A Different Perspective on Health Informatics: Its Role and Importance in Developing Counties

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PowerPoint on the web:

http://wvlc.uwaterloo.ca/HealthInformatics/developingcountryHI.htm

- Introduction – Perspective on problem area
- Current Health Systems and Informatics Environments n the Developing World – The present situation
- Signs of Progress
- Projects and Cautionary Tales
- Summary

Favela in Brazil

Which are the developing countries?

- There is no established convention for the designation of “developed” and “developing” countries or areas in the United Nations system.
- In common practice, Japan in Asia, Canada and the United States in northern America, Australia and New Zealand in Oceania and Europe are considered “developed” regions or areas.
- In international trade statistics, the Southern African Customs Union is also treated as developed region and Israel as a developed country; countries emerging from the former Yugoslavia are treated as developing countries; and countries of eastern Europe and the former USSR countries in Europe are not included under either developed or developing regions.

Practically, there are at least four types of countries:

- **Developed countries (Canada, United States, European Union members, Japan, etc.)**
- **Countries with a developing economy (China, India, Brazil, South Africa, Mexico, etc.)**
- **Developing countries (most countries in Asia, Africa, South America, Central America, and the Caribbean)**
- **Underdeveloped countries (other countries in Asia, Africa, and South America, etc.)**

The Least Developed Countries

(LDCs)

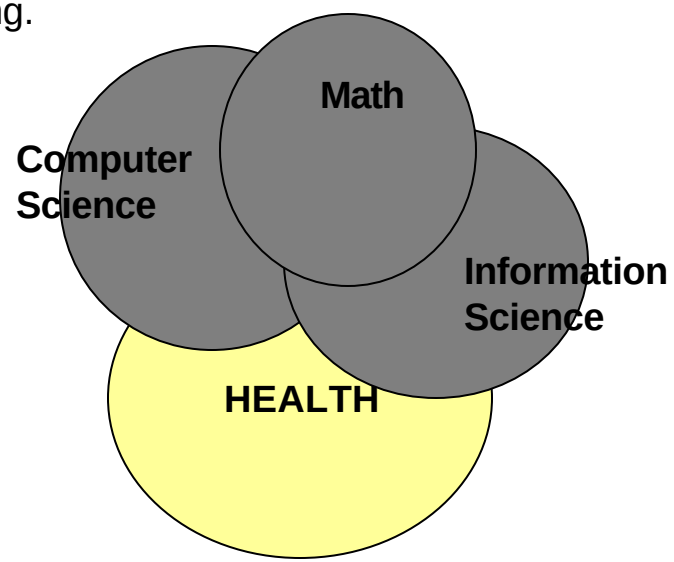
- Afghanistan
- Angola
- Bangladesh
- Benin
- Bhutan
- Burkina Faso
- Burundi
- Cambodia
- Cape Verde
- Central African Republic
- Chad
- Comoros
- Democratic Republic of Congo
- Djibouti
- Equatorial Guinea
- Eritrea
- Ethiopia
- Gambia
- Guinea
- Guinea-Bissau
- Haiti
- Kiribati
- Lao People's Democratic Republic
- Lesotho
- Liberia

Madagascar
Malawi
Maldives
Mali
Mauritania
Mozambique
Myanmar
Nepal
Niger
Rwanda
Samoa
Sao Tome and Principe
Senegal
Sierra Leone
Solomon Islands
Somalia
Sudan
Timor-Leste
Togo
Tuvalu
Uganda
United Republic of Tanzania
Vanuatu
Yemen
Zambia

- The development of concepts, structures, frameworks, approaches, and systems to enable efficient and effective health services, including all aspects of health research, disease prevention, health promotion, healthcare, disease management, and terminal care.

  - Health data mining; knowledge discovery.
  - The nature and structure of health information; a health ontology.
  - The meta-analysis of clinical trials.
  - Health care guidance systems; decision-support systems.
  - Bio-medical computing.

