income from individuals	69%	31%
Other income	31%	69%
Imputed rent on own dwelling	24%	76%
Total income	24%	76%

Source: Stats SA (2008)

Self-employment

Percentage of adult females and males that are self-employed.



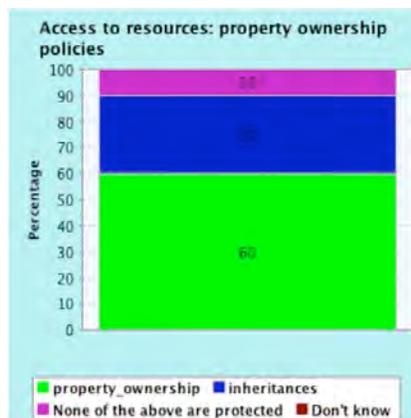
Data on self-employment shows relatively high overall rates, which are falling for both men and women in the Republic of Korea (and both averaging close to 33%). The next highest rates are found in Indonesia—with women averaging 17.6% and men 20.5% – and Brazil, with women stable at 16.4% but men falling slightly at 24.6% from 27.4% in 2004. At the lower end of the scale are the EU, with self-employed women at 1.9% and men at 6.3%; the US, with 5.8% and 8.5%, respectively (and falling slightly); and South Africa, with women at 11% and men at 8%. The rate of self-employment for women is higher than men only in South Africa. The gap between female and male self-employment is highest in the EU (although this averaging combines data across many countries) with men 3 1/3 times more engaged in self-employment than women. This indicator must be regarded as inaccurate, since a major portion of women's (and men's) non-formal and own-account activities are not included in national data.

ACCESS TO RESOURCES

Access and ownership to resources allows women to leverage investments, make decisions about allocation of resources, access credit and financing, and exercise personal decision-making power.

Property ownership policies

The extent to which government policy or laws exist that ensure women's rights to own land, property, and ability to inherit.



This indicator pertains to the ability of women to own and manage land resources, either for mobilizing capital or developing agro- or natural resource based enterprises. It also serves as a general indicator of women's rights and agency. Land and property rights are covered by laws or policy (sometimes inclusively under equal rights protection) in all countries except India. With regard to inheritance, women do not have equal rights in India, Indonesia and South Africa.

Access to land

The OECD/GID women's 'access to land' measure in 2009.

The measure shows complete equality in this area in Brazil and Indonesia. A fair number of inequities exist (0.5) in India, the Republic of Korea and South Africa. No data are available from the EU or the US.

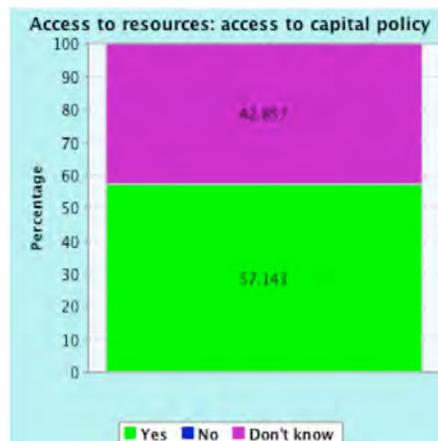
Property other than land

The OECD/GID women's 'property other than land' measure in 2009.

The measure shows equal access to Brazil, South Africa and the Republic of Korea, with a score of 0.5 in India (on the existence of inequities). No data are available from Indonesia, the US or the EU.

Access to capital and bank loans

Does the country have policy, legislation or laws in place entitling women to obtain loans without approval from a male family member?



In all countries surveyed, women can obtain loans without a husband or male family member as signer or co-signer. Nevertheless, the existence of rights to these resources does not ensure that women are in a position to exercise these rights, which may be inhibited for cultural or religious reasons. For example, in Indonesia, tax regulations do not allow married women a separate tax number from their husbands. This makes it difficult for women to engage in formal financial activities such as opening a bank account, and mitigates against applications for credit.

Table 9. Percentage of women age 15-49 who have a bank or savings account of their own (2005-06)

	Wealth Quintile					Total
	1st	2 nd	3rd	4th	5 th	
Education						
None	3.4	6.6	9.3	13.1	17.3	7.5
0-4 years	4.1	7.0	10.4	17.0	23.9	11.0
5-9 years	4.8	7.0	10.5	14.4	24.0	13.6
10-11 years	8.1	12.0	12.7	18.9	29.5	22.3
12+ years	16.7	18.2	20.7	26.6	47.3	40.9
Employment						
None	3.0	5.3	8.1	12.5	28.1	14.2
Cash	4.7	9.8	15.0	26.8	56.9	19.7
Non-cash	3.3	6.8	9.9	16.7	27.9	9.0
Total	3.7	7.1	10.5	16.3	33.6	15.1

Source: <http://hetv.org/india/nfhs/index.html>

An analysis of ownership of bank accounts by women in India indicates that the overall rate for women is 15%, with variances according to socioeconomic level and education (see Table 9). Access to one's own money and/or the ability to save money is a key indicator of how female resource access affects available opportunities. National models exist for changing these figures. In India the Self Help Group Bank Linkage Programme has supported an increase of women with access to credit from 45 per cent in 1999 to 66 per cent in 2009. Other sources of loans for the resource poor are micro-finance interventions, while the Self Employed Women's Association supports the establishment of bank accounts for its members.

Development Success Story: Self-Help Groups in India

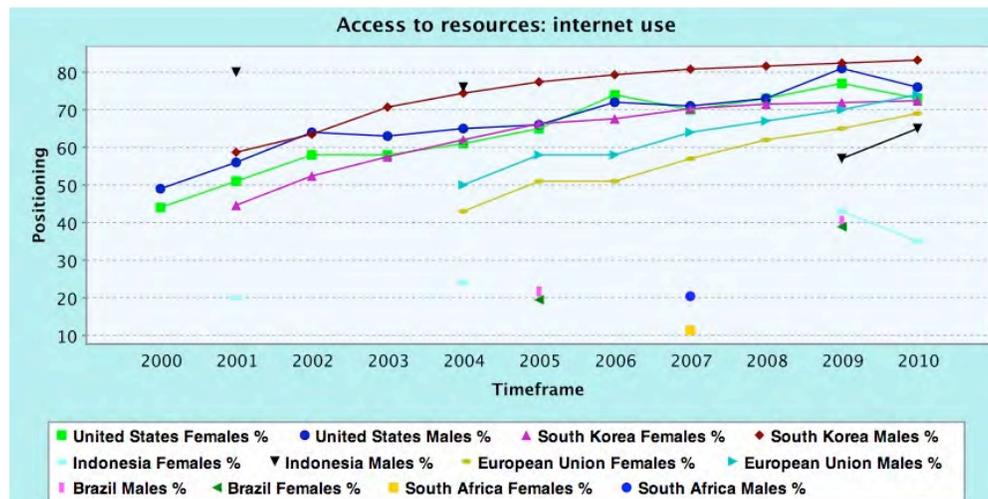
Self Help Groups (SHGs), are organisations of the poor at the grassroots, developed through a process of social mobilisation mostly consisting of women. Group members regularly save money that is placed in a local (generally public sector) bank account. Many studies have shown that this is a creation of a safe avenue for savings (on which interest is earned). The SHG has a set of by-laws devised and agreed by the members themselves. These include rules for monthly savings, lending procedures, periodicity and timing of meetings, penalties for default, etc. Meticulous accounts and records are maintained. The SHG itself functions like a small bank. The group lends money to its members. After a certain period (six months to a year) of disciplined functioning, it becomes entitled to a loan from the bank where it has an account. The real power of the SBL model lies in the economies of scale created by SHG Federations (comprising 150-200 SHGs each). This is evident, for example, in bulk purchase of inputs (seeds, fertilisers etc) and marketing of outputs (crops, vegetables, milk, NTFPs etc). They can also provide larger loans for housing and health facilities to their members through large service or loan providers. Insurance services including life, health, livestock and weather insurance are also available. Since most SHGs are women's groups, the potential for women's empowerment is huge and a number of studies have tried to assess the impact of microfinance interventions on women's empowerment. There is overwhelming evidence that women-run SHGs are the best managed with women showing much greater sense of responsibility, as well as a commitment to human development objectives such as health and education of their families.

Source: *Mid Term Appraisal of 11th five year plan, GOI and World Bank, 2012*

In South Africa, targets have been set to increase the proportion of women who own land to 30% by 2015, as well as to increase the proportion of women accessing credit to 40% by 2015. The percentage of land owned by women in December 2007 in South Africa was 13.3% following the implementation of land reform processes in the country. Female small business owners are significantly more likely to be financially marginalized than their male counterparts (43.7% of female business owners vs. 39.2% of male business owners), while female small business owners are significantly less likely to have bank accounts (43.1% vs. 52.1%) (FinScope, 2010, p. 5).

Internet use

Percentage of adult females and males that have access to and regularly use the internet.



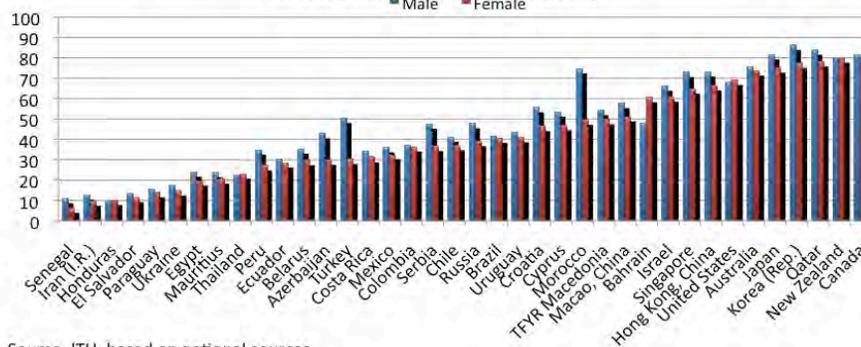
The findings here support the argument of Huyer et al (2005) that expanding internet penetration in a county is not sufficient to overcome the gender divide. Women trailed men in internet access in all the countries surveyed, with overall numbers gaining rapidly over the decade and the relative gap becoming slightly (but not dramatically) smaller. There was parity between men and women in the US (73% of each) in 2008, but women's internet use remained stable to 2010 while men's jumped to 76%. The highest overall percentage of users was found among men in the Republic of Korea (83.2%) in 2010, while women constituted 72.4% of users. In that country women make up a slight majority of smartphone users, relating perhaps to their lower rate of computer ownership and access – although one study shows that men accept and adopt high-end mobile phones faster than women (69% vs 31%) (Kim and Moon, 2011). The gender gap is largest in South Africa (and the percentages of users lowest) at 11.3% women and 20.4% men (in 2007, the only year for which data was available). In that country women's Internet usage was only 55.4% of men's in 2007. In India, sex-disaggregated data are not available after 2000. From those numbers it appears that although India has the fastest growing telecom network in the world, with high population and development potential increasing overall teledensity to 74 per cent, women may not be benefitting equally with men. In 2010, 15 per cent of internet users were female, with an 8.5% total penetration rate. According to Trendspotting, an Indian consumer research company, 17.6% of Indian females use the internet actively.⁹

A study in South Africa indicates the differing access to ICTs of women in different areas in the country. While most internet access in urban areas is through the place of work for both women and men, in rural areas ICT usage patterns vary. A study on the use of ICT by 42 women hawkers and vendors in KwaZulu-Natal found that the majority of women possessed mobile phones, while landlines, radio and television were also used. Computer technology was absent, although the women displayed a keen interest in its use. Both men and women used radio and TV to listen to and watch business-related programmes, and almost all of them used cell and land phones to make and receive calls to and from business partners, retail stores, product suppliers and distributors. However, none used ICTs to search for business related information (Jiyane and Mostert, 2010).

These numbers compare to other countries as seen below in ITU data on percentage of Internet users by gender.

⁹ <http://www.slideshare.net/TrendsSpotting/indian-online-women-and-moms-research-re-view-by-trendspotting>

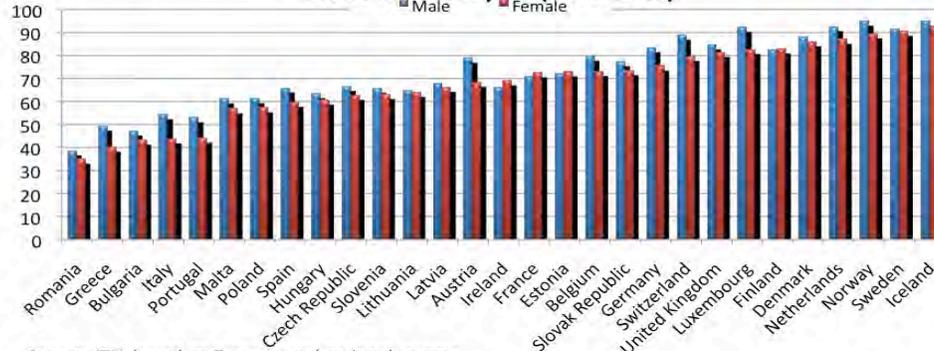
Percentage of Internet users, by gender, non-European economies
latest available year (2008-2010)



Source: ITU, based on national sources.

While internet access rates for males and females are approximately equal in the US, the EU countries show a wide range of gender access trends as seen in the chart below. Nevertheless, the EU average, the US and the Republic of Korea show approximately 70% or more of women have access to the Internet as of 2010.

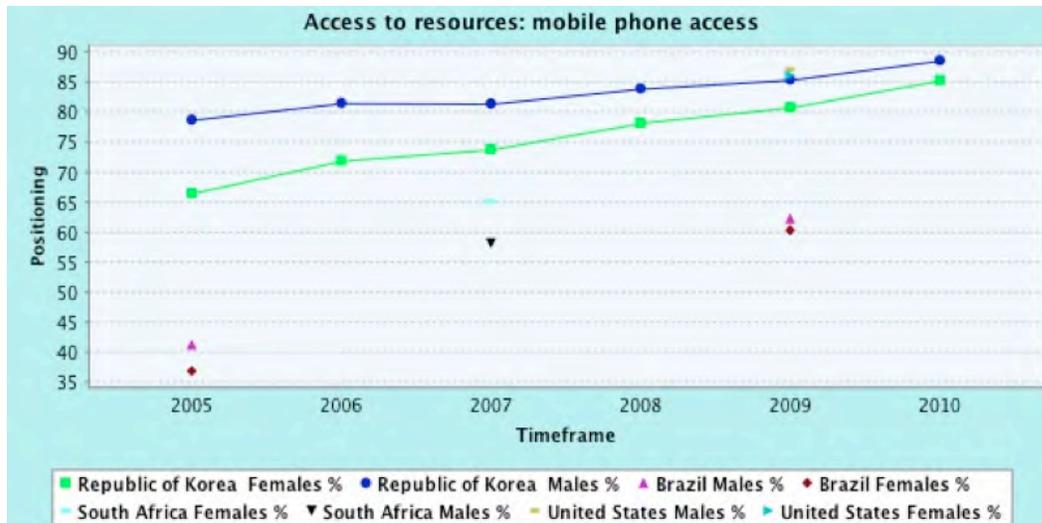
Percentage of Internet users, by gender, European countries
latest available year (2008-2010)



Source: ITU, based on Eurostat and national sources.

Mobile phone access

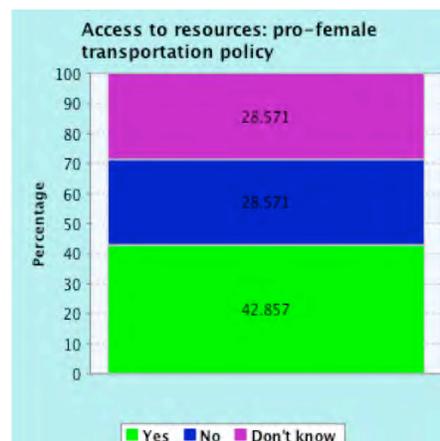
Percentage of adult females and males that have access to and regularly use mobile phones.



Mobile phone rates present a different scenario with very high use rates and relatively small gender gaps in all the countries. However, a gap continues in some countries: South Africa sees a sizable gender gap in phone usage in favour of females, with 8% more females than males using mobile phones. The US situation is of one of near parity, with 86% of women and 87% of men using mobiles. In the EU there are no sex-disaggregated data, with an overall teledensity of 118.6 (per 100 individuals). The Republic of Korea has seen enormous growth over the period 2005-2010, with women's usage growing at a more rapid rate than men's – from 66.4% to 85.2% as compared to 78.6% and 88%. India and Indonesia do not collect sex-disaggregated data consistently, but a recent study in India found that 12% fewer women than men own mobile phones, and 20% of female users borrow mobiles from family and friends (Dhawan, 2012).

Pro-female transportation policy

Does the country have pro-female transport policies or practices, such as women-only train cars, special secure areas for women taking public transit, etc.?



Such policy exists in Brazil, India, Indonesia and the Republic of Korea. In the EU gender equality on transport is assumed. Neither the US nor South Africa has any policy in place, although the South African Department of Transport has developed a Rural Transport Strategy which recognises the need for significantly enhanced participation by women in both the planning and the delivery of rural transportation (DoT, 2007).

Transportation, including roads, railroads, ports, and air transport, enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to jobs. Telecommunications allow rapid and free flow of information, helping to ensure that businesses can communicate with suppliers, clients and employees. Secure, efficient and affordable transportation is an innovation issue, but it is also a gender issue. Due to lower levels of access to resources and lower income levels in general, as well as socio-cultural and religious barriers to freedom of movement, women have less access to car ownership and experience more barriers to travel. Ensuring that affordable and safe transportation is available to women is an important part of encouraging their access to education and their ability to engage in economic activities (UNCTAD, 2011). Transportation is not simply about mobility and infrastructure, but also about socio-cultural roles and responsibilities that impede the development of women and girls. Its availability has effects on the ability of women and children to access health services, educational facilities and employment, as well as participate in decision-making forums (DoT, 2008). For instance, in South Africa, lack of transport to ensure the timely transfer of women between institutions accounted for 13.6% of maternal deaths in 1998, and the figure does not include delays in transporting women from their homes to health institutions (IDS, no date, quoting a study by Hall, Du Plessis & McCoy, 2002). Transport can improve the lives of women

by reducing the amount of time they spend on household activities. As women carry out most of household transport, a higher rate of bicycle use could reduce their workload significantly and improve their health (DoT, 2008). The importance of transport in the lives of women in South Africa is also evident in the fact that transport accounts for about 16% of the total annual household consumption expenditure of female-headed households. About 4% is spent on transport services by road, which is more than the 2.5% in the case of male-headed households (ASSAf, 2011).

Sex-disaggregated data on transportation access or use are not available in most countries, but some available data indicate gender differences exist: in the Republic of Korea, one in three female workers in 2005 commuted on foot, as compared with one in two male workers commuting by car or van.

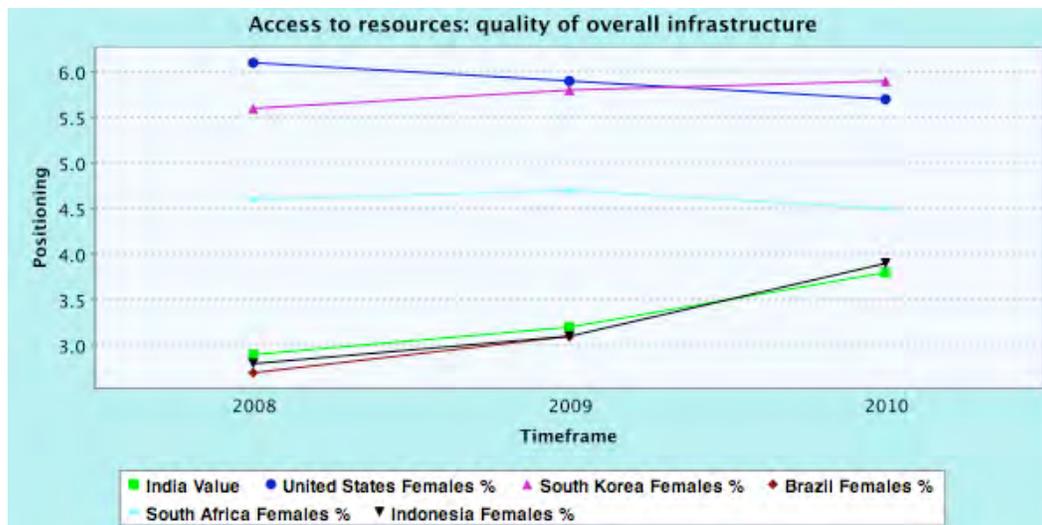
Gender in transportation policy

Does the national transportation policy include references to gender or women?

Only Indonesia has a national transport policy with several specific accommodations for women. India and the US have no national transport policies. In South Africa the Department of Transportation is said to be highly aware of the importance of considering gender issues. The EU cited no policies, but special accommodations are made for pregnant women as well as both elderly and limited mobility men and women.

Quality of overall infrastructure

The World Economic Forum Global Competitiveness Value for Quality of Overall Infrastructure is based on a survey to assess a country's general infrastructure (e.g., transport, telephony, and energy). The scale is from 0 (least) to 7 (most).



The Global Competitiveness Index tracks the status of national infrastructure as a base ingredient for an effectively functioning economy. The existence of reliable and adequate infrastructure determines the location of economic activity and the kinds of activities or sectors that can develop in a particular region, country or locale. It reduces the effect of distance between regions, integrates and connects a national market to markets in other countries and regions. In addition, the quality and extensiveness of infrastructure networks significantly effect economic growth and reduce income inequalities and poverty inside a country as well. A well-developed transport and communications infrastructure network provides access to core economic activities and services.

Adequate and affordable infrastructure such as transportation, access to communications and energy are critical for women who generally have less access due to cost and socio-cultural

barriers. When this is not available, we know that women's mobility is restricted, and hence their ability to participate in the knowledge society is reduced (Huyer et al, 2005).

The Republic of Korea and the US in 2011 rank the highest in overall infrastructure of the countries studied, followed by South Africa, Indonesia and Brazil¹⁰. The rankings for both the Republic of Korea and Brazil have been slipping in recent years.