- Anything in:



From a presentation by Dominic Covvey at: http://www.cs.uwaterloo.ca/health_info/health_docs/5

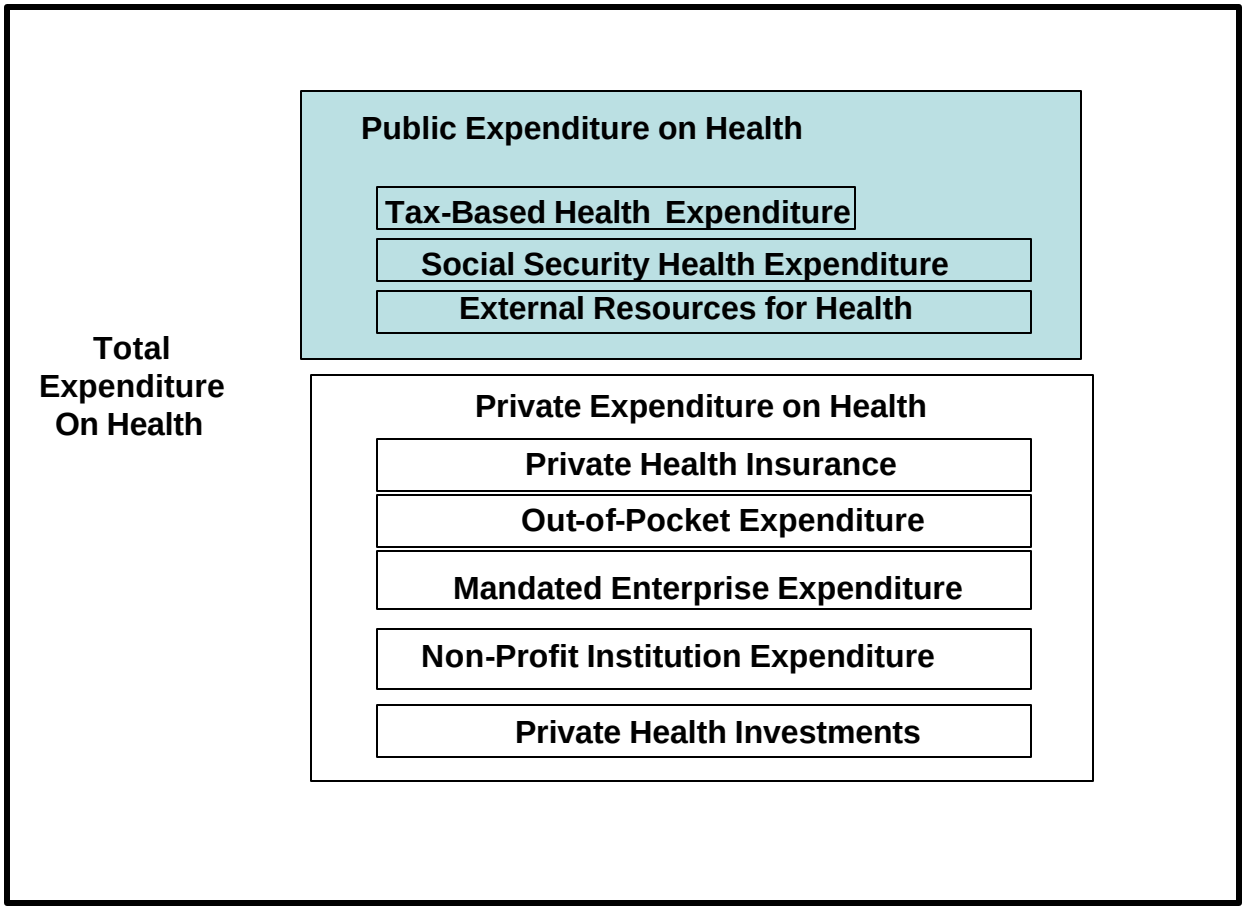
Introduction:

Some perspective on the scale of the problems in developing countries

Introduction: Economics and Health Informatics

- Income disparities
- Expenditure on health care (total and per capita)
- Number of trained health professionals

Expenditures on Health



Region	Total Health Expenditure (Millions) I$	Per Capita Health Expenditure I$	Share of GDP %
Africa	50,170	82	5.1%
Americas	176,223	438	7.0%
Middle East	80,932	176	4.8%
E.Europe and C. Asia	99,761	281	5.7%
OECD	2,317,247	2,078	9.7%
S. Asia	141,262	95	4.4%
Asia & Pac.	206,891	142	4.4%