Rural electrification policy

Is there a national rural electrification policy or programme?

All countries surveyed except the Republic of Korea have a policy or programme in this area.

Energy is a gender equality issue. In the developing world, the health and time of women and children in particular are affected by lack of access to clean energy. Approximately 40% of the global population relies on biomass for cooking. Of those who lack access to electricity, 85% live in rural areas (Thomas et al., 2007). Biomass cooking stoves are still mostly three-stone fires, traditional mud stoves or metal, cement and pottery or brick stoves – with no operating chimneys or hoods. Pollution levels inside households using these stoves are many times higher than typical outdoor levels, even in highly polluted cities. Health effects for women include respiratory illness, cataracts, heart disease and cancer. The World Health Organization estimates that nearly 1.5 million people die prematurely each year from household air pollution due to inefficient biomass combustion. Many of these are young children, who spend many hours each day breathing smoke pollution from cook stoves. As the age of children increases, the gender disparity for children experiencing acute respiratory infections increases – for example, in Kenya, boys up to the age of 5 experience more acute respiratory infections than girls. From the ages of 5-14, the imbalance changes greatly so that girls have approximately 40% more acute respiratory infections. This disparity continues for all other age groups, with female infections making up more than 50% of all infections. This is due to gender workloads – from the age of 5, girls tend to be kept at home to help with domestic chores, while boys go to school or work outside, and tend to spend more time indoors for the rest of their lives. Today, the number of premature deaths from household air pollution is greater than the number of premature deaths from malaria or tuberculosis (IAE, 2010; Energia, n.d.; Smith, 2012).

Lack of access to clean energy also has implications for time and for the environment, as women and girls are the collectors of fuel wood, they are forced to spend more and more time walking further distances to collect biomass. This leaves them less time for education, income generation and leisure activities (IAE, 2010; UNCTAD, 2011, ENERGIA, n.d.).

Conversely, a study by Dinkelman (2010) on the effects of rural electrification on employment in South Africa found that electrification significantly raises female employment within 5 years. The new infrastructure appears to increase hours of work for men and women, while reducing female wages and increasing male earnings. Evidence suggests that household electrification raises employment by releasing women from home production and enabling micro-enterprises.

Gender in energy policy

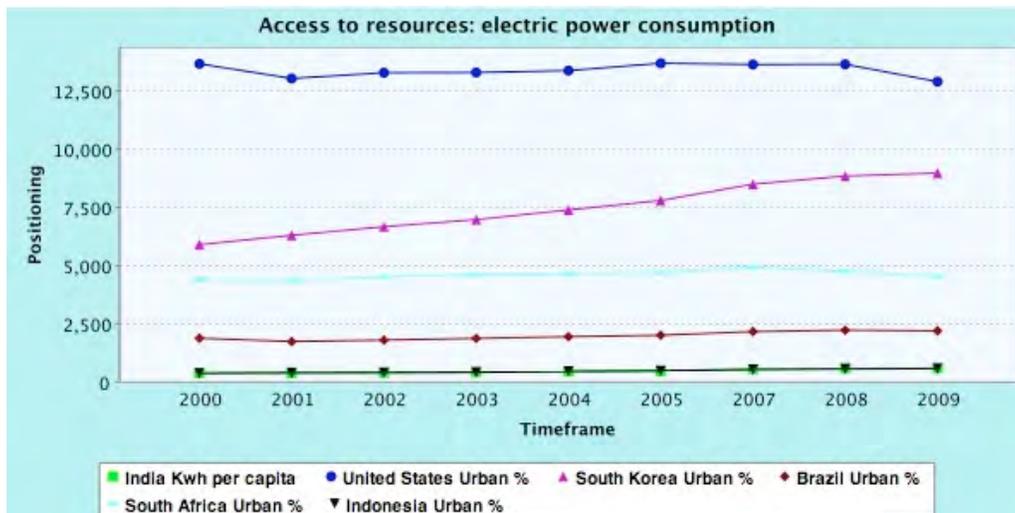
Does the national energy policy include references to gender or women?

Gender issues are articulated in the national energy policy of India and Indonesia. Brazil, South Africa and the US have no national energy policy while there was no response on this question from researchers in the Republic of Korea and the EU.

¹⁰ EU data were not available.

Electric power consumption

Electric power consumption measures the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants.



The rate of consumption is highest by far in the urban US, followed by urban areas of the Republic of Korea, South Africa, and Brazil. Urban areas of Indonesia and India are the least power-hungry users. In India, 2010 the proportion of households using solid fuels for cooking is 31 per cent in urban areas and 90 per cent in rural areas (UN, 2010).

AGENCY

This dimension refers to women's exercise of leadership and decision-making at personal and societal levels. Agency, or voice, refers to the ability of people to act "as citizens who matter and whose voices count (Sen, 1999)", who are able to make their own decisions and act on opportunities. For example, one can say that women's well-being, fertility and child survival depend on empowerment of women – including access to employment, women's literacy and property rights — independently of the level of affluence, industrialization or literacy in the overall population or community. This is shown in gender differences in child survival and longevity. In areas where women have voice, for example in the Indian state of Kerala where there is a long tradition of women's education and property rights, fertility rates were lowered more effectively than in China where a one-child policy was enforced by the state. Women's agency has also proved more effective in increasing longevity rates in Kerala, which are higher than areas in the richer and more industrialized provinces in northern India (Blunden, 2004).

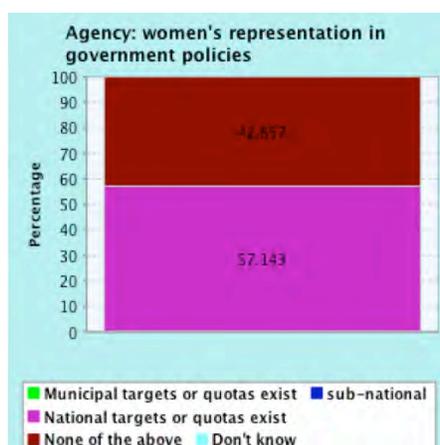
Representation in parliaments, as governmental ministers and in local/municipal governments is used as an indicator of women's agency at national and sub-national levels. Women remain largely under-represented at almost all levels in political parties and the public sector (especially in ministerial and other executive positions). As a result women's meaningful participation in decision-making, constitutional development and political processes are inhibited. Efforts to consciously enhance the visibility of women in governance have produced some results. As of May 2012, women make up less than 20% of legislators worldwide (men make up 80.2% and women 19.8% of parliamentary seats overall). They are notably underrepresented in the executive branch of government, and only in recent years have increasingly held the top profile portfolios for their governments in non-traditional areas for women in government, such as national security and defense, finance, revenue and foreign relations (Tommasoli, 2012).

The issue of quotas in national and municipal politics is somewhat controversial but increasing momentum globally, with concrete effects. Gender quotas may apply to the number of female candidates proposed by a party for election, or a number of reserved seats in the legislature. In some countries, quotas apply to minorities based on region, ethnicity, language or religion. Rwanda's majority female Parliament is a product of electoral quota systems at local up to national levels, where women can gain experience, capacity development support as well as a place at the political table (UN HABITAT, 2008). In 2010 a Parity Law passed was passed in Senegal which required all political parties and coalitions to put forward equal numbers of men and women on their candidate lists. The recent election in Senegal saw the representation of female members in the lower house of parliament increase from 22 to 43 percent (Faye, 2012).

Some of the countries in this study are implementing various quota strategies, with results as found below.

Women's representation in government policies

Government policy or laws exist that implement targets or quotas for women's representation.



No country has relevant policies at municipal or sub-national level, but they exist at national level in India, the Republic of Korea, South Africa and the EU.

Women's representation in political parties policies

Women's representation quotas/targets or rules implemented by political parties.

Political parties' control of the nomination process makes women's representation at high levels an important electoral issue. Candidate slates are often decided by nomination committees who select the candidates as well as the ridings where they will run for election.

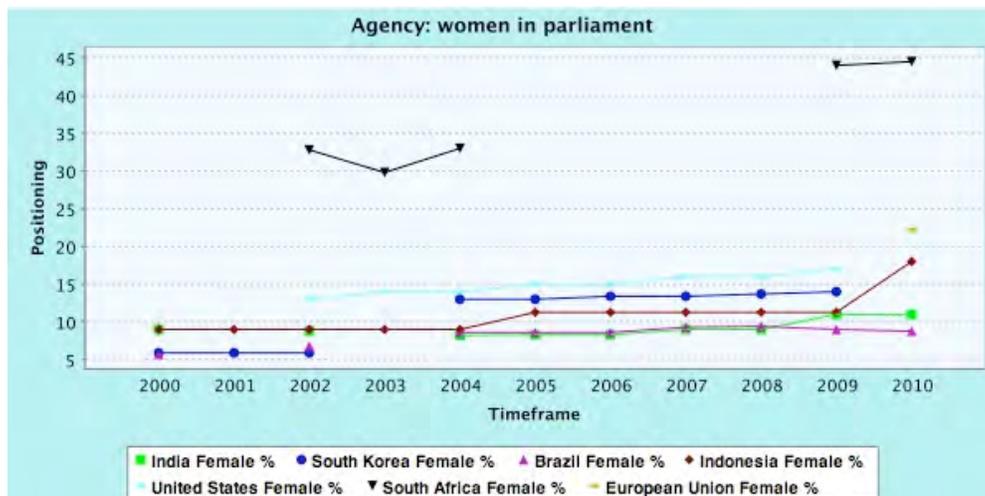
Women also need to be in place to address those barriers at the party level which hamper their opportunities to actively engage and influence political platforms within parties. More broadly the presence of women in a party will affect advocacy and implementation of gender equality reforms (Dahlerup, 2003 and Tommasoli, 2012).

Quotas have been set for representation of women in party politics in Brazil, India, South Africa and the EU, but not in the US. In Brazil, all parties are obliged to present approximately 30% female candidates. This strategy does not appear to have been as successful as in South Africa, as Brazil consistently shows among the lowest representation of female parliamentarians and ministers (see below).

Women in parliament

Percentage of members of lower houses of parliament that are female.

While setting quotas for female representation in political office is often a contentious issue, the situation in the countries in this study indicate that it can be a necessary step to increase female representation in governance. The number of female representatives in the Republic of Korea is low relative to other developed countries. In 2004 the Political Party Law was revised to require 50% quotas in proportional representation. As a result there has been a striking increase in the share of female members in the national assembly, to 13% in 2004 as compared to 5.5% in 2000. With gender quotas in proportional representation as a momentum, 5.7% of district representatives were women, which was a significant increase in comparison to 2.2% in 2000.

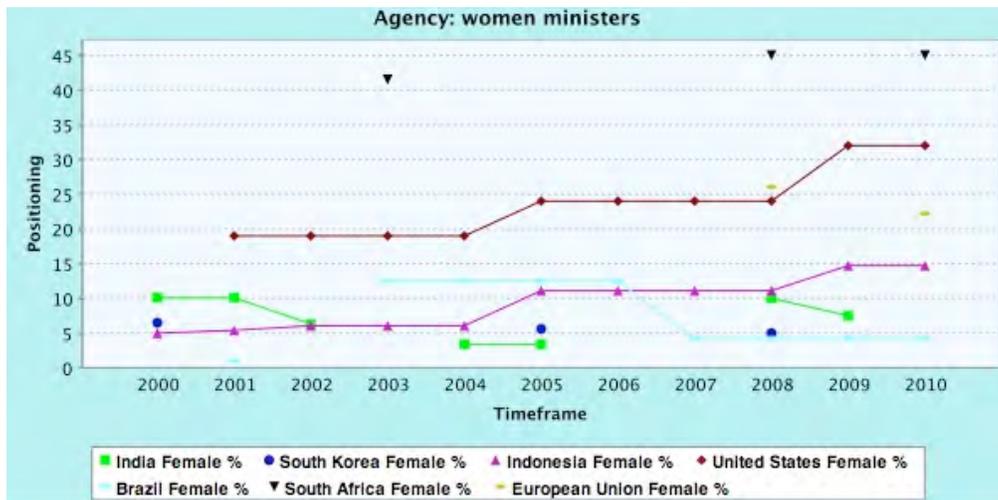


South Africa has by far the highest representation of women in parliament, moving from nearly one-third earlier in the last decade to close to one half by the end of the decade (44.5%). The marked increase between 2004 and 2009 is a result of a shift in policy by the African National Congress (ANC). In earlier election cycles, the ANC ensured that at least every third person on the party list was a woman. During the 2009 elections women accounted for 50% of nominees on the party list (MWCPD, 2010b).

Thirty-five percent of the members of the European Parliament in 2011 were women. The lowest, in single digits, is Brazil, with 8.8% in 2010. All other countries studied are in the low range, not reaching 20% members (with ranges from 11 to 18%). On the positive side, all are showing increases.

Women ministers

Percentage of government ministers and sub-ministers that are female.

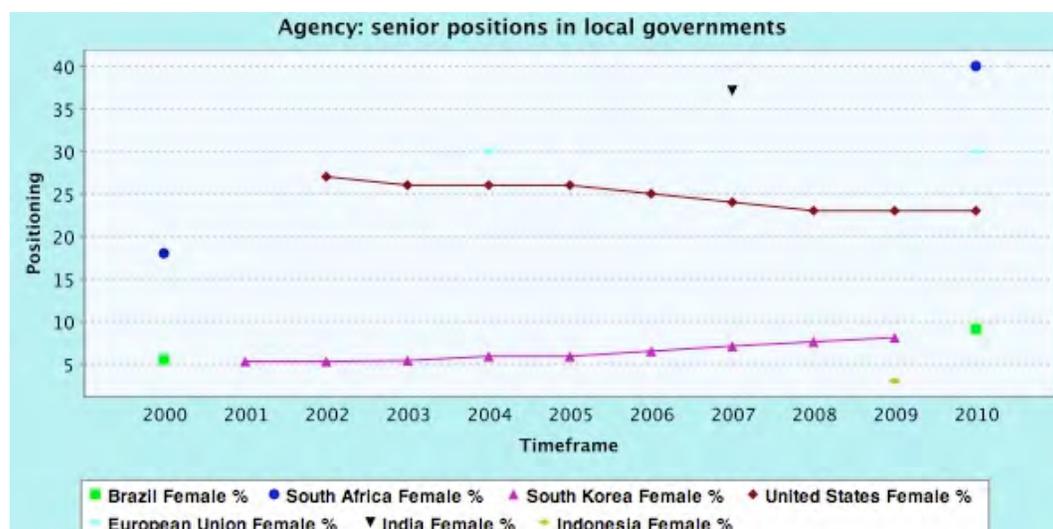


Again, the highest percentage of female ministers is in South Africa, with nearly half of ministerial and sub-ministerial positions held by women, a fairly consistent proportion since 2003. The US sees higher representation of females in appointed high-level positions than in elected ones, with one-third of cabinet-level positions held by women at the end of the decade. Brazil, India, and Korea have very low female representation rates, almost entirely in the single digits. Indonesia has shown improvement, with an increase from 5 to 15% over the decade. The effect of quotas is seen in particular in the Republic of Korea, where three of 17 cabinet members are women (17.6%) as a result of legislative quotas. Quotas were not applied to sub-ministerial positions, so that no women are represented at that level. This situation is also related to the low share of women in decision-making positions in the civil service, providing a small candidate pool for such posts (Kim and Moon, 2011).

The case of Brazil shows the importance of female leaders in promoting the greater participation of women in government. It is only with the election of Dilma Rousseff as President that a significant number of women were appointed to the highest positions in the federal government. At the beginning of her mandate, women made up 26% of ministers, compared to 17.6% at the end of her predecessor's term. This percentage increased even further during her first year in office and for first time a woman was appointed as President of Petrobrás, the Brazilian state oil company (Abreu, 2012).

Senior positions in local governments

Percentage of senior officials in local government that are female.



As is seen here, of the countries under study, only Brazil, the US and the Republic of Korea are consistently collecting sex-disaggregated data in this area. This is unfortunate, as it is an important indicator – we know from isolated and anecdotal evidence that women are more highly represented at lower levels of government.

Through the vehicle of the Panchayati Raj Institutions and Urban Local Bodies more than one million women have entered active political life in India, owing to a quota of one-third, a result of recent Amendments to the Constitution. The Panchayat Raj (Rule of Village Committee) – PRI - is a three-tier system in the state with elected bodies at the Village, Taluk and District levels. It ensures greater participation of people and more effective implementation of rural development programmes. With women now making up 54% of representatives – many of them illiterate and poor – the results are transformative. In more than 500,000 villages, totaling 600 million people, women now lead one-third of the *panchayats*. A new form of local governance is taking root, sensitised to the issues of poverty, inequality and gender injustice. Since the onset of PRI, the percentages of women in various levels of political activity have gone up to 36.7% in 2007 (Central Statistics Office, 2011; Nair, 2011).

Table 10. Female Representation in Panchayats, India, 2007-8

Tiers	Total	Women	Women as %
Gram Panchayat	2645880	974255	36.82
Intermediate Panchayat (Panchayat Samiti)	156557	58012	37.10
District Panchayat	15581	5778	37.08

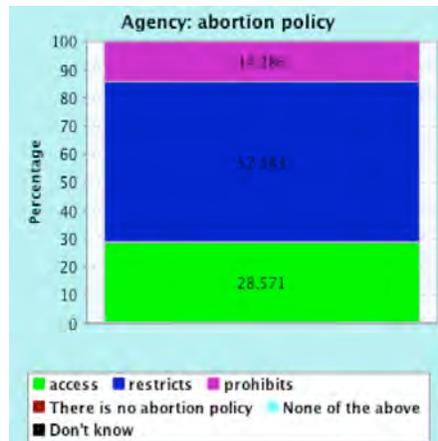
Source: India, Ministry of Panchayati Raj. (2009). Annual Report 2007-2008. New Delhi. p.70-72.

Senior positions in trade unions
Percentage of trade union officials that are female.



Little data is available globally on this important indicator of the role women play in leadership in the labour force. The important employment issues that women face – childcare, lower wages and less secure employment – mean that this is a critical gap.

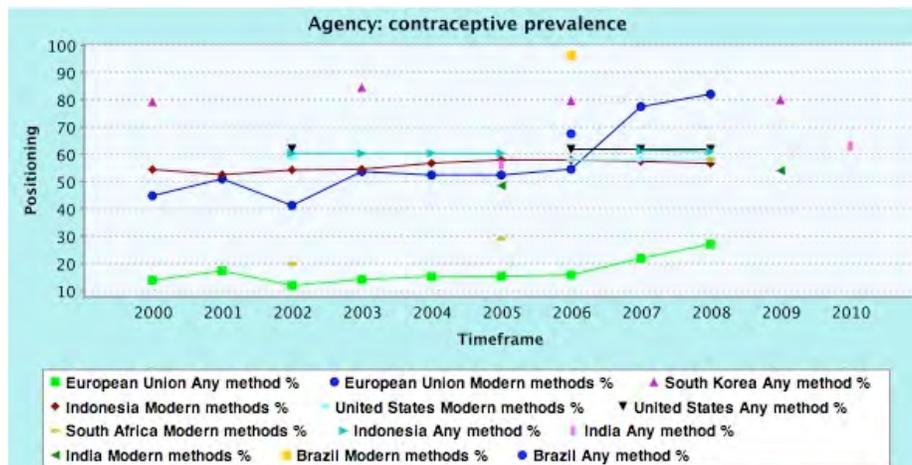
Abortion policy
The extent to which government policy or laws exist related to access to abortion.



This indicator relates to the ability of women to choose their family size and the spacing and timing of children. (See below for an indicator on contraceptive use.) In South Africa and the European Union, governments ensure women’s access to abortion. In Brazil, India, Korea and the US access to abortion is restricted, while it is illegal in Indonesia. The example of Brazil indicates some of the repercussions for women when abortion is not accessible. A 2010 study shows a high prevalence of illegal abortions – one in five women between 18 and 39 years of age living in urban areas has had an abortion. This poses a serious and widespread health risk in the country. Abortions are more prevalent in women with lower levels of education, while religion does not seem to be a strong factor: two thirds of women who had an abortion were Catholic, and one fourth Protestant or Evangelical, reflecting the religious distribution of the population (Diniz and Medeiros, 2008 in Abreu, 2012).

Contraceptive prevalence

Percentage of women of reproductive age that are using any method of contraception. Also percentage of women using modern methods of contraception.



Access to contraception, or the ability to choose the number and spacing of their children, is an important right for women. It leads to the ability to exercise other rights, such as the right to education, increased income and employment, health and greater decision-making power. For example, a study of a community in Bangladesh found that women who used family planning earned incomes one-third higher than other women in the community who had not used family planning (UNFPA, 2012).

Although we have a fair amount of data on this item, there is a problem with comparability of data. Brazil's data is based on "any method", with a calculated percentage of those using modern methods. India, Indonesia, the US and EU calculated each separately according to number of those using modern methods. The Republic of Korea calculated only "any method" and South Africa calculated "modern only." These data therefore cannot be directly compared, although they give a general indication of women's access to contraception and hence their potential agency in choice and spacing of children.

In India, while 99% of women are said to be aware of contraceptive methods, data collected to date indicate that 56.3 per cent of households used contraceptives in 2005-06 – of which 48.5 per cent used modern methods (increasing to 63 per cent in 2010-2011). A national HIV communication survey in South Africa by Shisana et al. (2009) found a dramatic increase in the number of people who reported using condoms in their most recent sexual experience. Increases occurred for both sexes in all age groups, with those for women being particularly remarkable, as women traditionally have reported low rates of condom use. Apart from a highly successful national condom promotion and distribution system, the increase seen in condom use among females may also indicate that females are becoming more empowered to negotiate sexual activity. One possible explanation of the findings, according to the authors, is that not only might there have been a shift in the levels of condom negotiating skills, but also an increased openness in the community to discuss sex and condoms among youth.