Expenditure disparity between OECD countries and Africa

But – OECD only spends twice as much in terms of share of GDP

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- **In 1998, the world spent an estimated I$3,1 trillion on health goods and services out of an estimated total world income of I$38.7 trillion. Thus, health spending represented some 7.9% of global GDP.**

- **This comes to an average expenditure per person of I$523 on health services.**

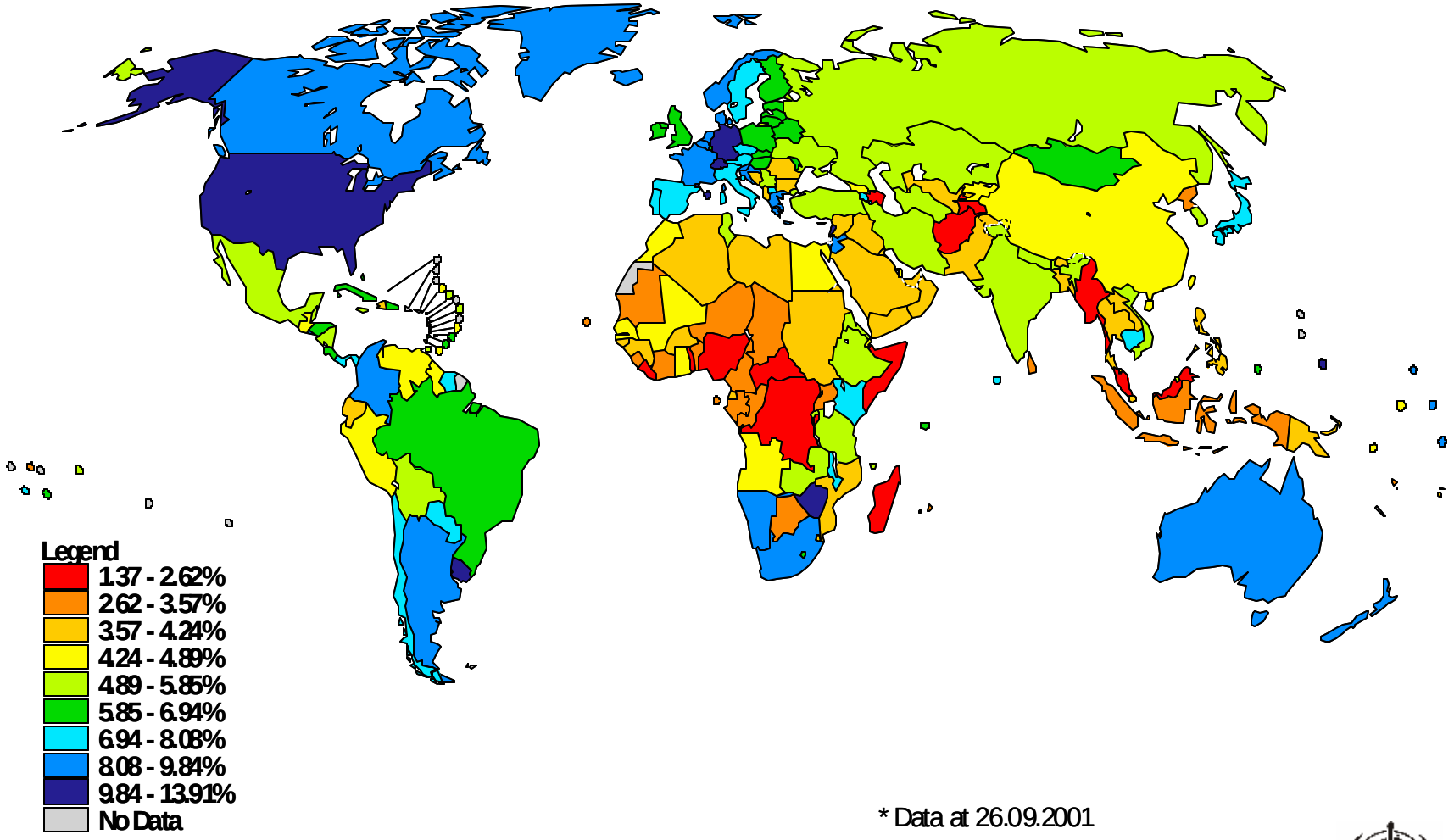
- **The average varies significantly across countries and across regions, ranging from only I$82 per person in Africa to I$2078 in the OECD countries.**

The "international dollar" (I$) is used to represent a currency unit which is meant to have the same purchasing power in a given economy than a US$1 will have in the US economy. Using official exchange rates, the figures would be US$2.6 trillion, US$29.6 trillion, and 8.9%, respectively.