OPPORTUNITY AND CAPABILITY

Science and technology education policy

Gender in education policy

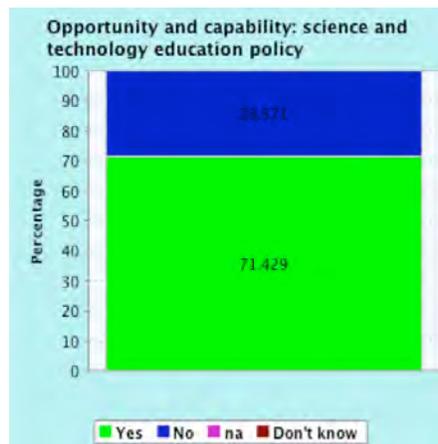
Does the national education policy include references to gender or women?

Is there a policy on universal access to primary education?

Is primary education free to all citizens?

All the countries in the study include gender issues in national education policies. All also ensure universal access to primary education. Primary education is free in all the countries/areas surveyed, with the exception of South Africa, which retains school fees against a sliding income scale. Any school fees, particularly at the primary level, constrain the education of girls of poor parents.

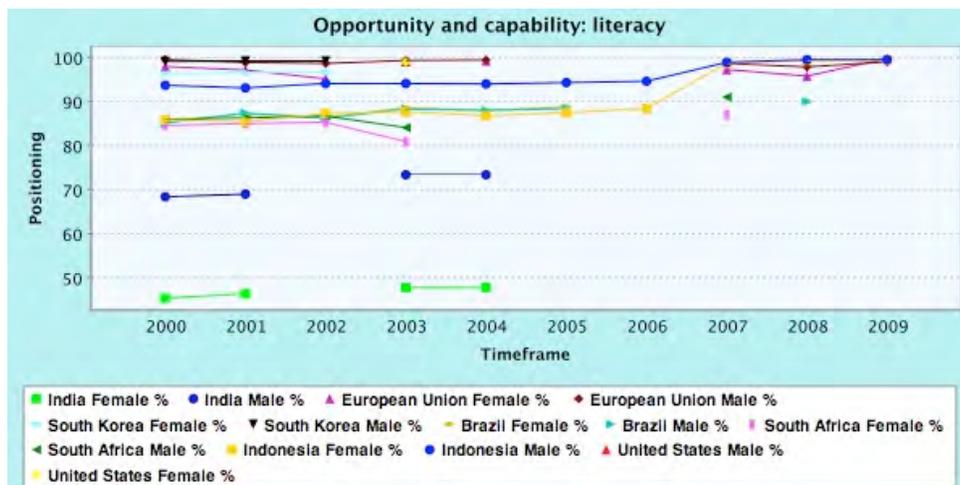
Is it mandatory to enroll in S&T subjects to a certain age/grade?



In Brazil, India and the Republic of Korea there is no national education policy, but science and mathematics make up part of the basic curriculum for primary and secondary education. In the US, curriculum is set by the individual states in the absence of a national education policy.

Comparative literacy situation – female/male

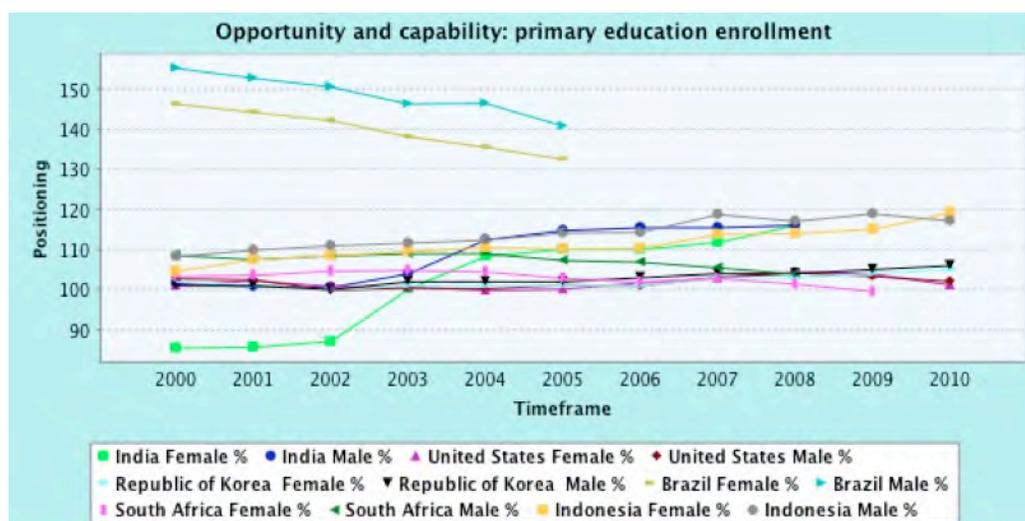
Percentage of the total literate population that are females and males.



Indonesia, the US and the EU have achieved both gender parity and universal literacy. In the Republic of Korea, the government ceased estimating literacy statistics in 2002 when literacy reached 96.6% for females and 99.2% for males. Brazil has achieved gender parity in literacy in 90% of the total population. In South Africa 87% of females and 91% of males are literate. India shows the lowest levels of literacy, where less than half of females (47.8%) are literate, according to the latest statistics, in comparison to 73.4% of males. This figure is nevertheless a substantial increase from 64.8 per cent in 2001, an improvement of 50 per cent from 224 million in 2001 to 334 million in 2011.

Primary education enrolment

Gross enrolment ratios for females and males in primary education.



All countries show enrolment rates of about 100% at the primary level,¹¹ indicating an achievement or near achievement of universal enrolment (for both boys and girls). In the countries studied, parity decreases as education level increases – in favour of women in most countries. The rates of school retention and success also vary and will affect enrolments at the secondary level.

Table 11. Main reason why 7 to 18 year olds are not in school, by sex, 2003

Reason	Female	Male
No money for fees	40.8%	39.3%
Pregnancy	9.8%	0.3%
Family commitment	8.2%	0.4%
Illness	7.5%	8.7%
Too old/young	7.3%	9.8%
Education is useless/uninteresting	6.5%	13.5%
Completed school/education	3.5%	4.7%
Working at home or job	3.2%	5.9%
Failed exams	2.9%	5.5%

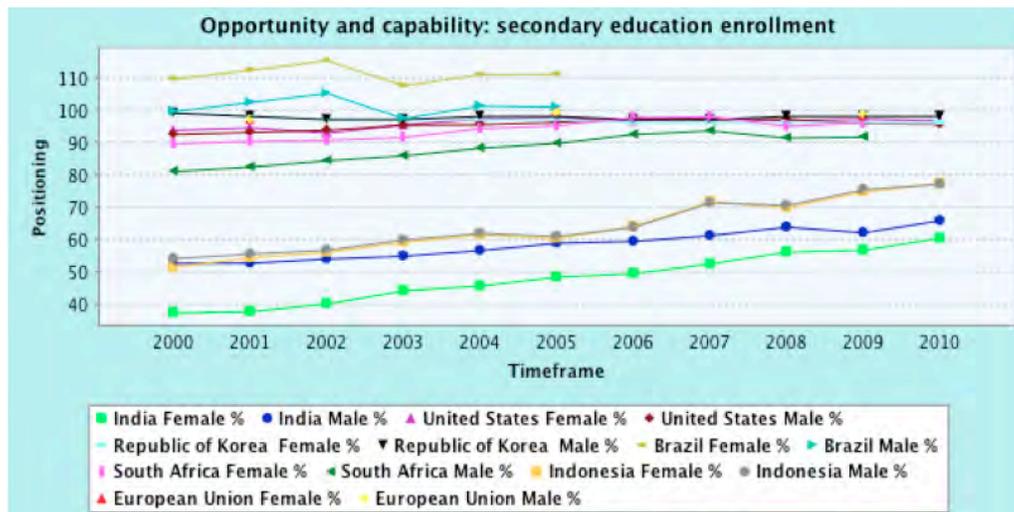
Source: DoE (2006b, Figure 38, p. 54)

¹¹ Gross Enrolment Ratio over 100 per cent implies enrolment of under age and over age children in a class corresponding to the particular age group of the class.

Secondary education enrolment

Gross enrolment ratios for females and males in secondary education.

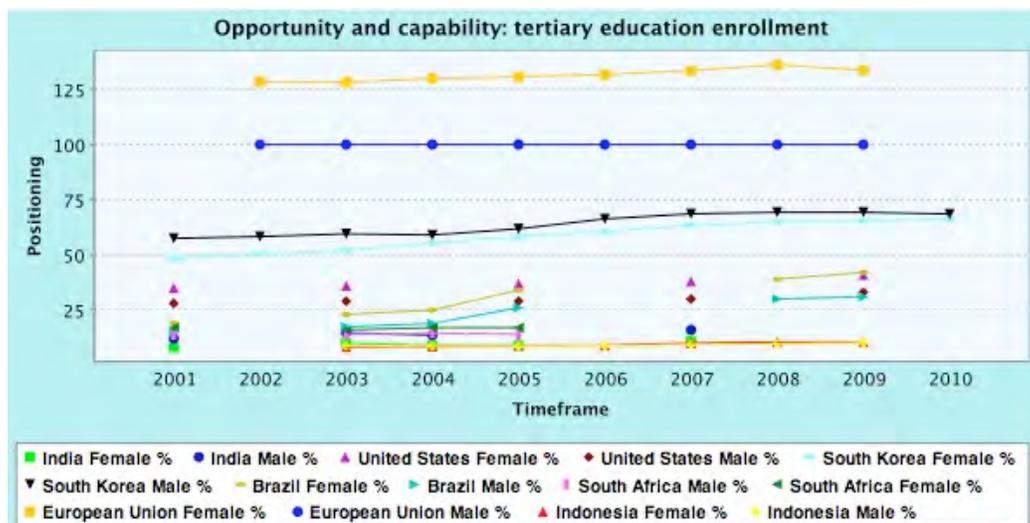
Access to secondary education continues to be a challenge for girls, especially in parts of Africa and Asia, according to the UNESCO Global Atlas of Education. It shows that girls in all parts of the world have benefitted from efforts to achieve universal primary education, especially since 1990, with two-thirds of countries achieving gender parity in primary enrolment. However, access to secondary education remains a challenge for girls in many regions, especially in sub-Saharan Africa and South and West Asia. Only 39% of countries have equal proportions of boys and girls enrolled in secondary education. There are also differences in school-life expectancy (SLE): in the Arab States, girls are likely to spend 10 years in school while boys tend to have at least one additional year. The Atlas also shows that access to education may not always translate into better opportunities for women in employment and income (UNESCO, 2012).



At the beginning of the decade, more females than males were enrolled in secondary school in all of the countries/areas under study. In India and the Republic of Korea, more boys are enrolled than girls, although the gap decreased from 25% to 4.5% in India. In the Republic of Korea a decrease in female enrollment occurred in relation to boys, from equal rates in 2000 to a gap of 2% in favour of boys in 2010. Indonesian enrollment rates for girls gradually increased to parity in 2010. We see girls taking the lead in the other countries of the study. Rates are over 90% for both females and males in all countries except India and Indonesia.

Tertiary level enrolment

Gross enrolment ratios for females and males in tertiary education.



In four countries/areas in this study, more females than males are enrolled at the tertiary level than males (Brazil, South Africa, US and the EU), with the largest gender gap in Brazil (11%). There are more males at this level according to the latest statistics in India (21% v 15%) and the Republic of Korea (85.7% v 118.8%) and Indonesia (21.8 vs 24.%). With the exception of South Africa and the Republic of Korea, trends in the countries in this study compare with global trends: females tend to enroll in tertiary level education more than males in higher-income countries, but show lower enrollment rates than men in lower-income countries (UNESCO, 2012).

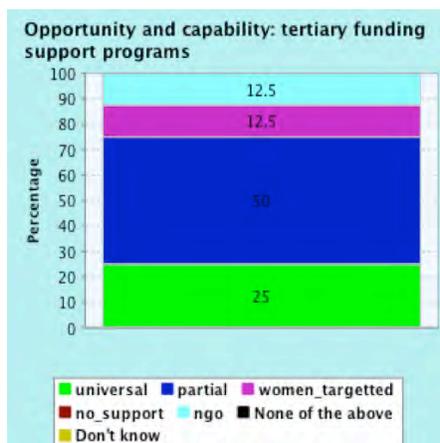
Tertiary-level funding support policy

Is funding support available to tertiary and graduate level education and research?

All countries/areas in this study are reported as providing policy support for funding at this educational level, but the kind of support varies widely from free public universities (in Brazil and Indonesia) to scholarship support in the others. Research undertaken for this study in India indicates that only a “miniscule” few benefit from the funding programmes in that country (Nair, 2012).

Tertiary level funding support programmes

Availability of funding support programs for tertiary and graduate level education and research.



South Africa and the EU are characterized as having universal availability of funding support programs for tertiary and graduate level education and research, while it is partial in Brazil, Indonesia, the Republic of Korea and the US. India provides funding support targeted directly at women.

Adult education policy

Percentages of females and males enrolled in lifelong learning.

Are there national or sub-national policies or programs supporting adult education?

National or sub-national policies or programs supporting adult education exist in all the countries/area, with the exception of the Republic of Korea. The UNESCO definition of adult education is

Education specifically targeting individuals who are regarded as adults to improve their technical or professional qualifications, further develop their abilities, enrich their knowledge with the purpose to complete a level of formal education or to acquire knowledge, skills and competencies in a new field, or to refresh or update their knowledge in a particular field (UNESCO, 2011).

Adult education is particularly important for women, who generally have less access to education and skills training. In many countries, women enroll at higher levels in distance education and other forms of adult education than men, both formal and nonformal. Very little sex-disaggregated data are collected (UNESCO, 2011).

Enrolment in distance education

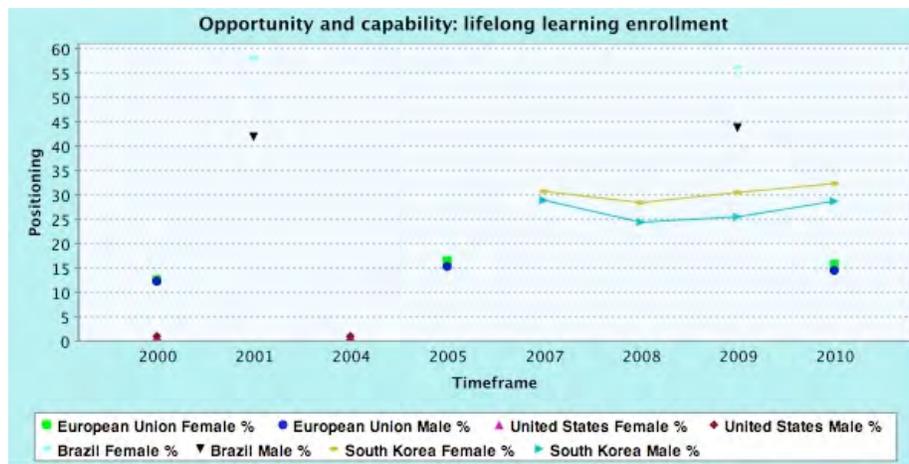
Are there national or sub-national policies or programs supporting adult education?

Percentages of females and males enrolled in distance education.

Only Brazil and South Africa have consolidated data on this indicator. South Africa's distance education system is well-organized through its public universities. Women have dominated through the decade, comprising 56% of students in 2001 and rising to 60% in 2009. In Brazil female students make up nearly three times the number of male students in distance education courses in 2000, when the number of available courses was low. Since then there has been a major expansion of this field, but women are still substantially more numerous (14.5% of women enrolled at the tertiary level were in distance education as compared to 9.1% of men; women are 1.3 times more numerous than men at the tertiary level).

Lifelong learning

Percentages of females and males enrolled in lifelong learning.



This is an extremely important indicator, measuring whether a society supports its adults to return to or continue their education. Skills development, ongoing education, adult education, and e-learning are all important tools for highly-skilled knowledge capacity. It is particularly important for women, who often have less access to formal education at higher levels.

Two models to support lifelong learning and skills development for women are found in India – The Women's Vocational Training Programme in the Ministry of Labour was launched in 1974 to increase the social development and economic growth of women through vocational/skill training. It is supported by the Women's Occupational Training Directorate, responsible for designing and pursuing long term policies related to women's vocational training in the country. The National/Regional Vocational Training Institutes for Women are the only exclusively female Institutes that provide facilities for structured, long-term regular advanced skill and post-advanced training. 73,048 participants have been trained at the national level, since inception.

The Support to Training and Employment Programme for Women (STEP) programme was established by the India Ministry of Women and Child Development. It aims to increase the self-reliance and autonomy of women by increasing productivity and enabling them to take up income generation activities. It provides training and upgrading of skills in the traditional sectors, i.e. agriculture, animal husbandry, dairying, fisheries, handlooms, handicrafts, *khadi* and village industries sericulture, social forestry and wasteland development. The objectives include to: support access to credit; upgrade skills; provide employment and income generation programmes to women's groups; provide support services in training and employment conditions for women. The target groups include marginalised, asset less rural women and the urban poor (Nair, 2012).

Turning to skills development in general, in South Africa the National Skill Development Strategy (NSDS) positions the workplace as an active learning environment to promote self-employment and secure work opportunities for new entrants into the labour market. A policy framework for skills development includes 23 Sector Training and Education Authorities (SETAs) established by the Minister of Labour (Paterson et al, 2008). The SETAs have established, internships, unit-based skills programmes and apprenticeships. One of the primary objectives is to collect levies from employers through the Skills Development Levies Act, to fund education and training¹². The last two South African National Skills Surveys show that this policy has had some effect, and that distribution of training according to gender has significantly changed in the private sector. In 2002/03, 22% of females and 28% of males received training. Four years later, in 2006/07, 56% of females received training as opposed to 51% of males, exceeding the NSDS equity target of

¹²www.vocational.co.za

54% females trained. Additionally, the magnitude of the increase rose with enterprise size, with small enterprises experiencing the smallest increase and large enterprises the largest. Simultaneously, the differential in training rates in favour of females increased with enterprise size, with males and females in large enterprises respectively experiencing a 31% (from 30% to 61%) and a 49% (from 20% to 69%) increase in training between the two survey years. Women in large enterprises were therefore by far the biggest beneficiaries of access to training in 2006/07 (Paterson et al, 2008).

Reaching women through informal education requires different strategies which suit differing contexts. Community and knowledge centres are a major strategy to reach rural women in India. ICT is being used innovatively at the grassroots, so that the rural areas have become a hotbed for the development of IT applications to meet the needs of villagers. Increasing feminisation of agriculture has not been matched with appropriate extension support to women farmers, so, these centres have become to means of bridging extension gaps. The hubs also make available capacity building programmes for technologies use, knowledge and information tailored to local needs, and marketing platforms. Common Service Centres (CSCs) and Village Knowledge Centres are using ICT to promote local innovation. The Common Service Centre (CSC) programme is establishing one lakh CSCs to promote village level entrepreneurial activities (VLE) by providing public and private services to rural citizens. 90,000 have been established in an e-governance plan for IT-literacy for women, and women are actively involved in many of the Centres. Some of the Village Knowledge Centres also function as CSCs and act as a point for promoting functional literacy for women and men. While there are no systematic data on the number of women who use them or act as managers of the Centres, a number of case studies reveal that they do play an important role. Some of the examples include the VKC/VRC of the M.S. Swaminathan Research Foundation, and the Self Employed Women's Association (SEWA) model (Nair, 2012).

Unfortunately, despite the importance of lifelong and adult education for both females and males, very little data exist in general, and very little are disaggregated by sex. Our researchers did not use equivalent approaches to the data. Brazil and the US disaggregated the relative percentages of men and women in lifelong learning: in Brazil in 2009, women comprised 56.2% of students; in the US in 2000, women were 50% of those engaged in formal and informal continuing education. The Republic of Korea and the EU disaggregated by sex the percentages of men and women who in the course of their lives participated in lifelong learning. Women's participation in lifelong learning is slightly higher in the Republic of Korea, where from 2007-2010 rates for women grew from 30.7% to 32.3% while for men the rates varied from 24.4% to 28.9%. In the EU, the figure ranges from 16.5% in 2005 to 15.8% in 2010 for women and 15.3% and 14.5% for men. Data are not available in other countries.

ENABLING POLICY ENVIRONMENT

All the GE&KS dimensions are conditioned by government policy. The presence of enabling policies and their implementation, including the presence of national legislation to reinforce international conventions, is crucial to facilitate women's participation in national STI and knowledge systems. Among the dimensions measured are the inclusion of gender issues in key knowledge society areas of science and technology, ICTs, labour and education. In addition to the inclusion of gender issues in knowledge society areas, the existence of gender-specific policies that cover vital inputs for women's participation in the knowledge society are assessed, including childcare, flexible work hours, transportation and other policies that enable women to leave the home and enter the workforce. A country's accession to the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) is another important indicator that signals the existence of legislation ensuring women equal access, opportunity and freedom from discrimination in all areas of life.

Republic of Korea

The Republic of Korea passed an Act on Fostering and Supporting Women in Scientists and Technicians in 2002 in order to promote female participation and increase women's representation in the fields of engineering, science and technology, fields traditionally dominated by men. Based on the Act, the First Basic Plan for Fostering and Supporting Women Scientists and Engineering (2004-2008) was implemented. The achievements were multiple. First, the ratio of women to graduates with S&E doctoral degree rose from 16.3% in 2004 to 19.5% in 2008. Second, the share of women among those employed in S&T at public institutes increased in the same period from 20% to 24.6%. Third, there was an increase in the proportion of women participating in the government science and technology committee from 27.8% to 33.7%. Fourth, the economic participation rate of females holding degrees in S&E reached 64.9%, as compared with 62.6% in 2009. Fifth, women employed in S&T R&D increased from 12% to 14.9%. Sixth, of all faculty members at S&E universities, the share of females increased in both science (from 15.4% to 16.1%) and engineering (from 2.4% to 3.3%). Finally, the government established the Korea Advanced Institute of Women in Science, Engineering and Technology (Kim and Moon, 2011).