Organisation for Economic Co-operation and Development

AUSTRALIA:	**7 June 1971**
AUSTRIA:	**29 September 1961**
BELGIUM:	**13 September 1961**
CANADA:	**10 April 1961**
CZECH REPUBLIC:	**21 December 1995**
DENMARK:	**30 May 1961**
FINLAND:	**28 January 1969**
FRANCE:	**7 August 1961**
GERMANY:	**27 September 1961**
GREECE:	**27 September 1961**
HUNGARY:	**7 May 1996**
ICELAND:	**5 June 1961**
IRELAND:	**17 August 1961**
ITALY:	**29 March 1962**
JAPAN:	**28 April 1964**
KOREA:	**12 December 1996**
LUXEMBOURG:	**7 December 1961**
MEXICO:	**18 May 1994**
NETHERLANDS:	**13 November 1961**
NEW ZEALAND:	**29 May 1973**
NORWAY:	**4 July 1961**
POLAND:	**22 November 1996**
PORTUGAL:	**4 August 1961**
SLOVAK REPUBLIC:	**14 December 2000**
SPAIN:	**3 August 1961**
SWEDEN:	**28 September 1961**
SWITZERLAND:	**8 September 1961**
TURKEY:	**2 August 1961**
UNITED KINGDOM:	**2 May 1961**
UNITED STATES:	**12 April 1961**

Health spending around the world, 1998*
(measured share in total expenditure, % of GDP)