Brazil

The Constitution of 1967 established the principle of equality between men and women and included measures against discrimination in the labor force. In 1988, the Federal Constitution expanded social rights including provision of pregnancy and maternity leave; breaks for women workers to feed their baby; support for daycare up to six months and paternity leave. It also expanded the definition of the family by recognizing both the traditional two-parent union and other arrangements such as female-headed households. It also ended the principle of the *Pátrio Poder*, or the primary authority of the father.

Four major trends in gender equality were noted as of 2002:

- (a) Substantial increase in women's access to and use of contraception, causing a sharp drop in fertility rates and family sizes.
- (b) Since 1988, women's rights have expanded within the household, in the work place and in terms of land rights and personal safety.
- (c) Female education has increased to the point that women now have more schooling on average than men.
- (d) Although men still predominate in the labor market, women's participation has steadily increased over the two last decades. The wage gap between men and women has also narrowed (World Bank, 2002).

In 1985 the National Council for Women's Rights (Conselho Nacional dos Direitos da Mulher - CNDM) was created in the Ministry of Justice, to promote policies to bar discrimination against women and strengthen their participation in the political, economic and cultural activities in the country. In 2003 it was transformed into the Special Secretariat for Women's Policies with ministerial status, under the Presidency of the Republic. It is a best practice in inter-ministerial relations on gender since it has a membership of 16 ministries and several civil society organizations. In addition to the Ministries of Social Development, Human Rights and other "traditional" women's ministries, the Ministries of Science, Technology and Innovation, Rural Development, Environment and Planning, Budget and Governance are all members. The Council is not, however, part of the highest Council for Science and Technology.

Every three years the Secretariat organizes a meeting on "Thinking gender and science", bringing together an existing network of feminist research groups to discuss the issue of gender in science. It also awards a prize, now in its fifth year, for schools, college and undergraduate students called "Building Gender Equality". Both programmes are part of the Second National Plan for Politics for Women, which addresses the issue of "strengthening the participation of

women in an equal, plural and multiracial way in spaces of decision making; motivating the participation of women in scientific and technological areas”.¹³

Brazil is a signatory to CEDAW and a member of many other regional networks.

In science policy, the Ministry of Science and Technology oversees an extensive set of programmes, funding and institutions supporting STI in the country. It coordinates four national S&T agencies: the Brazilian Space Agency, the National Commission of Nuclear Energy, the National Council for Scientific and Technological Development (CNPq); and the Agency for Financing Studies and Projects (FINEP). It also oversees 26 national research institutions. It organizes a National Conference of Science Technology and Innovation, an annual weeklong countrywide event. The budget for the Ministry has increased by almost 300% over the past ten years, making Brazil the largest national investor in science and technology in Latin America and the Caribbean – about 1.19% of its GDP goes to R&D. In addition, the Brazilian Congress has an active Science and Technology Commission, in both the House of Representatives and the Senate.

The government has committed to a major capacity building effort over the last fifty years, with a notable increase in investment in the last decade. In the 90s, CNPq and CAPES awarded around 40,000 scholarships per year. 60,000 scholarships were awarded in 2001 and around 90,000 scholarships in 2008. Additional scholarships are awarded at state level. An important aspect of this funding is that MSc and PhD scholarships are automatically awarded to all students in the graduate programmes of excellence and are provided irrespective of nationality.

Over the last fifty years a national system of graduate programmes has been consolidated, and many international tier institutions were created. In 2007 2,568 graduate programmes were evaluated of which 1,320 were PhD level. There are also solid science and technology institutions in the non-governmental sector. The Brazilian Academy of Sciences is one of the oldest, founded in 1916, while the Brazilian Society for the Advancement of Science was established in 1949. Scientific associations and societies exist in all disciplinary areas (Abreu, 2012).

India

The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, Fundamental Duties and Directive principles. The Constitution of India not only grants equality to women, but also empowers the State to adopt measures of positive discrimination in favour of women.

Constitution of India Guarantees

- Equality Before Law for Women (Article 14)
- The State not to discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them [Article 15 (1)]
- The State to make any special provision in favour of women and children [Article 15 (3)]
- Equality of opportunity for all citizens in matters relating to employment or appointment to any office under the State (Article 16)
- The State to direct its policy towards securing for men and women equally the right to an adequate means of livelihood [Article 39 (a)]; and equal pay for equal work for both men and women [Article 39 (d)]
- To promote justice, on a basis of equal opportunity and to provide free legal aid by suitable legislation or scheme or in any other way to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or other disabilities [Article 39A]
- The State to make provision for securing just and humane conditions of work and for maternity relief (Article 42)
- The State to promote with special care the educational and economic interests of the weaker sections of the people and to protect them from social injustice and all forms of exploitation (Article 46)
- The State to raise the level of nutrition and the standard of living of its people and the improvement of Public Health (Article 47)

¹³ Secretaria Especial de Política para Mulheres. II Encontro Nacional de Grupos e Núcleos de Pesquisas Pensando Gênero e Ciência.

- To promote harmony and the spirit of common brotherhood amongst all the people of India and to renounce practices derogatory to the dignity of women [Article 51(A) (e)]
- Not less than one-third (including the number of seats reserved for women belonging to the scheduled castes and the scheduled tribes) of the total number of seats to be filled by direct election in every panchayat to be reserved for women and such seats to be allotted by rotation to different constituencies in a panchayat [Article 243 D (3)]
- Not less than one-third of the total number of offices of chairpersons in the panchayats at each level to be reserved for women [Article 243 D (4)]
- Not less than one-third (including the number of seats reserved for women belonging to the scheduled castes and the scheduled tribes) of the total number of seats to be filled by direct election in every municipality to be reserved for women and such seats to be allotted by rotation to different constituencies in a municipality [Article 243 T (3)]
- Reservation of offices of chairpersons in municipalities for the scheduled castes, the scheduled tribes and women in such manner as the legislature of a State may by law provide [Article 243 T (4)]

India ratified CEDAW in 1993 and has also ratified four of the eight ILO Labour conventions.

In 1992 the National Commission for Women was set up to study and monitor all matters relating to the constitutional and legal safeguards provided for women and to review existing legislation and suggest amendments wherever necessary. The National Policy for the Empowerment of Women 2001 was brought in by the Department of Women and Children under the Ministry of Human Resources Development. A National Mission for Empowerment of Women was also launched on 8th March 2010 to monitor effective implementation of different programmes and ensure that benefits accrue to women.

The other major enabler of gender equality is the establishment of quotas for women in local government. The 73rd Constitutional Amendment Acts passed in 1992 by Parliament ensure one-third of total seats are reserved for women in all elected offices in local bodies, whether in rural or urban areas. Apart from this, the Five Year Plans have had perspectives built in to promote the advancement of women¹⁴. The budget outlay, 4 crore lakhs (CR) (approx. USD 700,000) in the first Plan (1951-56), has increased to 13,780 Cr (over USD 25 million) in the 10th Plan.

Gender budget cells have been established in 56 ministries. Apart from these the Science Policy of India specifically states that it will promote the empowerment of women in all science and technology activities and ensure their full and equal participation. The 11th Five Year Plan of S&T clearly spells out specific intervention areas to promote women in science and science for women.

There are very specific science and technology programmes for socio-economic development as well as science and technology application programmes to promote the development and delivery of appropriate technologies, in which women are not visualised as end users but partners in the process. The National Science and Technology Entrepreneurship Development programme aims to promote entrepreneurship inclusive of women (Nair, 2012).

Indonesia

The amendment to the 1945 Constitution, in particular article 28D (1), states, “every person has the right to equitable legal recognition, guarantee, protection, and certainty and to equal treatment before the law.”

The State Ministry for Women’s Empowerment and Child Protection was established in 1978, with the primary task to formulate policies and initiate, coordinate, monitor and evaluate the implementation of programmes and activities to enhance the status and role of women in the family and society. Currently the focus of the Ministry is formulation of government policies and coordination and integration of the planning, monitoring and evaluation of women’s empowerment programmes. It also initiates and coordinates programmes and activities relating to the enhancement of the role and status of women to achieve gender equality. Since 2003 the Ministry

¹⁴ See Nair, 2012.

has been tasked with monitoring and evaluating gender mainstreaming in development policies and programmes. The implementation of programmes for the advancement of women in different sectors and regions remains the responsibility of the line ministries and regions. Beside the empowerment of women, the Ministry is also responsible for policies and programmes regarding the protection of the rights of the child. The Ministry's vision is the achievement of gender equality and justice within the family, community and state.

The Ministry of Women's Empowerment and Child Protection issued a National Policy on Women's Empowerment with the objective to achieve increased quality of life and enhanced role of women, and child protection, including: (1) to ensure gender justice in various laws and regulations, development programmes, and public policies; (2) to improve the GDI and GEM ranking of Indonesia through the achievement of gender equality and justice, and increasing the position of women in public life; (3) to eliminate violence against women ; and (4) to improve the welfare and protection of women, and increase child rights.

The Presidential Instruction No. 9 of the year 2000 on Gender Mainstreaming in National Development instructed all Ministers, Heads of State Institutions (including the Armed Forces), the Attorney General, Governors of all Provinces, chiefs of district and mayors of all cities to mainstream gender in implementing planning, formulation, implementation, monitoring and evaluation of policies and development programmes. The State Minister of Women Empowerment is tasked with providing technical assistance to government agencies at the national and regional levels, and reporting to the President concerning the implementation of Instruction.

Other laws include:

- Requirement for 9 years compulsory primary education, and parents are encouraged to ensure both girls or boys junior high school at least.
- Abolishment of Forced Labor
- Equal pay for men and women for work of equal value.
- Ratification of the Convention on Elimination of Discrimination Against Women (1984)

The tool of gender responsive budgets was introduced by the Ministry of Finance in 2010. Gender responsive budgets are to be implemented in 2012 in eleven ministries, including the Ministry of Energy, Public Works, Agriculture, Health, and Transportation. Gender responsive budgets are required to be supported by gender-impact assessments implemented by the ministries in cooperation with universities and national research institutes.

The State Ministry for Research and Technology was established in 1973. One of its functions is to coordinate the research and technology development activities of all government agencies. The Ministry is also responsible for the coordination, monitoring and evaluation of the implementation of the Strategic Policy for National Development of Science and Technology. Under the Ministry of Research and Technology there are about seven R&D institutions, in particular: Indonesian Institute of Sciences, National Agency for Atomic Energy, National Coordination for Survey and Mapping, Agency for the Application and Assessment of Technology, National Aerospace Agency, Agency for National Standardization. In each institution there is a gender working group that is responsible for gender studies in that institution (Hermawati and Saari, 2012).

South Africa

Gender equality is a core ideal preserved in the Bill of Rights of the South African Constitution of 1993. A national gender machinery has been put into operation, consisting of a set of co-ordinated structures within and outside government with the aim to achieve equality for women in all spheres of life – political, civil, social, economic and cultural. The ultimate objective of the gender machinery is to achieve the government's national and international commitments to gender equality, as contained in the National Policy Framework for Women's Empowerment and Gender Equity. These national machinery structures are located at the executive level, in Parliament, as well as in civil society (James et al., 2006).

A national coordinating body located in the Presidency, the Policy Coordination and Advisory Services (PCAS), facilitates integrated strategic formulation and integration across government by guiding and mobilising ministries, provinces and local government towards integrated programme delivery. It also co-ordinates the national gender programme (www.thepresidency.gov.za). The objectives of the co-ordination framework include gender mainstreaming, setting goals and objectives for the national gender programme, establishing clear lines of communication and accountability, and developing a dynamic management information system that facilitates informed implementation (James et al., 2006).

Also at the executive level, the Ministry for Women, Children and Persons with Disabilities (MWCPD) was established in 2009, incorporating the former Office on the Status of Women (OSW) in the Presidency. It is responsible for promoting and realising the protection of women's rights and for guiding the government in its efforts to achieve national and global gender equality goals and commitments. (Mayende-Sibiya, 2010; www.wcpd.gov.za/women). A Gender Equality Bill was approved by Cabinet in 2012 designed to provide the necessary legislative authority to hasten the empowerment of women and address issues of enforcement and compliance towards the attainment of the government's target of 50/50 gender parity. It strongly calls for equal participation of women in the economy and for equal representation of women in positions of decision-making in both private and public sectors. It also provides for the monitoring of all legislation that address inequalities, discriminations against women, violence against women, access to services and economic empowerment.

More recently the Department of Communications announced in October 2012 that a Gender and ICT strategy had been finalized, which includes the establishment of a national Women and ICT Forum (Rasool, 2012).

Also at the executive level, gender focal points are located in all national government departments. Their main task is to ensure the effective implementation of the national gender framework at an operational level. They are responsible for ensuring the integration of a gender perspective into all policy and implementation activities. Success of the focal points has however been varied (James et al., 2006). Examples of gender focal points include the Gender and Women Empowerment Unit in the Department of Trade and Industry, and the Gender Equity Directorate in the Department of Education.

In addition, the Women's Parliamentary Caucus is a multi-party caucus in which women in Parliament can discuss and debate gender issues and provide capacity-building initiatives for women in Parliament. Parliament also has established a Joint Monitoring Committee on the Improvement of Quality of Life and Status of Women. The functions of this committee are to, among others, ensure that legislation before Parliament is gender sensitive and to encourage the public, particularly women, to participate in the law making process. It also monitors the state's obligations to the Convention on the Elimination Discrimination against Women and the Beijing Platform for Action and other applicable international instruments. The committee is also required to monitor the work of government departments in meeting the objectives of gender equality and equity (James et al., 2006). A new Parliamentary Portfolio Committee to act as a legislative body to promote and protection of the rights of women and the attainment of gender equality has also been set up. It also oversees the rights of children and persons with disabilities (Xingwane, 2011a).

In the gender policy framework for local government, introduced by the then Department of Provincial and Local Government in 2007, an outline is provided of the structures that will constitute the gender focal points at the level municipalities (DPLG, 2007). These include, amongst others, a gender manager in the office of the major or municipal manager, tasked with the responsibility of ensuring that gender issues are incorporated in the processes of the relevant municipality.

Moreover, a number of independent statutory bodies have been established that are involved in gender issues. These include the Commission on Gender Equality, the Human Rights Commission, the Independent Electoral Commission, the Public Protector, the Public Service Commission, the Youth Commission, the Land Commission, and the South African Law Commission. The Commission on Gender Equality is an independent statutory body established to monitor the progress and achievements towards gender equality, with offices throughout the country. There have been numerous changes in leadership and the appointments of commissioners within the committee, which has given rise to problems in terms of direction and delivery (James et al., 2006). The functions of the Commission on Gender Equality form part of the departmental budget of the Ministry for Women, Children and Persons with Disabilities (MWCPD, 2010a).

Although South Africa's multi-agency national gender machinery is globally acknowledged as one of the most advanced machineries, lack of financial and human resources limited it from achieving its objective of transforming women's lives (Xingwana, 2011b).

South Africa has committed itself to a number of international and regional instruments that promote the development of women in all spheres of life. These include:

- Beijing Declaration and Platform for Action (1995)
- Convention on the Elimination of All Forms of forms of Discrimination Against Women (CEDAW) ratified in 1995
- United Nations Millennium Development Goals (MDGs) of halving poverty and unemployment by 2014
- The Commonwealth Plan of Action for Gender Equality 2005-2015
- SADC Declaration on Gender and Development and its Addendum on Violence Against Women
- Protocol to the African Charter on Human and People's Rights on the Rights of Women in Africa (2003).

USA

U.S. laws prohibit gender discrimination in school enrollment, in hiring and pay, in automatic preferences for males to receive inheritances, in property ownership, and in denying credit. Although U.S. laws show a commitment to end discrimination against women, the U.S. has not ratified the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW).

In 2009 President Obama signed an Executive Order creating the White House Council on Women and Girls. The mission of the Council is to provide a coordinated federal response to the challenges confronted by women and girls and to ensure that all Cabinet and Cabinet-level agencies consider how their policies and programmes impact women and families. The Council will be chaired by one of the president's senior advisors, and will include as members cabinet-level federal agencies.

Every state has a compulsory school attendance law making it illegal for children outside of a certain age range not to be enrolled in school. In many states, the age range is 6 to 16. Moreover, it is illegal to exclude students, based on their sex, from participation in any education programme or activity that receives federal financial assistance.

Women have the right to work outside the home, rights to the same minimum wages as men, the right to work without being sexually harassed, and the right to work when they are pregnant (Ephraim, 2012).

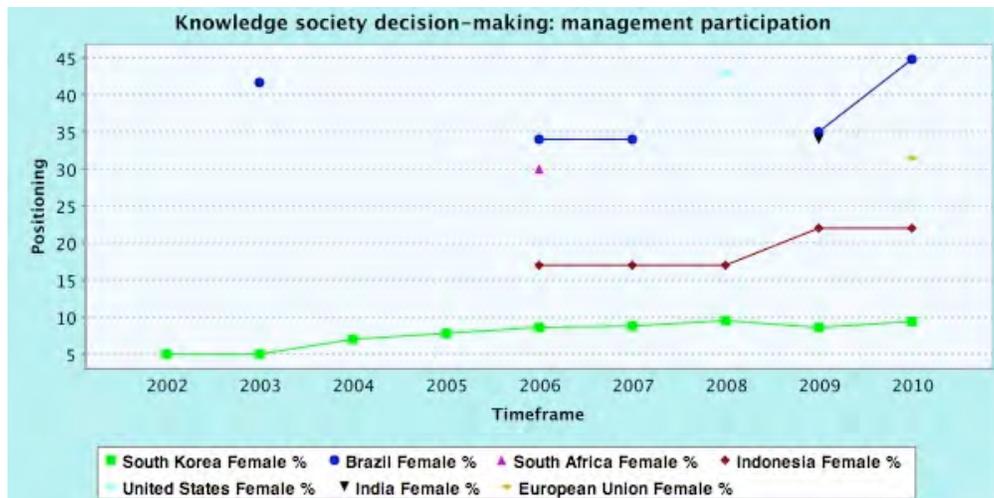
KNOWLEDGE SOCIETY DECISION-MAKING

The ability of women to participate in governing and decision making in the knowledge society is a key equality indicator. It refers to the participation of women in setting research and funding agendas, providing leadership in research programmes and policy, and in seeing their concerns and priorities reflected in KS decisions. The GE&KS framework measures women's representation in several key decision-making positions: national and sub-national legislative bodies, as senior officials and managers in relevant government departments, women in leadership in science, and by the share of businesses with 35 percent or more women in decision-making positions.

One of the major findings of this review is that increasing the representation of women in KS decision making is not an automatic result of "getting more women in" to the STI and knowledge society system. As noted by Abreu in the Brazil study, "in spite of a legal framework of gender equality and the strong inroads women have made in education and science, the [KS] outcome indicators show how difficult it is to achieve a significant representation of women in the higher levels of decision making, in the higher levels of the economy, the highest levels of an academic career and in the science and technology system (Abreu, 2012, p. 32)."

Management participation

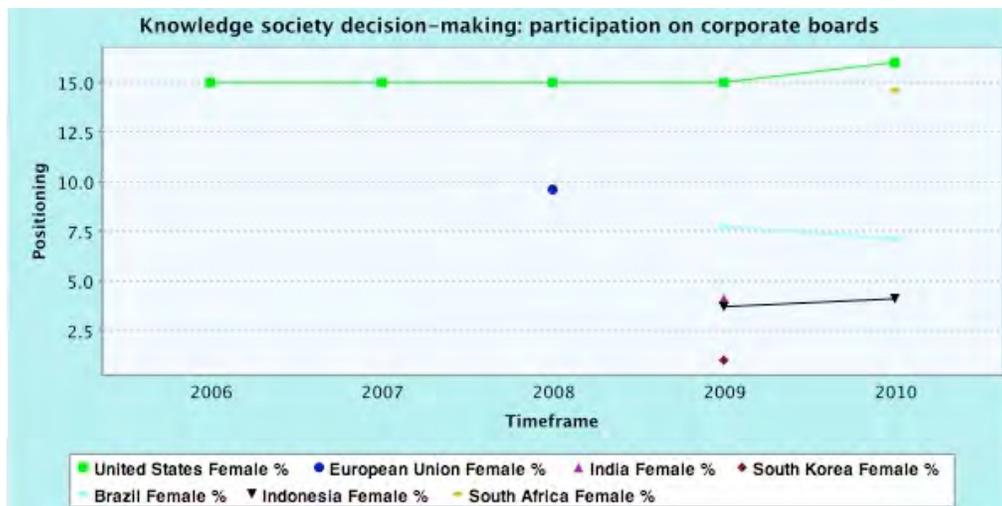
Percentage of legislators, senior officials and managers that are female.



Brazil shows the greatest participation of females throughout (although there is a dip in the second half of the first decade), as does South Africa (data for one year), followed by the US, India and the EU. While the Republic of Korea experienced the largest increase, from 5% to 9.4%, over the decade it remains at the lowest level of all countries surveyed. (It is also the only country to have data for every year from 2002-2010). Levels in Indonesia improved from 17 to 22%.

Participation on corporate boards

Percentage of members of corporate boards that are female.



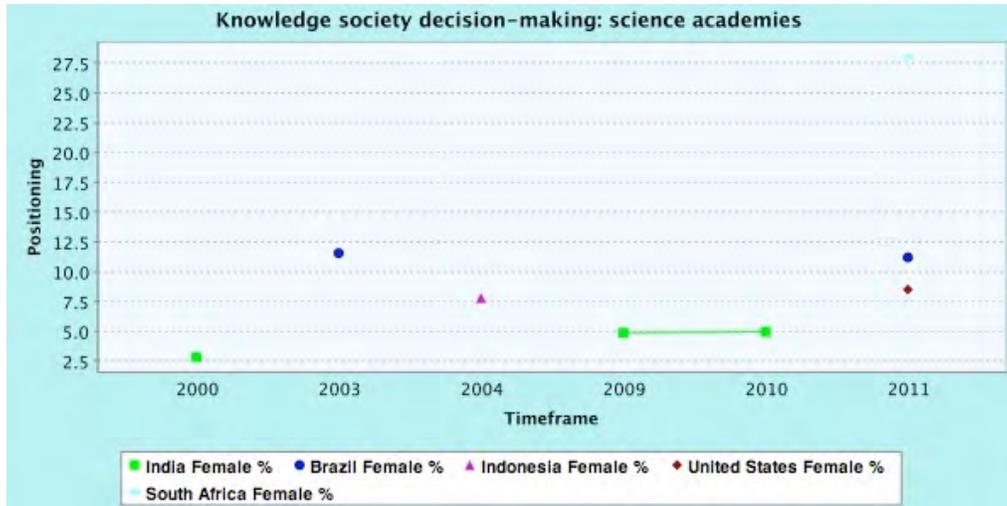
The data are insufficient to analyse country trends, but one conclusion is clear. Women's participation on major corporate boards is very low in all the countries surveyed. Only the US (at 15-16%) and South Africa (14.6%) show percentages beyond single digits in any year. The EU percentage of 9.6 is an average brought up significantly by three Scandinavian countries with averages above 20%¹⁵. The other countries are between 3.7% and 4.1%, except the Republic of Korea, which comes in at an abysmal worst-case scenario of 1%. The India example is illustrative:

Governance Metrics International in their assessment of 54 companies found the average % of women on boards as 4.1. According to one study, only 26.1% of the listed companies (392 of 1,500 firms) have a woman on their board. Out of the 278 directors on the BSE Sensex (Bombay Stock Exchange) there are only 10 women directors. When compared to global counterparts corporate India stands below average. Over 77% of the 200 largest companies in the world, as ranked by Fortune, had at least one women director on their board as of 2006 compared to this only 36% of Indian companies have women holding senior management positions as compared to 91. According to a survey by international executive research firm, EMA Partners International, around 11 per cent of Indian companies have women CEOs, while in the case of Fortune 500 list from the US, the women CEOs just account for 3 per cent of the total consideration set. A sector-wise analysis shows that in India, over half the women CEOs (54 per cent) hail from the banking and financial services sector, followed by media and life sciences (11 per cent) each (Nair, 2012).

¹⁵ Finland, Norway and Sweden.

Science academies

Percentage of members of national scientific academies who are women.

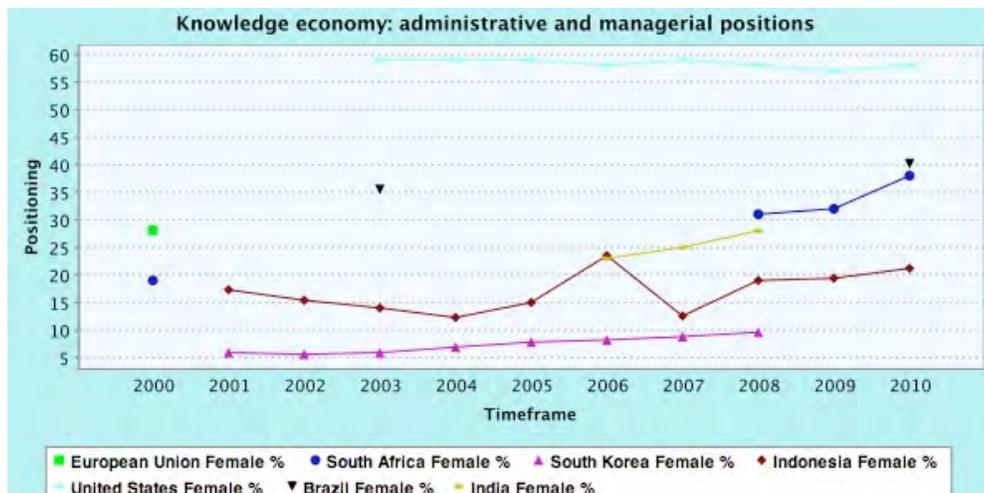


This is an important indicator of who is recognized as a leader and eminent researcher in the national science community, and who sets the scientific agenda in a country. Academies also work with governments and universities to set policy and programme priorities.

With the exception of South Africa (28% in 2010), female representation in science decision-making is similar to that in the corporate sector: most academies have less than 12% female representation. Yearly data on this would be enlightening, in order to understand how and whether academies are taking active steps for progress in this area. The EU reported no data on a regional basis, and the Republic of Korea reported no female members in its national science academy.

Administrative and managerial positions

Percentage of women of legislators, senior government administrators, traditional chiefs and heads of villages and administrators of special interest organizations; corporate managers such as chief executives and general managers, as well as specialized managers and managing supervisors.



This indicator shows a far greater range between countries/areas than “professional and technical positions” (see below). The US is in the lead by far here, with a consistent average of 58% throughout the decade. Brazil is in second place, at 40% – more than one-third less than the US representation (however, Brazil’s figure did not include the public sector, where women have shown a preference to work). India and South Africa ranged from an average of one quarter to 38% over the period, while Indonesia reached a high of 24% in 2006 and went down to 21% in 2010. The Republic of Korea showed a very low 9.6% in 2008. It is to be noted that South Africa saw a 100% increase over the decade, while in the Republic of Korea the share of women in administration and management increased by 3 percentage points.

University research leadership

Percentage of presidents, chancellors/vice chancellors of universities and/or research institutes that are women.

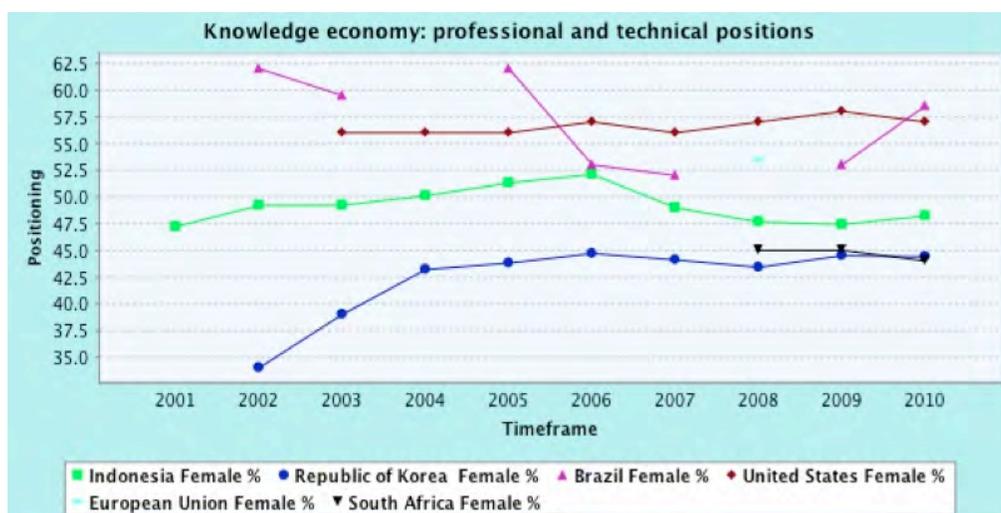
Little data is available on this indicator. Brazil reported 10.9% in 2009 and 13.8% in 2010 of public universities headed by a woman (although public universities represent only about 1/3 of Brazilian universities). The US shows 23% female college presidents in 2006, and South Africa shows 17% in 2011. No country/area showed data on female heads of research institutes.

KNOWLEDGE ECONOMY

The share of women in professional and technical as well as in administrative and managerial positions indicates the status or profile of women in the knowledge economy. The level of women’s employment in key knowledge society areas is measured by looking at employment by economic activity (occupation and status). An important measure of movement toward the achievement of a knowledge economy is the presence of women with high levels of computer skills as well as of women working in information technology industries.

Professional and technical positions

Percentage held by women.



According to the International Standard Classification of Education (ISCED), this category includes natural science workers, technology professions, athletes, and those in social, communications and creative arts professions as well as health care and education. It profiles in a very general way the participation of females in the larger knowledge society labour force, including non-S&T as well as S&T related knowledge-based professions. While the numbers are consistently high in all reporting countries/areas (ranging from an average of 42.3% for Korea to 57% for both Brazil and the United States), researchers reported that most female employment at

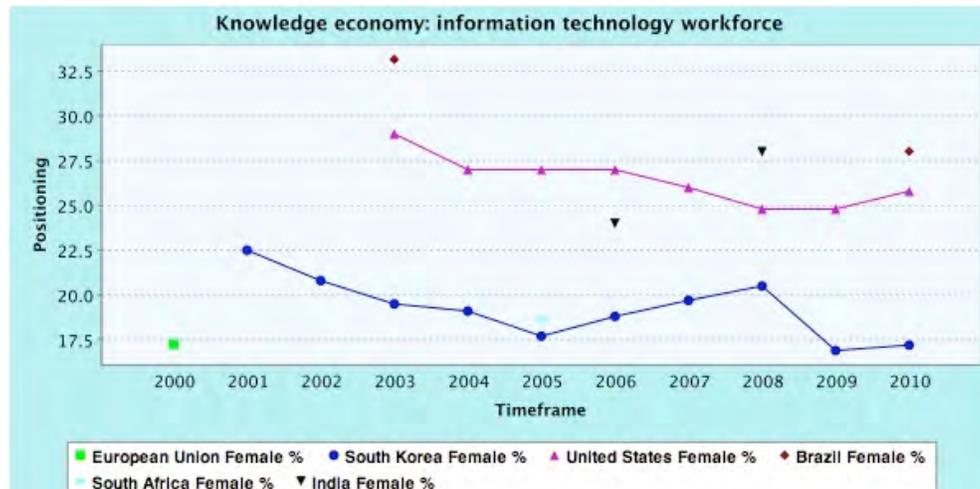
this level are in non-STI related fields in social welfare, health and education fields, and journalism and communications. The situation in the Republic of Korea provides an example of gender trends seen in other countries. The proportion of women in professional and technical occupations has remained at the 43-44% level for the past seven years, indicating that women are predominately found in health, social welfare and education-related fields. Nearly three-quarters of employees in those fields are women, while the proportion of women in engineering professional occupations is under ten percent (9.2%). Table 11 below indicates the concentration of females in non-STI related fields in India.

**Table 11. Women's employment in the organised sector by industrial activity, India
(Figures in thousands)**

Co de	Industria l activity	Public sector										Private Sector									
		199 1	199 5	200 0	200 1	200 2	200 3	200 4	20 05	200 6	200 7	199 1	199 5	200 0	200 1	200 2	200 3	200 4	20 05	200 6	200 7
0	Agricultur e, Forestry, Fishing and Hunting	51. 1	49. 7	48. 1	48. 3	43. 6	47. 8	47. 7	N A	58. 2	52. 7	446 .5	440 .6	461 .9	464 .4	419 .8	418 .7	411 .0	N A	438 .0	437 .9
1	Mining & Quarrying	62. 1	64. 6	57. 6	55. 6	55. 3	54. 3	66. 0	N A	77. 0	76. 5	16. 5	16. 0	8.9	8.4	6.9	6.6	7.3	N A	8.5	7.2
2& 3	Manufact uring	112 .3	125 .5	99. 1	93. 0	88. 1	86. 6	81. 5	N A	77. 7	77. 9	484 .3	606 .0	933 .9	937 .0	928 .0	923 .3	867 .9	N A	812 .7	866 .9
4	Electricity , Gas & Water	30. 5	35. 7	43. 6	44. 7	45. 4	46. 3	49. 7	N A	50. 4	51. 5	0.8	1.2	0.9	1.3	1.2	1.4	2.4	N A	2.2	1.8
5	Construct ion	55. 3	60. 9	64. 1	63. 2	63. 7	60. 5	62. 6	N A	61. 4	61. 6	6.0	3.9	4.0	4.0	3.8	3.7	3.4	N A	4.2	3.8
6	Wholesale & Retail Trade and Restaura nts and Hotels	13. 2	15. 1	16. 6	17. 4	17. 3	14. 0	14. 0	N A	13. 9	13. 6	21. 1	24. 2	29. 4	29. 4	30. 3	30. 5	32. 0	N A	34. 6	38. 0
7	Transport , Storage & Communi cations	136 .7	155 .6	170 .2	174 .9	178 .1	180 .3	179 .0	N A	180 .4	183 .0	3.2	4.4	6.8	8.1	8.3	8.7	10. 4	N A	10. 2	11. 9
8	Finance, Insurance , Real Estate & Business Services	146 .8	167 .7	181 .1	184 .8	191 .1	202 .0	206 .0	N A	205 .7	199 .5	27. 4	36. 8	53. 9	60. 2	65. 1	72. 3	81. 2	N A	124 .1	213 .0
9	Communi ty, Social and Personal Services	173 8.8	192 5.7	217 6.1	217 7.2	220 4.1	221 2.7	218 3.6	N A	223 1.8	225 4.9	428 .4	494 .4	566 .1	577 .3	585 .4	598 .7	628 .8	N A	674 .9	706 .1
	Total	234 6.8	260 0.4	285 7.0	285 9.2	288 6.7	290 4.7	289 0.0	N A	295 6.5	297 1.2	143 4.2	162 7.5	206 5.8	209 0.1	204 8.7	206 3.7	204 4.4	N A	210 9.3	228 6.6

Information technology workforce

Percentage of information technology workers that are women.



A direct indicator of women's participation in STI, this indicator sees a drop in rates of female employment over the last decade in the countries with the highest female percentage. Brazil, (with the highest representation) saw a decrease between 2003 and 2010 from 33 to 28%. Comprehensive data were available only from the US and the Republic of Korea, but in both countries female participation in the sector dropped significantly over the decade from 29% in the US and 22.5% in Korea, to 25% and 17.2% respectively. India, however, saw an increase of four points to 28% from 2006 and 2008.

A report by the South African National Advisory Council on Innovation (NACI, 2009) provides a good overview of the issues and challenges identified by women in the ICT sector in most countries. James et al (2006) identified challenges relating to societal issues such as work/life balance and conflict, the under-valuing of women's contributions in the workplace, and the negative perception and stereotyping of women in general, among others. There are, however, specific issues that relate to the ICT sector:

- The lower levels of access to ICTs by women and girls as compared to their male counterparts, particularly in under-served rural areas;
- The absence of female role-models;
- The fast-moving pace of the ICT sector into which re-entry is very difficult; and
- The lack of available guidance on ICT as a career arena (James et al, 2006).

Data on race as well as gender representation in the sector in South Africa indicate that numbers of black and white male professionals increased over 1996 to 2005, while the numbers of their female counterparts decreased. In terms of annual average growth over the period, black male and white male representation increased by 2.3% and 2.5% respectively. Simultaneously, the average annual employment of black and white females declined by 2.2% and 1.1% respectively, between 1996 and 2005 (Roodt & Paterson, 2008).

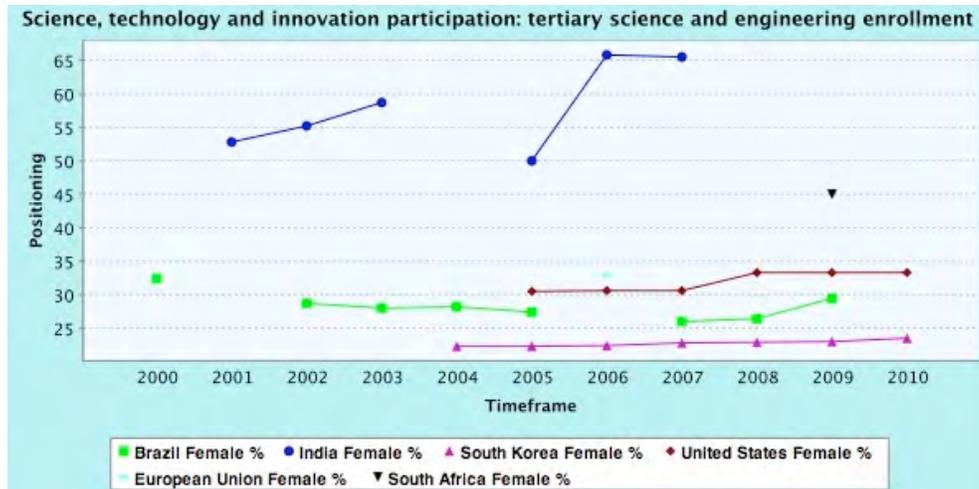
SCIENCE, TECHNOLOGY AND INNOVATION PARTICIPATION

Perhaps the most important pillar of the knowledge society is science, technology and innovation in promoting long-term economic growth, innovation and research, building the basis for a science-based knowledge society and improving infrastructure and the quality of life for all members of society. Measurement issues particularly relating to women's participation in STI

include: human capacity utilization in the SET sector of research and industry; economic opportunities and status; participation and ownership in the private sector; economic use of and benefit from technologies; and participation in both their development and distribution. It goes without saying that in order for either men or women to participate meaningfully in the knowledge society the necessary infrastructure must exist.

Tertiary science and engineering enrollment

Percentage of people enrolled in tertiary science and engineering programmes that are women.

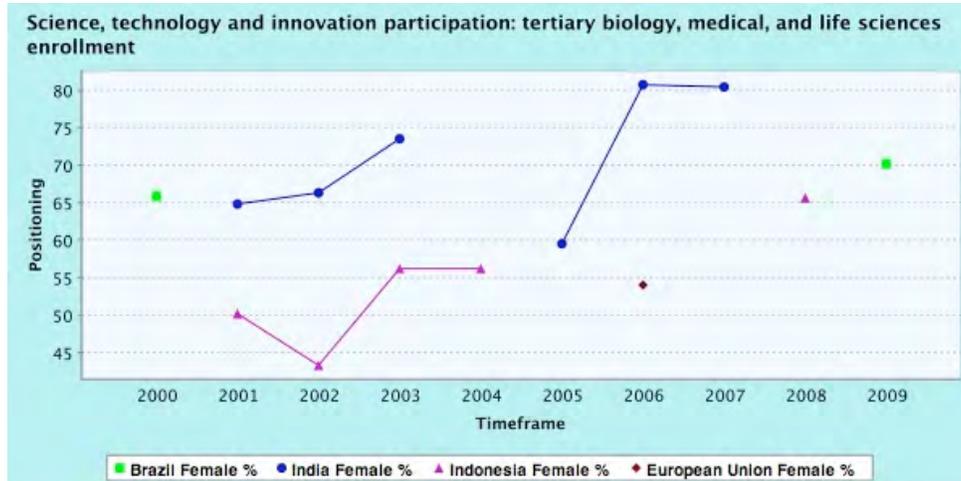


This standard statistical category includes biology, medical science, nursing and pharmacy – in all of which women are highly represented – as well as all other scientific, technological and engineering disciplines. The figures are highest (and rising) in India at 65.6% and South Africa at 45%. Others follow with percentages close to half that of the India – the US moving from 30.5% - 33.3%, Brazil at 29.5% and Korea at 23.5%. The figures for all are rising, with the exception of Brazil's, which experienced a drop from 32.4% to 29.5% over the decade. The EU average was 33% in 2006.

The Republic of Korea case illustrates trends evident in most of the other countries in this study, with a high level of enrolment of females in medical and biological sciences, and a very low rate in natural sciences, computer and engineering sciences (see indicators below). These numbers drop from stage to stage of S&T education and research. In Korea, while the share of women enrolled in natural science exceeded 40% in 2010, women's participation comprised only 14% in engineering, with little change in women's enrollment in science and engineering fields since the mid-2000s. At the undergraduate level, the proportion of women in sciences increased slightly (43.2% in 2004 to 44.1% in 2010), and this share has also risen somewhat in engineering (12.9% to 14%). In 2010, women received proportionately fewer doctorates (36.6%) than master's degrees (49.1%) in the sciences, with the same pattern is seen in engineering : 14.6% in master's degrees dropping to 9.7% in doctoral degrees (Kim and Moon, 2011).

Tertiary biology, medical, and life sciences

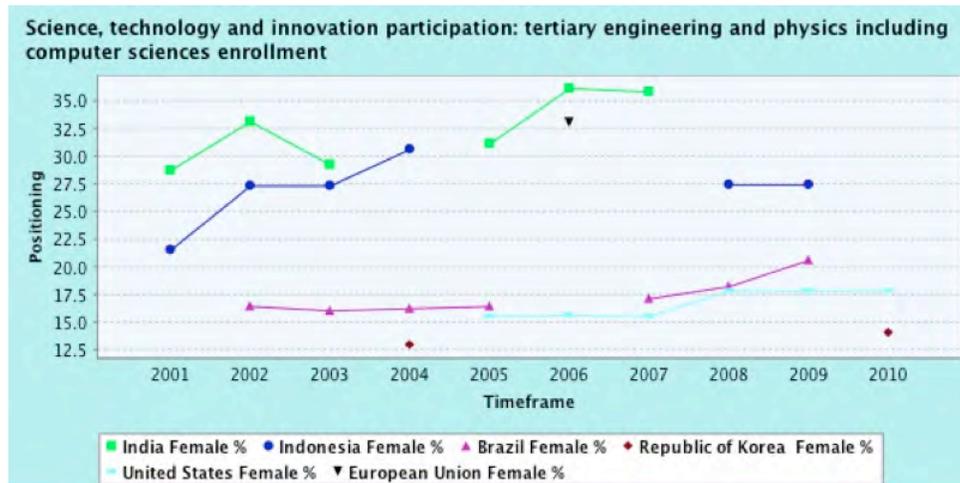
Percentage of people enrolled in tertiary biology, medical, and life sciences programmes that are women.



As shown here, if participation in engineering is dropped from the calculation, the representation of women increases. Of the countries providing data, the vast majority of university students in bio, medical and life sciences are female, ranging from 44% in Korea to 65.6% in Indonesia, 70.1% in Brazil and 80.4% in India.

Tertiary engineering and physics including computer sciences enrolment

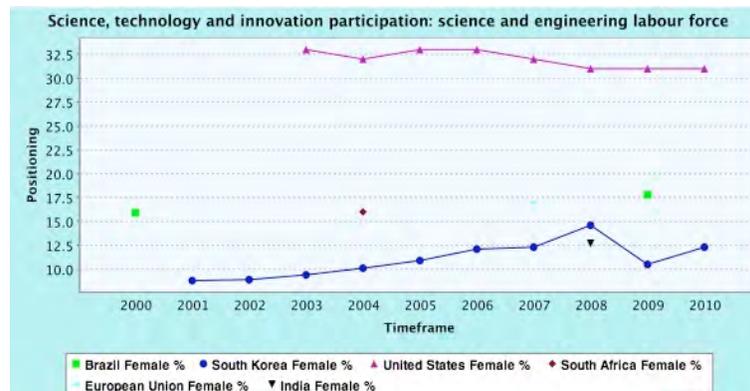
Percentage of people enrolled in engineering and physics including computer sciences programmes that are women.



The underrepresentation of women in physics, computer sciences and engineering fields is quite apparent upon examination of female enrollments in engineering and physics at the tertiary level. India shows the highest enrollment in these fields, at 35.8% in 2007. Female enrolment is 27.4% in Indonesia, 20.8% in Brazil, 17.8% in the US and 14% in the Republic of Korea. A positive sign is a trend of increasing percentages in all countries for which data is available.

Science and engineering labour force

Percentage of people in the science and engineering labour force that are women.



Rates of female participation drop substantially in most countries during the transition from S&E education to the S&E workforce force by about 30 points, indicating a substantial loss of females and the investment made in their education. This trend is representative of much of the world. Interestingly both Brazil and the Republic of Korea are unusual in that retention rates in the engineering and physics workforce are roughly commensurate with enrollment rates. The reasons for this are not entirely clear, however rates of enrolment in the Republic of Korea are also extremely low, so that systemic attrition may have occurred in earlier phases of S&E education. Some of the reasons for the positive translation rates in Brazil may include public and competition based processes for filling positions in the university and national research system, a comparatively high representation of females in many science disciplines and consistent public funding for tertiary and postgraduate students (see Abreu, 2012).¹⁶

A study in South Africa gives an insight into some of the reasons for this drop in participation, and loss of resources in the STI system (see Table 12). The Gender and Development Unit at the Human Sciences Research Council undertook a quantitative and qualitative assessment of the participation of women in the industrial science, engineering and technology sector for the South African Reference Group on Women in Science and Technology (SARG) of the National Advisory Council on Innovation. A questionnaire was administered to 90 women in SET companies across South Africa, of which 46% were working in state-owned enterprises. The respondents identified the work environment as a key factor in facilitating or inhibiting women's participation in the SET sector. For example, feedback on work performance, remuneration and promotion opportunities, gender relations in the workplace, race relations, mentorship and career development opportunities, and implications of a career on in SET for family life played a role in determining women's participation in the SET industry (NACI, 2008). In-depth interviews with 38 senior women and CEOs revealed additional factors that facilitate or inhibit women's recruitment, retention and advancement in industrial SET. These include the masculine image of science; gender-blind workplace policies with no emphasis on female constraints; the allocation of women into supportive roles; the challenge of balancing work and family responsibilities; gender discrimination and masculine organisational culture; sexual harassment; and the "glass ceiling" (NACI, 2008).

¹⁶ In the Republic of Korea, women's representation in the category of science professionals and related jobs has doubled from 13.8% in 2001 to 31.4% in 2010. The reasons for this are not clear and are thought to be caused primarily by increased representation of females as science professionals and related positions. However, the revision of occupational classification during the same period could have influenced this increase as well. Further, female science professionals tend to be employed at less than FTE Equivalents (Kim and Moon, 2012). Therefore this data has not been included in the comparison at this time.

Table 12. Challenges women face in SET during the life-cycle¹⁷

Life-cycle	Challenge
0-6 years	Boys and girls given differing perspectives on their SET capacity
7-18 years	Parents and school influence/impose gendered subject choices e.g. girls = arts; boys = maths & science
19-24 years	Both males & females enter science stream. But many girls experience obstacles, including science anxiety and leaky pipeline, so do not pursue SET studies through postgraduate levels and do not choose SET careers
21-25 years	More women opt out of SET system Difficulty securing economically viable positions
25-35 years	Career versus family Lack of gender sensitive mentoring programmes & role models
35-60 years	Glass ceiling effect: failure to acknowledge women's contributions & previous experience
60+ years	No structure for mentoring role related to opportunities for younger SET workforce Retirement and exclusion from decision-making Funding constraints for PhD studies and limited support for researcher development and publication

Source: NACI (2009)

PhDs in research institutes

Percentage of people with PhDs in research institutions that are women.

Women account for the majority of tertiary students in two-thirds of countries with available data. However, men continue to dominate the highest levels of study, accounting for 56% of PhD graduates and 71% of researchers (UNESCO, 2012). Little data were found for this indicator. In Indonesia, women comprised 18.4% of the category in 2004 and 21.8% in 2006. The EU showed 32% of this category as female in 2006.

Female researchers

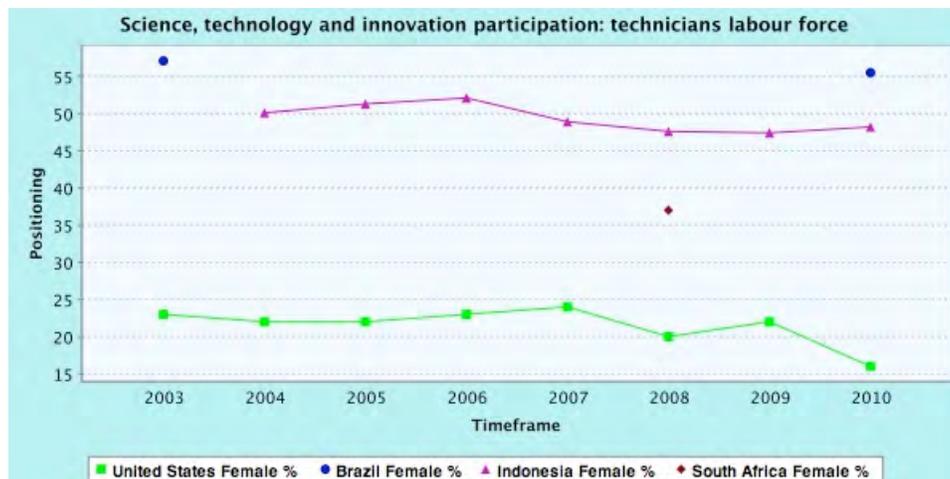
Number of female researchers as a share of the whole.

Little sex-disaggregated data is available for this indicator. In India in 2000 only 9.8% of researchers were women; by 2005 this figure had increased to 12.7%. South Africa showed 35.8% of researchers as female in 2003 and 38% in 2007, while the EU shows a consistent rate of 27-30%. The small amount of data available show a gradual upward trend.

¹⁷ See ASSAf, 2011 for more detailed information.

Technicians labour force

Percentage of people in the technician labour force that are women.



Strikingly, the three countries for which time series data are available all show declines in the percentage of women. In Brazil and Indonesia, with high percentages of women (from 47-57%), the decline was slight; in the US it was significant.

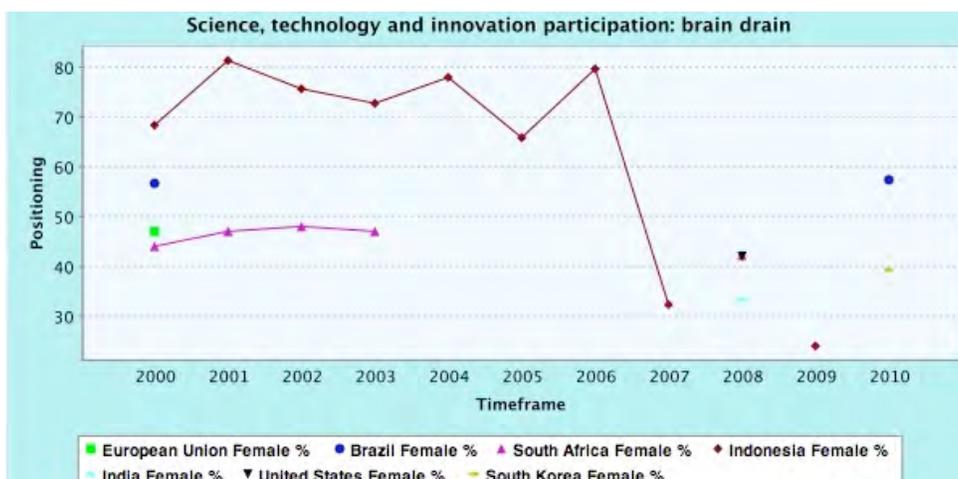
Refereed articles

Percentage of articles published in refereed journals that have female authorship.

Sex-disaggregated data are sparse for this indicator. In India 14.5% of refereed articles in the life sciences are authored by women. In South Africa women produced 22% of scientific articles in 2000 and 25% each in years 2002-2005.

Brain drain

Percentage of professionals emigrating that are women.



These data show a high rate for Brazil – with females making up 56.6% of skilled emigrants in 2000 and 57.4% in 2010. In Indonesia percentages were high from 2000, when they were at 68.3%, through to 2007 when there was a big drop to 32.3% and further to 24% in 2008. In Korea, 39.3% of this group are women, and in South Africa where the figures have been relatively consistent throughout the decade, women comprise an average of 42.2% of professionals who

emigrate. These trends indicate that in certain countries, more males than females participate in "brain drain". Reasons for these trends may include women's family responsibilities which keep them at home and lower levels of access to international networks (see Campion and Shrum, 2004). Understanding the sex, occupation and race breakdowns of national brain drain patterns could provide important insights for policy and education support programmes.

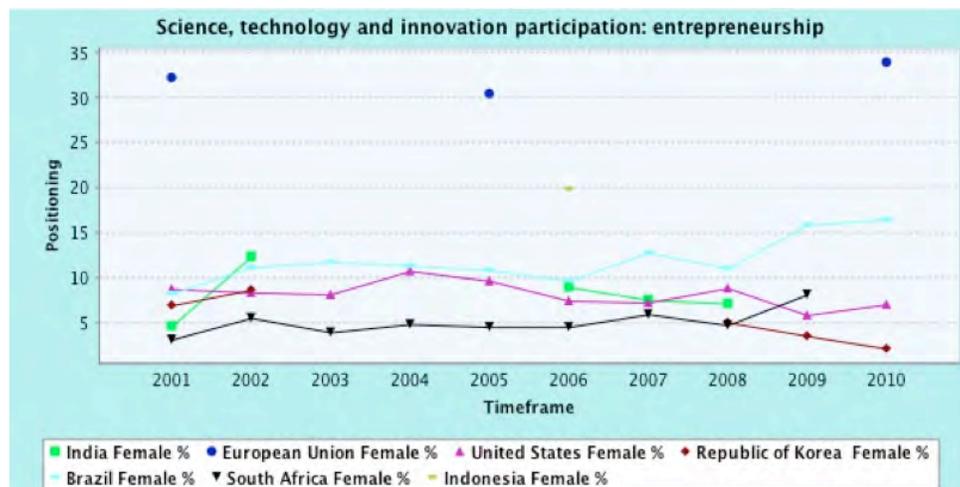
Women's participation in innovation

Female participation in innovation, i.e. in the private sector and entrepreneurial enterprises, is limited. In India, as in many other countries, women entrepreneurs tend not to join formal entrepreneurial organizations (Nair, 2012). Considering the high percentage of women in the nonformal, own-account, and self-employed sectors (ILO, 2002), this is an important gap for policy and planning for economic growth and innovation. Data here are available only from a few countries/regions and are not consistently collected. The available numbers indicate low participation and are not consistently compared or related to nonformal, own-account and self-employed work.

Entrepreneurship

Percentages of female and male new business entrepreneurship

Percentages of male and female 18-64 population who are either nascent entrepreneurs or owner-managers of a new business¹⁸



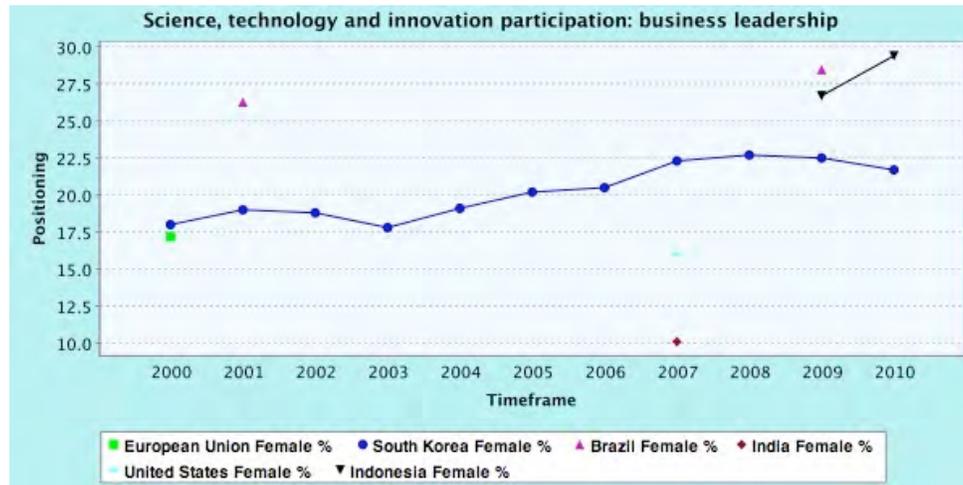
This is a significant area because a large percentage of new businesses are science and technology based, especially in the countries under study. Based on data from the Global Entrepreneurship Monitor, we see growth in some countries in the percentage of women relative to men who are owners of such businesses. The country/region with the highest level of participation by women is the EU at 33.8%; Indonesia follows at 19.8%, followed by Brazil (16.4%), South Africa (8%), India and the US (7%). The Republic of Korea has dropped steadily from 5% in 2008 to 3.5% in 2009 and 2.1% in 2010. These data are quite startling because the US and India are among the world leaders in entrepreneurial innovation. It is not a good situation if half of the population in those countries are among the least engaged globally in new entrepreneurial activity, which is frequently marked by technology innovation.

It should be noted that these data are misleading in part, since in many countries informal employment is generally a larger source of employment for women than formal sector activities. They work as own-account workers and small and micro enterprise owners whose economic activity is unlikely to appear in national accounts. In South Asia and Southeast Asia, this sector makes up the majority of employment for both females and males (ILO, 2002).

¹⁸ Appendix Two contains the data found for this indicator.

Business leadership

Percentage of businesses employing more than one person that are run by women.



The most recent data for female-run businesses (of more than one person) shows Indonesia at 29.4%, followed by Brazil at 28.5%, Korea at 21.7%, EU (data only for 2000) at 17.2%, and the US and India with 16 and 10.1% respectively. This is an area with room for substantive improvement in all countries.

South Africa provides some illustrative data: In the case of both women and men the majority tend to work for others as employees (more than 80%). However, men are more likely than women to provide employment to others (in 2011, 7.8% of men were employers compared to only 2.9% of women). Women, on the other hand, are slightly more successful than men in creating their own opportunities, given that there are respectively 10.3% and 8.6% own-account workers among women and men. Another interesting trend is that the proportion of women in self-employment appears to be decreasing (from 11.8% in 2008 to 10.3% in 2011) whereas for men it is increasing (from 7.5% in 2008 to 8.6% in 2011). This supports an earlier conclusion that female employment in the formal non-agricultural sector is increasing (ASSAf, 2011).

South Africa: Three initiatives supporting female entrepreneurship

The South African Women Entrepreneur's Network (SAWEN) is a flagship programme of the Department of Trade and Industry where women economic empowerment is applied in an effort to enhance their participation and contribution in the economy. SAWEN brings together women groups to address the unique challenges that face them. The programme is in direct response to the constitution in terms of contributing to gender equality and access to resources. SAWEN is also South Africa's response to the Beijing Platform Action Plan of 1995. The programme's strategic objective is that of strengthening the participation of women associations in the policy dialogue. As an umbrella body, SAWEN aims to represent and articulate the aspiration of all women entrepreneurs in South Africa by working closely with like-minded organisations and associations from various sectors of the economy in a concerted and structured fashion.

Technology for Women in Business (TWIB), which, since 1998, has helped women apply technology to support and grow their businesses, thereby assisting in the mainstreaming of women's businesses within the broader South African economy. TWIB was introduced to accelerate women's empowerment and women-owned enterprise development through the facilitation of technology-based business applications and systems and in the process, unlock constraints

to enterprise innovation and growth, as well as local and global competitiveness. TWIB's mandate extends to programmes that encourage girls to choose careers in engineering, science and technology by facilitating access to educational information, career opportunities, academic and extramural learning programmes, and by creating successful female role models.

Isivande Women's Fund (IWF) is an exclusive women's fund established by the Gender and Women Empowerment Unit at the Department of Trade and Industry, in partnership with the Old Mutual Masisizane Fund. The fund aims at accelerating women's economic empowerment by providing affordable, usable and responsive finance than is presently the case. IWF targets formally registered, 60% women owned and/or managed enterprises that have been existing and operating for two or more years with a loan range of 30 000 - 2 million¹⁹.

A study in 2010 by the US Department of Commerce, Economics and Statistics Administration identified key gender characteristics of entrepreneurship and self-employment in the country, which reflect the situation in other countries, both developed and developing:

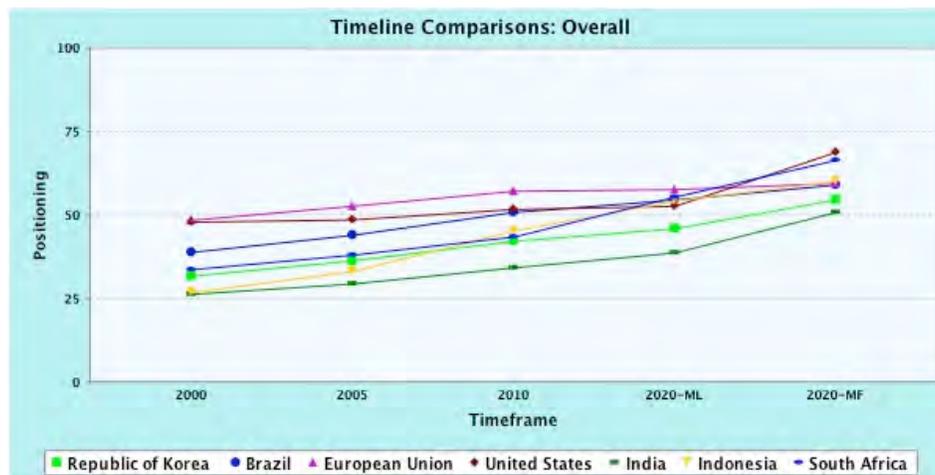
- Women-owned businesses are typically smaller than men-owned businesses. Although women own 30% of privately-held businesses which account for only 11% of sales and 13% of employment among privately-held companies. Average sales/receipts for women-owned businesses are only 25% of average sales/receipts for men-owned businesses. Women-owned businesses are concentrated in industry sectors where firms are typically smaller.
- Women-run businesses start with less capital than men and are less likely to take on additional debt to expand their businesses and to indicate that they do not need any financing to start their business. It is not known whether this is because women encounter less favorable loan conditions than men or if they are less willing to take on risk by seeking outside capital.
- Self-employed women make much less on average than self-employment men. The annual earnings ratio between self-employed women and men is 55%, well below the ratio between non-self-employed women and men (US Department of Commerce, Economics and Statistics Administration, 2010).

¹⁹ www.thedti.gov.za/economic_empowerment/women_empowerment.jsp

SECTION Three: Overview of National Comparisons

Overall position

The national comparisons presented here are based on current year data and preliminary future analyses. They are meant to present comparative graphic results and forecasts based on data collected so far. The future forecasting component of the graphs assesses potential ranking and improvement or deterioration in 2020 based on the Most Likely or current policy environment, and if all positive conditions are in place, the Most Favourable policy environment – or the most positive policies which are likely in view of current trends. This section will be updated and expanded as national experts in the GE&KS sectors participate in the GE&KS online survey (forthcoming).



The **European Union** as a composite ranks first overall, and first or second in every dimension. This is a remarkable result, considering the wide variation among countries in the EU in terms of social support, GDP, and promotion of STI.

The **United States and Brazil** are tied for second overall. The US ranks 5th in health, agency, social status. Its high overall status comes from a primary ranking in the opportunity and capability as well as the knowledge society decision-making dimensions – relating to educational levels of women and their positions in private sector decision-making. The US comes in second in economic status and access to resources but ranks lowest in enabling policies. While it ranks higher in other sectors, this finding indicates that a more favourable policy environment for the US could be an important strategy towards addressing economic competitors in other parts of the world and a strategy for regenerating economic growth after the economic crisis of 2008.

Brazil is ranked the highest of the so-called developing countries, coming in above even the Republic of Korea. It is third overall, first in women's participation in the knowledge economy and science, technology and innovation, as well as agency. It is second in health, opportunity and capability and enabling policy, and third in social status, economic status and access to resources. This showing can be attributed to a range of factors, including a strong emphasis on addressing social issues and reducing social inequalities. Specifically gender equality and women's rights have been a strong theme in the country, with steps taken to increase women's rights both inside and outside the home, increase their participation in education and employment, and improve their access to contraceptives. It has also implemented substantive policies and programmes to support S&T education for all, including substantive funding to research and education. Brazil makes substantial investments in S&T: the budget for the S&T Ministry has increased by almost 300% over the last ten years, so that today Brazil makes the largest investment in science and technology in Latin America and the Caribbean – about 1.4% of 71

its GDP. Its low ranking (4th) in knowledge society decision-making show where improvement needs to be made in addition to those areas where it ranks third. Interestingly, women spent more hours in unpaid work than men in all countries surveyed except Brazil. Brazil is an example of a country with a highly enabling policy environment for women as well as effective implementation strategies (see Abreu, 2012).

Indonesia is fourth overall, with an enabling policy environment and fourth ranking in most sectors which reflect a steady improvement over the last decade²⁰. Of the countries in this study, Indonesia collects the least sex-disaggregated data, with data not available for many of the indicators addressed here. Its positive enabling policy environment gives it a strong potential for improvement, however current levels of economic status, access to resources, agency, health and social status indicate a need to improve the actual status of women in the country.

South Africa ranks fifth overall but first in agency. It ranks highly also in knowledge society decision-making (2), third in social status, and fourth (although close to the higher ranked countries) in science, technology and innovation participation. This is likely a result of a strong educational system, a policy focus on STI, and a quota system implemented in various sectors of society to promote diversity of participation by race and gender. Its high rate of HIV in the population puts it last in health, while it ranks 5th in access to resources. To address the high levels of poverty and marginalization among women in the country, South Africa's best practice so far has been the provision of a social security net to an increasing number of beneficiaries, the majority of whom are women. However, many challenges exist, in particular the increasingly gendered nature of poverty; the fact that the condition of women has not improved measurably, despite government interventions and infrastructure injection; the lack of funding for women's programmes; and the fact that rural women, children, people with disabilities and older persons remain the most vulnerable. Some of the strategies needed to address this include implementation of an integrated poverty eradication strategy, the targeting of the poorest families and marginalised communities with a basket of services; the need to strengthen the national gender machinery; and the creation of a special fund to support poverty eradication.

While it ranks first in health, the **Republic of Korea** comes in last in several sectors, including economic status, access to resources, enabling policy, knowledge economy and STI participation. This reflects the situation that even though it ranks third in opportunity and capability it sees a low level of female participation in public and economic life in both public and private sectors. This shows the country has failed to adequately support its women to participate actively in its economic success. While an enabling policy environment for gender equality in the knowledge society is well established and several institutes are working to improve women's status in diverse fields including STI, overall a low level of gender awareness exists in the country. Diverse laws and policies are encouraging considerable development and rapid advance in gender equality in the country over the past ten years. After the new millennium, female participation in STI system has made continual gradual progress, however the share of women in professional fields remains substantially lower than that of men and is well below the average for member countries of the OECD. In private enterprises where the laws and policies do not apply, women's progress has been slow, and the percentage of female-run enterprises is also extremely low. In these areas countermeasures for stabilizing women's access to knowledge society are needed. There are gaps between the law and social understanding and due to pro-active measures such as quotas for women, male backlash against the policies often emerges. *This picture demonstrates a glaring lack of correlation between national GDP and gender equality.*

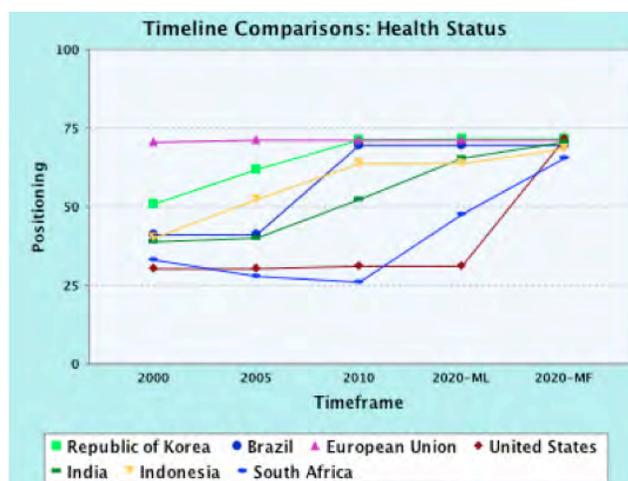
India ranks lowest overall and in most categories, except in economic status; knowledge economy, enabling policy; and health. While its enabling policy environment is positive and has been in place for many years, implementation and funding needs to improve before its women can equally benefit. The lower status of women in the country may contribute to India's ranking as

²⁰ Lack of data for many indicators means that Indonesia's ranking may change as more data and expert analysis are incorporated into the national assessment.

lowest of the BRIC countries in level of innovation, according to the Global Innovation Index 2012. The GII report notes that this is a result of "deficits in human capital and research, infrastructure and business sophistication, where it comes last among BRICs, and in knowledge and technology outputs, where it comes in ahead of Brazil only." Ensuring that women in the Indian population are enabled and supported to improve their health, access to resources and opportunities, and develop capacity to contribute to India's knowledge society is one obvious and immediate strategy for India to make up some of this gap. This can be achieved if national investment focuses on the key areas of health, education and skills development. Good quality employment and livelihood opportunities are also needed for youth, both males and females. There are definite signs of progress. It has achieved universal primary education enrollment for example and has a high rate of representation of females in the bio and life sciences. As well, with a labour force expected to increase by 32 per cent over the next twenty years, the country can improve its situation if it invests more in the key areas of health, education and skill development for better returns. In particular, it needs to ensure good quality employment and livelihood opportunities for youth both females and males.

The rationale for these rankings are broken down by dimension in the discussion below. Charts indicate the past and future trends based on data and expert assessments, to 2020. Two estimates are presented for 2020, that which is "most likely" given the current policy and implementation environment in a country, and "most favourable", or the best possible outcomes given the current policy environment.

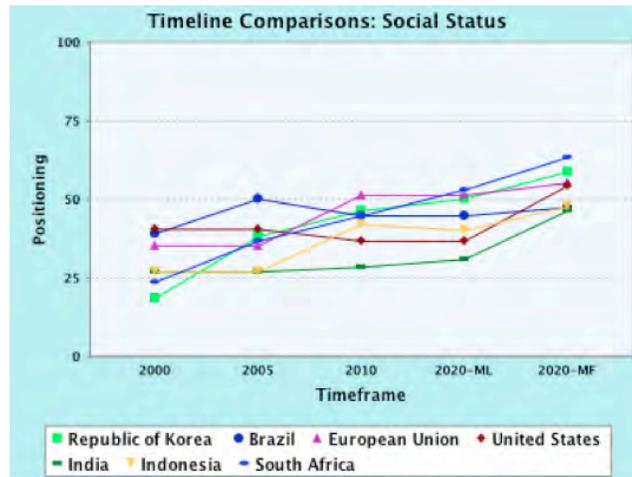
Health status



In terms of health status, The Republic of Korea and the EU show the highest ranking based on their high rankings in life expectancy and healthy life expectancy, in addition to low fertility rates. South Africa has the lowest ranking, based on the rate of HIV/AIDS infections among females in the country. Indonesia, Brazil and India are at the midpoint, with the US coming in just above South Africa.

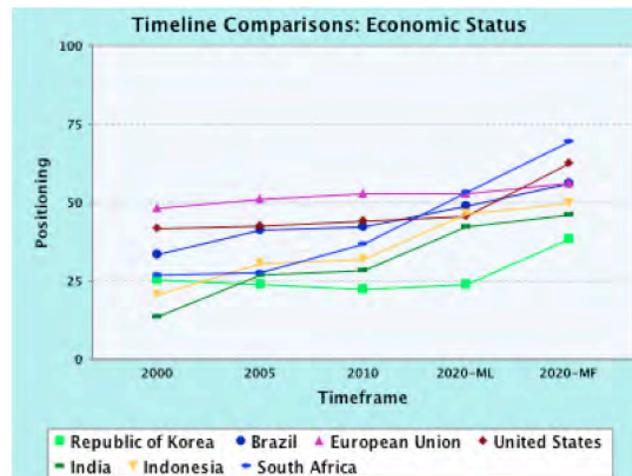
Based on current policy and data trends, Brazil, the US, the Republic of Korea and the EU are expected to remain more or less at the current levels over the next 10 years, with the remaining three countries expected to see a dramatic improvement. The low status of the US is likely caused by its medium-high rate for new HIV infections.

Social status



In terms of social status, all countries are ranked lower than in health. The Republic of Korea and the EU are at the top levels, with Brazil a close third. India is ranked the lowest, due primarily to a male-female sex ratio at birth that is higher than the global average, reported violence against women, and rankings of the major international gender equality indexes – Global Gender Gap (WEF) and Global Inequality Index (UNDP). The US ranks only slightly higher, its ranking due to not having signed CEDAW or having implemented an equal rights policy (ERA). Brazil's comparatively low ratio of unpaid work for women compared to men also contributes to its top ranking as does its positive policy environment. The rest of the countries are solidly clustered in the middle. For the Republic of Korea, this is partly due to the high percentage of unpaid work engaged in by women in comparison to men as well as low rates of violence against women. Most countries are expected to see an improvement in 2020 with the exception of Brazil, which is assessed to be doing all the right things in this dimension. The US is expected to see an improvement only if the most favourable policy environment comes into effect, while India, South Africa and the Republic of Korea are expected to see solid improvements in the current policy environment.

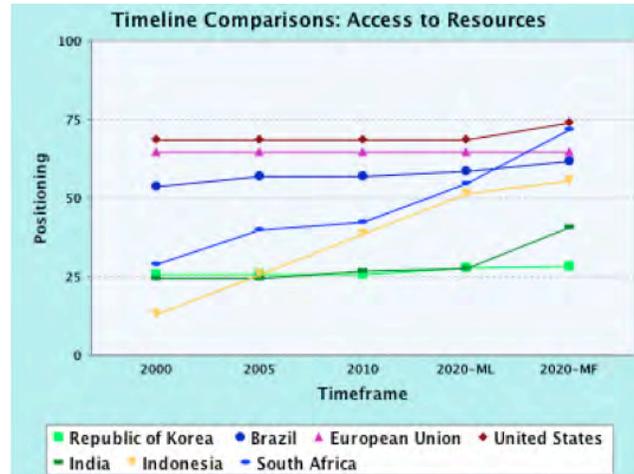
Economic status



The EU and the US are ranked first and second, respectively, with Brazil coming in a very close third. South Africa comes in fourth, followed by Indonesia, India and the Republic of Korea respectively. India shows the lowest participation of women in the paid economy in general, with

low participation in the paid labour force, high participation in the agricultural labour force (which tends to be low-paid) and low wages for women in comparison with men. The Republic of Korea's low ranking is mostly a result of less than 50% of women participating in the paid labour force as well as low comparative wages.

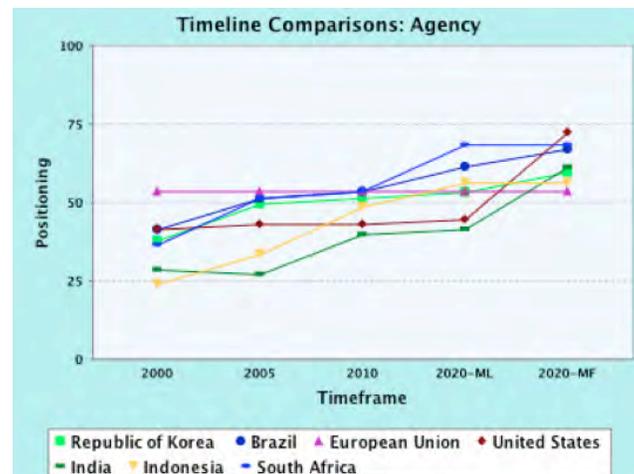
Access to resources



In access to resources, five of the seven countries/regions ranked are showing consistently fairly high rates from 2000-2020. Results for South Africa and Indonesia show improving trends in access to resources, as measured here by access to land, property, credit, internet and mobile communications, transportation and electricity. India shows a slight increase between 2000 and 2010, with potential for substantive change only if the most favourable policy environment is put into place and acted upon. Low levels of access to resources for women will indicate great difficulty for women to contribute to and benefit equally from opportunities in the knowledge society.

Brazil is in third place, despite its comparatively low level of access to internet (below 40% for the female population and 41% for males), which is lower than Indonesia. Use of mobiles in that country is above 50%, as is the case for all countries reporting data. Indonesia's steady increase likely relates in part to improvements in overall quality of infrastructure and electricity use, which bodes well if current policies continue and are built upon.

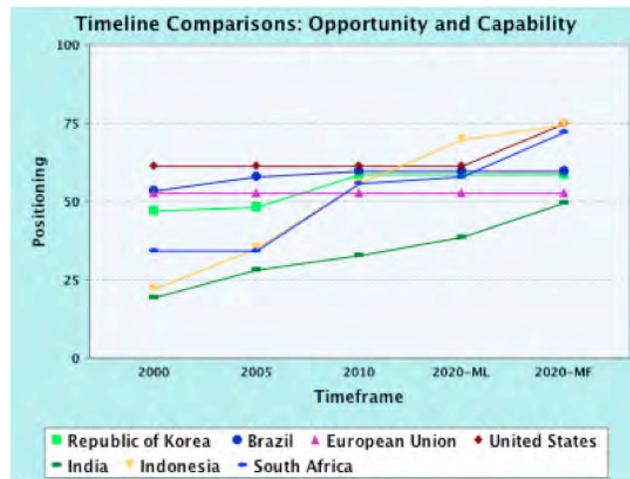
Agency



As measured by leadership and decision-making at personal levels, agency here is primarily quantified by women’s representation in parliaments, local governments and as senior ministers. Brazil, South Africa and the EU are tied for first, with the Republic of Korea a close second. India and the US are at the bottom.

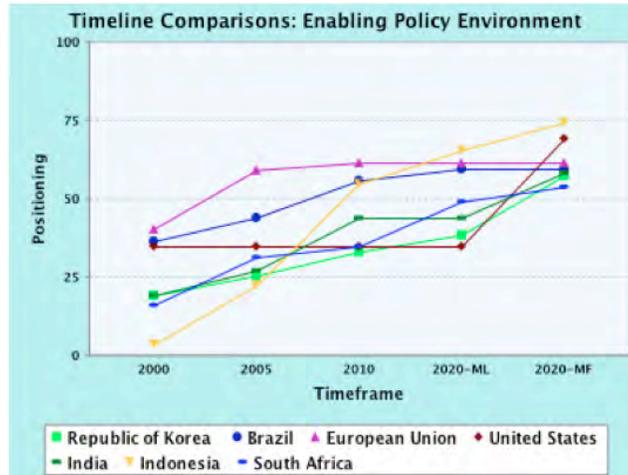
In general, representation of women in parliaments, as ministers and at the local government level is extremely low. South Africa’s high ranking comes from its approximately 30% representation of females in each level, a result of a quota system implemented after apartheid. Brazil has some potential to increase its ranking, while is considered to have potential to dramatically increase its ranking given the most favourable policy environment.

Opportunity and capability



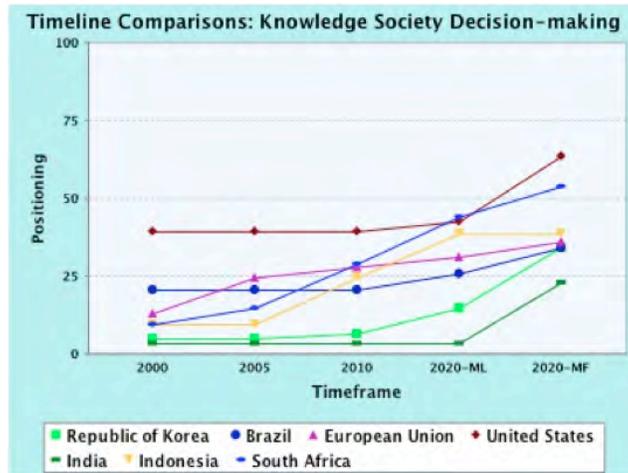
The rankings for most countries are much higher for this dimension, which includes access to education in general, literacy, and lifelong learning. India’s low ranking results from its high proportion of illiteracy among women. South Africa’s rate is somewhat higher at 87% of women, while the rest of the areas under study are at universal literacy. The same situation holds true for gender parity in education at lower levels and a slight advantage in favour of females at higher levels – which occurs for most of the countries under study with the exception of the Republic of Korea, which together with India and Indonesia sees more males enrolled at the tertiary level than females. The Republic of Korea’s slightly lower ranking also stems from its lack of consistent funding support programmes in tertiary level education and no formal adult education policy. Access to and use of distance and lifelong learning opportunities by women in the US, EU and Brazil also contributed to higher rankings in this area.

Enabling policy environment



In Enabling Policy Environment, we look at knowledge society-related policies and assess their attention to gender issues. The assumption is that while policy is not useful without implementation and programming, it is a first step towards integrating gender equality into the national knowledge society. Brazil, the EU and Indonesia are at the top in this ranking, followed, interestingly, by India. The Republic of Korea is lowest ranked, although the US and South Africa are also low. This could indicate that a more favourable policy environment for the US in this area could be an important strategy towards addressing international economic and innovation competition in Asia, and a strategy for regenerating economic growth after the economic crisis of 2010.

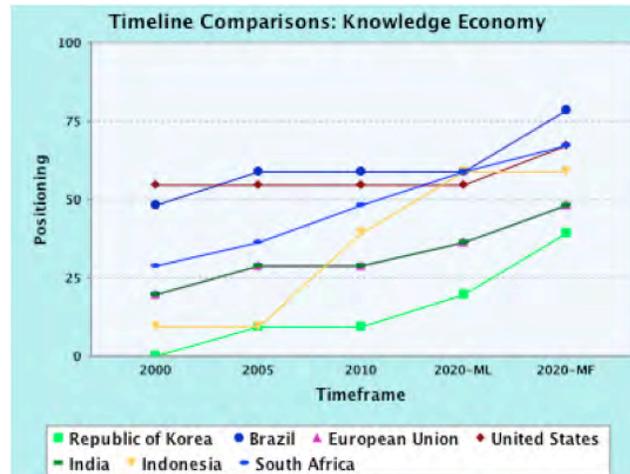
Knowledge society decision-making



Despite a comparatively high representation of gender in the STI dimension in some countries, the representation of women in the decision-making of this sector – in universities, science academies and corporate boards – remains extremely low. The situation in the US, while the highest of the countries in the study, has remained flat since 2000 and the most likely scenario continues that trend. In the other countries there has been a steady increase, although the representation of women in this sector remains extremely low in all countries and regions. India and the Republic of Korea are ranked the lowest. The Republic of Korea ranking is a bit surprising given the emphasis of that country on developing its STI sector and the growth it has experienced. This result indicates that women have not benefitted as greatly as men in advancing

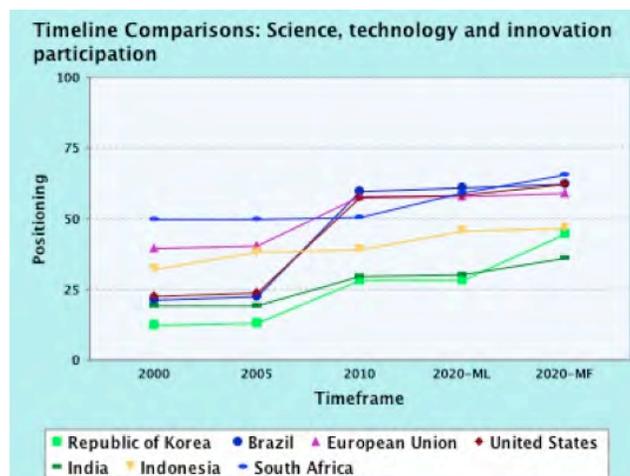
and participating in the sector, and that unless concrete steps are taken to change this, the prospects for improvement of this trend remain quite low. Conversely, promoting change in this dimension in both the Republic of Korea and India poses real potential for generating rapid progress.

Knowledge Economy



Comprising representation in professional and technical positions, IT workforce and administrative and management positions, this dimension has a low showing on the part of the Republic of Korea and India once again, with low participation of women in these important knowledge economy sectors. However, the Republic of Korea does show indications of improvement. If current trends continue and a favourable policy environment takes effect. South Africa and EU are clustered in the middle, with Indonesia showing surprising progress over the last five years, with potentially more to come. Finally Brazil ranks highest overall, followed closely by the US, with the second ranking in administrative and managerial positions (the US is highest), and the highest comparative representation of females in the IT workforce.

Science, technology and innovation participation



This dimension/sector includes S&E education, workforce participation, professional outputs, and participation in entrepreneurship leadership. Of the countries and regions under study Brazil and the US show the most dramatic increases. Both are ranked highest with the EU, although Brazil is the highest of all by a slight margin. The ranking of Brazil is based primarily on female representation in the S&E sector, although females are also strongly present in entrepreneurship

in the country. All countries show progress to date with the exception of South Africa, although it shows some potential for improvement over the next 10 years. Indonesia has also shown substantive improvements, as has the Republic of Korea, with a potential for moderate gains. While India has a high representation of females in its S&E sector, the participation of females at the top levels of the sector, and in the formal entrepreneurship sector are low, indicating poor prospects for females in innovation in the country at this time. The high representation of females in the informal sector in India could pose a potential resource if improved support and resources can be directed towards this sector.

SECTION FOUR: Relationships between dimensions – Key inputs

In an attempt to assess the relative influence of input areas on achieving great female participation in STI – or the knowledge society, the following charts show results when dimensions are mapped against overall Outcome rankings. Outcomes (on a score out of 10) are mapped to the y axis, and the dimension in question (also on a score out of 10) to the x axis.

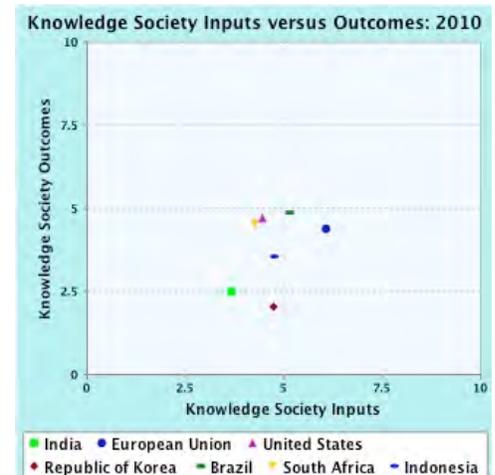
The x/y position represents the position resulting from the comparison, providing a visual representation of the relationship between the sector and Knowledge Society Outcomes, if any significant relationship exists.

A high score on both axes will be up and to the right. If there is a strong relationship or correlation between the dimension area and Outcomes, a straight line will appear from lower left to top right between the two axes, showing a roughly close relation. This would mean that a low or a high score on one axis may be associated with a low or high score on the other axis. More dots along this line mean that there is a greater correlation in the countries and the dimension in consideration has the potential to have a strong influence on encouraging women's STI participation.

In this analysis it must be stressed that low levels of sex-disaggregated data in different sectors in all countries are affecting results. Further inputs from expert analysis and national surveys will be implemented to provide additional data to correct any imbalances. This analysis is to be considered a preliminary assessment only, indicating areas of concern and general trends.

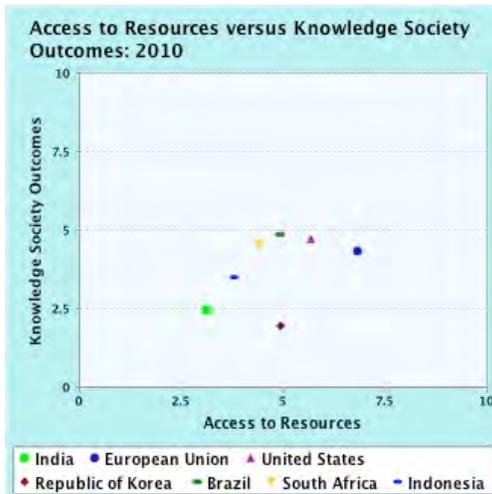
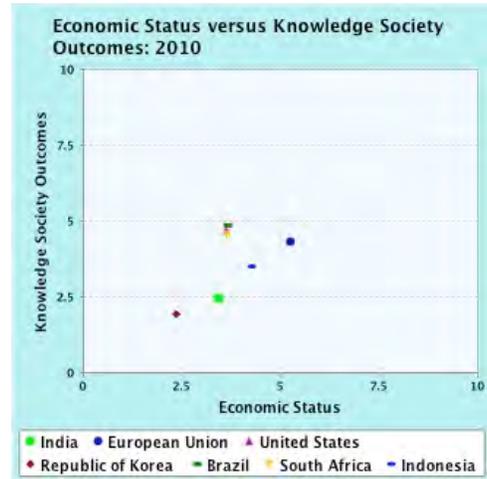
Overall Knowledge Society Inputs versus Outcomes

In looking at the overall relationship between all dimensions of the GE&KS-defined Inputs and Outcomes for women's participation in a national knowledge society, we see some interesting trends. A fairly strong relationship is seen between GE&KS Inputs and knowledge society Outcomes in the leading countries of this study – Brazil, the United States and the EU. Reading from left to right, Brazil is in second place in terms of KS Inputs which are generating the highest level of KS outcomes of all the countries. The US has a comparatively high level of KS Outcomes, albeit with lower inputs than all other countries except South Africa (which has a roughly equivalent position to the US) and the Republic of Korea. This shows that with some moderate investment in inputs, the US could enormously increase the contributions of women to its STI sector and knowledge society –increasing its economic growth. The EU shows the highest rate of KS inputs, but comes in fourth in KS Outcomes, indicating that there continue to be serious barriers to female participation in its knowledge society that will emerge in the dimension comparisons below. South Africa similarly has a fairly high showing in KS outcomes, primarily as a result of its agency ranking and its supportive policy and programme environment for women in the science and engineering sector. The Republic of Korea, with middling KS Inputs, comes in last on KS Outcomes, behind India.



Economic Status vs KS Outcomes

Results indicate a strong relationship between higher economic status for women and KS Outcomes. Higher economic status here is determined by women’s participation in the workforce, their income as compared to men, quality / sector of employment (i.e. high percentages of employment in the agricultural labour force tends to go with low-paid work and lower economic status, income of female-headed households as compared to male-headed households, and levels of poverty. All countries are roughly aligned along the diagonal line from bottom left to top right, with South Africa and Brazil showing a weaker relationship between the two than the other countries, where there is a close to direct relationship. This indicates that other factors are more indicative for the two outlying countries, although the medium-high participation of women in the sector in those countries indicates that economic status remains a factor.

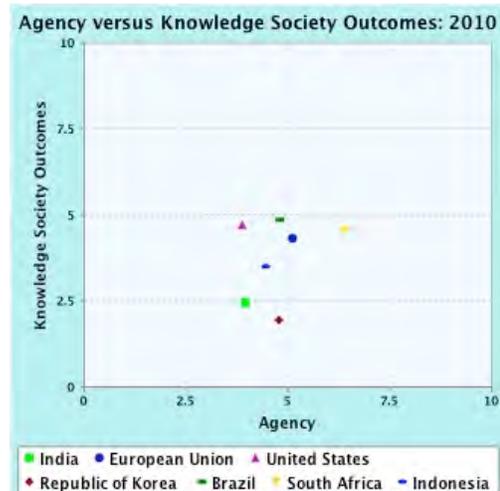


Access to Resources vs KS Outcomes

This dimension is another that shows a very close correlation with KS Outcomes, for five of the countries in this study. Again the EU and Republic of Korea, as well as the United States, do not follow this trend, with Korea once again showing the lowest ranking in KS Outcomes of all the countries studied. This means that while women in Korea may have access to resources, they are lacking in support and status in other dimensions. The EU and US show higher rates of access to resources for women that do not translate into equivalently high KS Outcomes, also meaning that gaps in other dimensions are affecting outcomes.

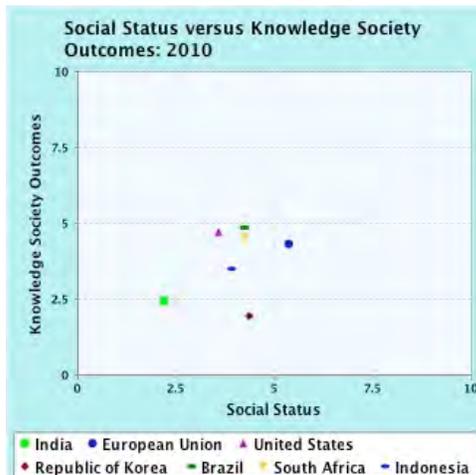
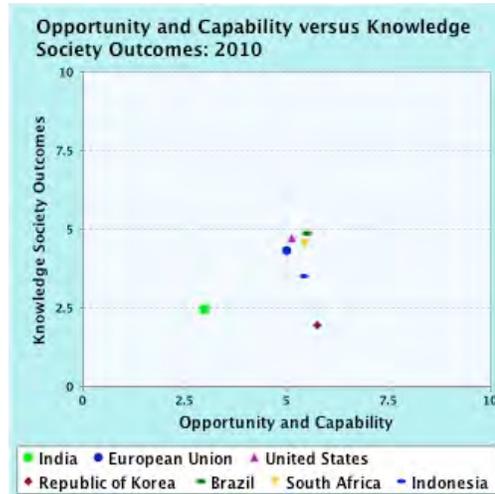
Agency versus KS Outcomes

With a very close correlation for three countries and a fairly close correlation for another three, agency is also significantly correlated with women's participation in the knowledge society. The exception here is South Africa, which has the highest ranking for agency – a result of high levels of women in parliament and government. This Agency status does not quite match its KS outcomes, but does contribute.



Opportunity and Capability vs KS Outcomes

The results for this dimension – which charts education and training opportunities and participation – indicate that while education is a necessary prerequisite for STI participation, it is not sufficient in itself. Five countries/regions are clustered along the diagonal from left to right with the exception of Indonesia and notably Korea, with a very high level of education of women which is not translated into equivalently high KS Outcomes. The results for India indicate that increasing education for women – particularly at higher levels – is one of the areas it must focus on to increase KS Outcomes for women.

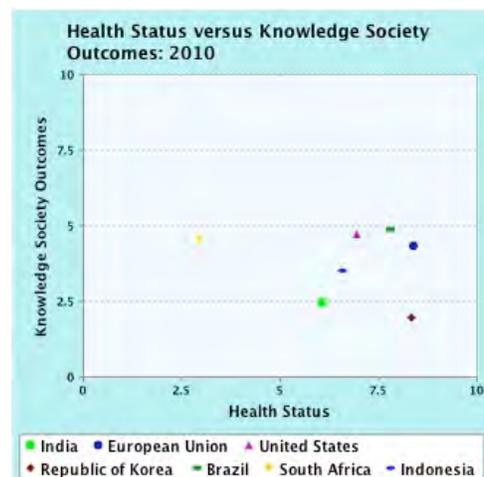


Social Status vs KS Outcomes

There is a somewhat closer relationship between social status and KS Outcomes, with the EU and the Republic of Korea in 1st and 2nd place in Social Status, but with very different outcomes. Since five of the countries are clustered along the diagonal from lower left to upper right, we see that there is some degree of correlation. For India, the almost equal relationship between social status and KS Outcomes indicate that the comparatively low social status of women in the country is strongly correlated with similarly low KS outcomes. With minor variations in social status, Brazil, the US and South Africa show roughly equivalent KS Outcome levels.

Health Status vs. KS Outcomes

Results of the comparisons between health status/inputs and KS Outcomes show a low level of correlation. The Republic of Korea and the EU are equivalent in health status with a large variation in KS Outcomes. The case is similar for Brazil and the US. South Africa's low health status is reflected in its isolated location at the left of the chart. This result indicates that improving the health status of women, while obviously a base condition of gender equality, is not sufficient in itself to achieving other gender equality or knowledge society outcomes.



CONCLUSIONS AND KEY FINDINGS

While additional information from experts will need to be incorporated for the future forecasting assessment, and additional correlations will be run and compared in the next phase, some conclusions can be drawn from the results so far.

Key findings:

The major finding of this study is that the knowledge gender divide continues to exist in all countries, even those which have a highly-developed knowledge society: Women participate at much lower levels in knowledge society decision making and the knowledge economy than men. In the science and technology sector, only in the health and life sciences (education) are they represented equally with men, and only in some countries. In all countries, female representation in the science and technology workforce is lower than male. ***In all countries in this review – which represent the leading knowledge-based economies in the world – the knowledge society is failing to include women to an equal extent, and in some cases, their inclusion is negligible.***

- Numbers of women in the science, technology and innovation fields are alarmingly low in the world's leading economies, and are actually on the decline in many, including the United States.
- Women remain severely under-represented in the areas of engineering, physics and computer science — less than 30% in most countries. In addition, the numbers of women actually working in these fields are declining across the board. Even in countries where the numbers of women studying science and technology have increased, it has not translated into more women in the workplace.
- Women have lower levels of access to the productive resources necessary to support active engagement in the knowledge society – property (land); financing; technology; and education.
- In turn their representation in employment, entrepreneurship and research is lower in key sectors of the knowledge society.
- Female parity in the science, technology and innovation fields is tied to multiple empowerment factors, with the most influential being higher economic status, larger roles in government and politics, access to economic, productive and technological resources and an enabling policy environment. Findings also show that women have greater parity in countries with government policies that support health and childcare, equal pay, and gender mainstreaming.
- The results show that access to education or improved health are not solutions in and of themselves. They make up only part of what should be a multi-dimensional policymaking approach. There is no simple solution.
- Women in most of the most countries under study are experiencing inequality of opportunity.
- Most countries do not collect sex-disaggregated data consistently at the national and international levels. More data is necessary to inform the policies and programmes that will allow countries to profit from the underutilized potential of their female population.
 - Indonesia and India collect and make available the least sex-disaggregated data in all sectors, including but not restricted to STI.
 - Little or no consistent sex-disaggregated data is collected in many countries in important areas, such as business leadership, heads of universities and research institutes, skilled emigrants, publication of refereed articles rates of HIV/AIDS infection among female youth, and others.
- While women's enrollment in bio and health-related sciences is high in general, female representation drops dramatically in physics and engineering, and in the

- transition to the S&E workforce. All of these should be clear signals to policy makers for the need to address these consistent gaps in achievement.
- Women's low level of representation in decision-making and in formal enterprises in the private sector is a shocking gap, and in view of the share of women in informal enterprises worldwide, is a glaring inconsistency that needs to be addressed. This is particularly important when one factors in the contribution that women make to poverty eradication and food security at the local level and in informal enterprises.
 - Brazil and South Korea may represent models for encouraging and retaining women in the science, engineering and technology workforce, but particularly in South Korea women's participation in other sectors of society, including decision-making and the private sector, is of great concern, indicating that economic and STI development that does not take into account women will in fact leave them behind. Women in countries with low levels of health and/or social status are behind from the very beginning, leaving those countries with additional constraints to women's knowledge society participation that are very difficult to overcome. These can prevail despite an enabling policy environment. India and South Africa are cases in point.

Recommendations

It is clear that more consistent and systematic collection of sex-disaggregated data at the national and international levels is necessary in all countries in this study, in order to set the stage for evidence-based policy that will allow countries to reverse the underutilized potential of their female population.

In general, policy makers will need to recognize the lack of consistent support for women's STI activities at all levels, from grassroots food production enterprises to their participation in medium and high level enterprises, to their leadership in STI institutions. Translating women's skills and knowledge into the innovation sector remains a high priority for a country that is intending to build its STI capacity. It will require tools to attract and retain girls and women into STI fields, to retain them both in the public university and research sector, and to provide tools, mentoring, training and encouragement to allow them to flourish in the private sector and as technically-skilled entrepreneurs.

The correlational data show that women's parity in the science, technology and innovation fields is tied to multiple empowerment factors, with the most influential being higher economic status, access to economic, productive and technological resources and agency. A supporting policy environment is an important mediating influence which sets the stage for progress. Nevertheless other sectors are also important leveraging inputs: findings show that women have greater parity in countries with government policies that support childcare, equal pay, and gender mainstreaming and can thereby build on this parity to enter and contribute to the knowledge society. Governments should recognize the importance of implementing policies and substantive on the ground programmes in each of the GE&KS dimension areas to correct the most glaring imbalances. They will also need to establish a more positive supportive environment for women. This includes support for women in the key areas of access to economic and technological resources; promotion of women's agency and leadership in key STI areas, and support to women's social and economic status such as childcare and flexible work hours. Many national-level examples of successful programmes and policies exist and can be consulted as models for action.²¹

The glaring gender gaps seen in each of these sectors indicate that government investment and commitment to eradicating these gaps could provide a large return on a comparatively low level of investment.

²¹ See UNCTAD, 2011 for a discussion of national policy models and initiatives.

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Appendix 1

Inputs and Outcomes of Gender Equality in the Knowledge Society

1. Health status. Without good health and wellbeing, educated, creative, skilled women will not be able to participate effectively in the knowledge society. Health status also reflects women's status in society: life expectancy and disease rates are all conditioned by social as well as physiological factors.

2. Social status. Social status indicators provide a way to assess social contexts, norms and practices, as well as to measure equity in social institutions. Furthermore, they can identify cultural and traditional practices that constrain or enable women's participation in social and economic development. The composite indicator on equity and discrimination in social institutions is taken from the OECD Gender, Institutions and Development Data Base because gender inequities have a clear economic impact, preventing women from being full participants in the knowledge society as well as in economic and social life more generally. Sex ratio at birth indicates whether fewer girls are born than boys as a result of female foeticide or other practices, and is an important indicator of a cultural attitude discriminating against girls and women.

Another basic condition for a nation's entry into the knowledge society is the provision of a safe and secure social environment that is free from domestic and other forms of violence against women both inside and outside the household. Virtually everywhere in the world women work longer hours on domestic and labour force activities than men; the indicator on women's time use/workload is included as a means of assessing its correlation with knowledge society activity. Does a heavy workload prevent women from becoming an integral part of a knowledge society or is it something that they just take for granted and overcome? Does it influence their ability to generate new income-generating activities, to gain access to education and/or to participate at higher levels of the technical and professional workforce?

3. Economic status. In the belief that women are more likely to become part of a knowledge society if they have the full opportunity to become economically active members of society, the basic measure of women's economic status is female labour force participation — women as a percentage of the country's economically active population. Another indicator of economic status is a comparative measure of men's and women's wages in order to show disparities in income. In order to take complete account of women's economically productive work, the indicator measuring females by category of workers, comprising self-employed, salaried and family workers, is included. Not all countries include women's informal economy work in data collected in this category, although since the Beijing 1995 World Conference on Women there has been an international consensus on the importance of gathering these data. Among the constraints to women's full participation in the knowledge society is representation at the lowest income levels; women in this category are the least likely to have opportunities to escape poverty. All of these economic issues condition women's life opportunities and their ability to participate in the knowledge society.

4. Access to resources. A broad range of resources is required to facilitate participation in the knowledge society for both women and men. The indicators identified for this dimension include women's level of access to resources, as well as disparities between women and men in this regard. The issue of access includes ownership rights to land and other property, access to credit and capital, access to information and communications technology (particularly to Internet and cell phones — technologies on which most data are available), transportation access and access to electricity, which is often a major challenge in rural areas of developing countries.

Women will be better placed to leverage capital and other resources and become innovative entrepreneurs, take advantage of opportunities and act autonomously if they have the right to own property and the ability to access credit.

Although measured by only one indicator, women's access to ICTs is the *sine qua non* requirement for entering a knowledge society. ICTs represent a revolution in the instruments of a modern society, bringing access to enormous amounts of information and knowledge quite literally to one's fingertips (and the resulting capacity to participate in increasingly knowledge-based economies) and providing access to education from a distance. ICTs also contribute to the generation and distribution of knowledge for social development in providing information on health, agriculture and markets, facilitating communication between governments and citizens and supporting increased dialogue among many different social, cultural and political groups.

5. Agency. Measuring the extent of women's agency is critical to assessing their participation in the knowledge society. It will show the ability of women to exercise choice and act autonomously in their personal and professional lives (which are inter-related) as well as to take advantage of opportunities to improve their situation. The purpose of the indicators in this dimension is to identify women's independent actions — women as agents — measured by their participation in civil and political society and in the process of social decision-making. The percentages of women holding seats in parliaments and of women ministers are standard indicators of women's political empowerment. While these remain important measures on which data is available globally, an indicator on women in leadership positions at local and regional levels as well as within institutions is included to cover a broader spectrum of women's empowerment. As agency measures women's capacity to act autonomously, an indicator of contraceptive use captures women's abilities to control their own bodies. Access to reproductive services and reproductive choice are important indicators not only of women's ability to participate in the labour force but also of their ability to make choices about their roles and contributions both in the household and across society.

6. Opportunity and capability. The dimension of opportunity and capability looks at skills, advantages and options available to women. Do women have the same opportunities as men to become literate? What are girls' and boys' chances of enrolling and remaining in school at primary, secondary and tertiary levels? Since in many countries and regions girls' enrolment rates are higher than boys', this is an example of how gender indicators can provide important information on both male and female social trends and concerns. What are men's and women's chances of continuing to learn throughout life? Comparative adult literacy rates and net primary, secondary and tertiary enrolments are standard measures of gender equality in education that are used by the UNDP and the MDG indicators, among many others. Distance learning and lifelong learning opportunities are also gender indicators, as they provide chances for women who may not be able physically to attend school at higher levels for reasons including lack of mobility, family obligations and cost. Distance learning and other avenues to adult

education are relevant means by which to assess the ability of women to take advantage of learning opportunities throughout their lives.

7. Enabling policy. All the above factors are conditioned by government policy. The presence of enabling policies and their implementation, including the presence of national legislation to reinforce international conventions, is crucial in facilitating women's participation in the knowledge society. Among the dimensions to be measured are the inclusion of gender issues in key knowledge society areas of science and technology, ICTs, labour and education. Consideration of gender issues in government policy can facilitate the use of women's knowledge and the flourishing of their innovative and entrepreneurial capabilities in these sectors.

In addition to the inclusion of gender issues in knowledge society areas, it is important to examine the existence of gender-specific policies that cover vital inputs for women's participation in the knowledge society, including childcare, flexible work hours, transportation and other gender-specific policies to enable women to leave the home and enter the workforce. A country's accession to the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) is another important indicator that signals the existence of legislation ensuring women equal access, opportunity and freedom from discrimination in all areas of life.

The existence of arrangements to institutionalize inter-ministerial relations on gender will determine the degree or progress of gender mainstreaming in government policies and services (or the degree to which gender analysis is integrated into the implementation of policy and programming).

Outcome indicators cover the following topics:

8. Women in decision-making in the knowledge society. The ability of women to participate in governing the knowledge society is a key equality indicator. It is measured here in terms of women's representation in key decision-making positions, such as in the percentage of women legislators, senior officials and managers in relevant government departments, heads of universities, representation in national science academies, and representation on corporate boards.

9. Women in the knowledge economy. The share of women in professional and technical as well as in administrative and managerial positions indicates the status or profile of women in the knowledge economy. The level of women's employment in key knowledge society areas is measured by looking at employment by economic activity (occupation and status). An important measure of movement toward the achievement of a knowledge economy is the presence of women in information technology industries.

10. Women in science, technology and innovation systems. Perhaps the most important pillar of the knowledge society is science, technology and innovation in promoting long-term economic growth, innovation and research, building the basis for a science-based knowledge society and improving infrastructure and the quality of life for all members of society. Measurement issues particularly relating to women's participation in STI include: human capacity utilization in the SET sector of research and industry; economic opportunities and status; participation and ownership in the private sector; economic use of and benefit from technologies; and participation in both their development and distribution. It goes without saying that in order for either men or women to participate meaningfully in the knowledge society the necessary infrastructure must exist. For women the transportation is particularly critical since they are less apt to

either own or have access to a car, in addition to safety concerns concerning travel outside of their community or at night.

To measure women's achievement in this area we include an indicator on the share of women studying science and engineering at tertiary level. An integral aspect of encouraging women's participation in the knowledge society involves the number of women enrolled in SET education and entering careers in related fields. Success in encouraging women to continue along career paths in science, technology and innovation is assessed through measurements of the percentage of women researchers, of women scientists and engineers and comparative rates and trends in men and women's scientific publications.

Statistics of the brain drain affect the patterns and rates of growth in both developing and developed countries. Understanding national gender trends in this area could provide policy makers with valuable information on which sectors of society may provide a better return on public investment to encourage women and men to enter and remain in these fields.

The number of women-led enterprises in sector value chains in the global economy is another likely indicator of women's participation in the knowledge society, as well as of whether women-run SMEs are reflected in participation rates of indigenous businesses in the international economy. The indicator of women's early stage entrepreneurial activity, developed by the Global Entrepreneurship Monitor, is likely to be useful as a means to identify young businesses in knowledge society areas. Studies from Japan have shown that women's new home-based businesses are overwhelmingly knowledge-based. Women-owned and run businesses are also a multiplier of women's employment in the knowledge economy, as women-enterprises tend to hire more women than other businesses (Allen et al. 2007).