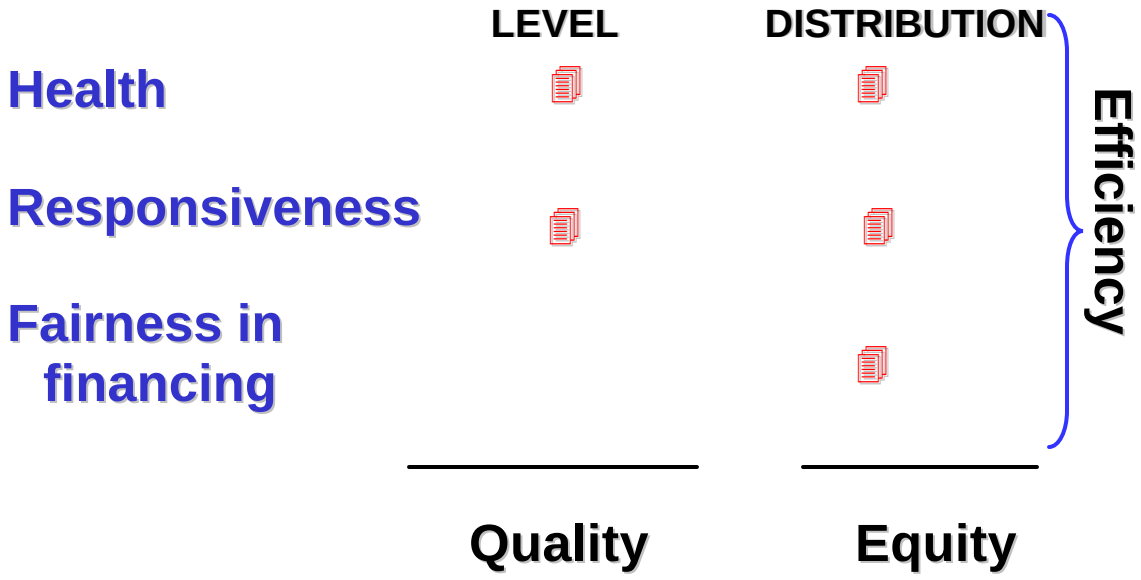
* Data at 26.09.2001

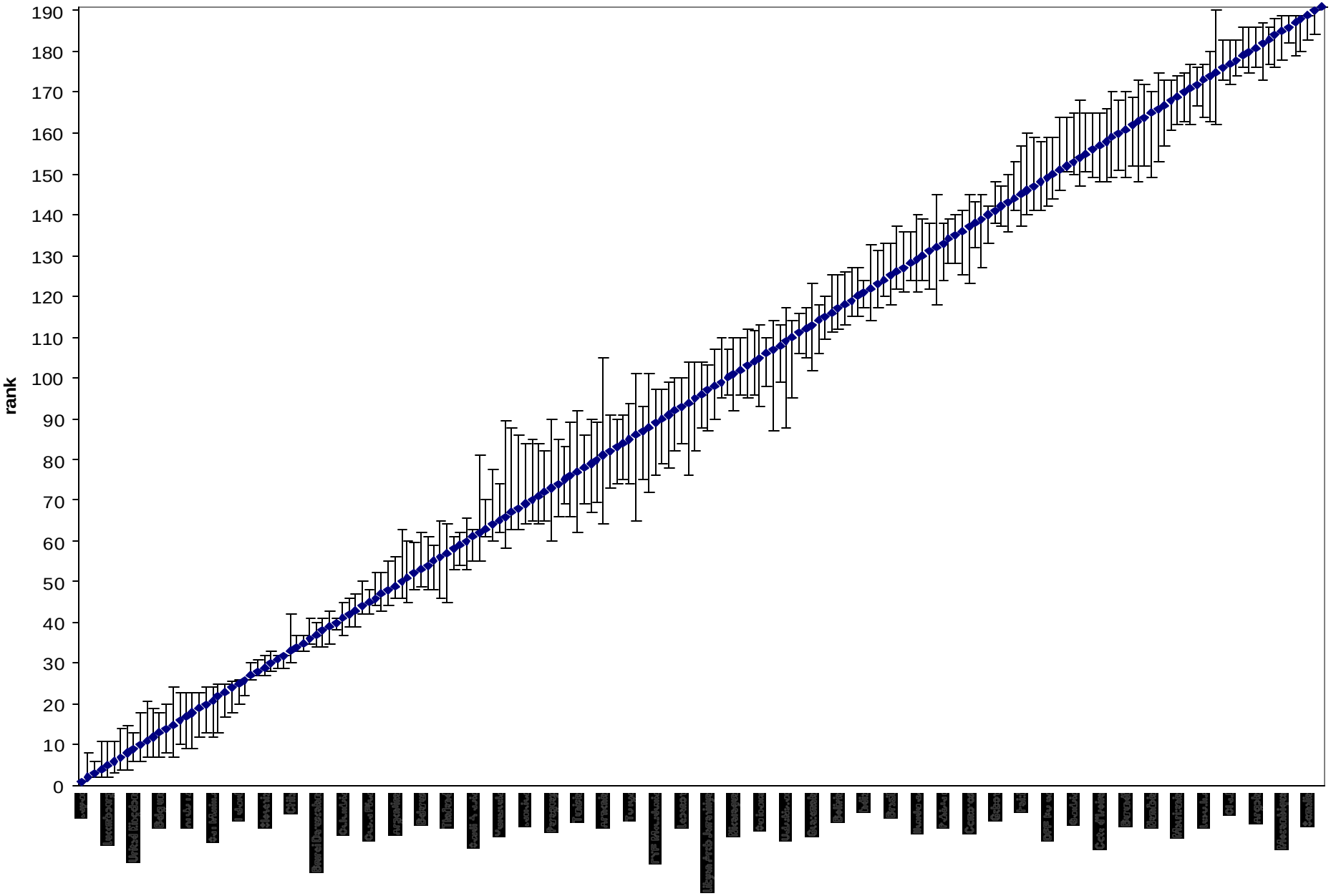
Global Programme on Evidence for Health Policy

Overall Health System Attainment

Overall health system attainment is a function of attainment of three goals: health, responsiveness and fairness of financial contribution.

Because societies are concerned with both the level and distribution of health and responsiveness, five components must contribute to overall health system attainment as shown in Figure below: (World Health Organization)




rank
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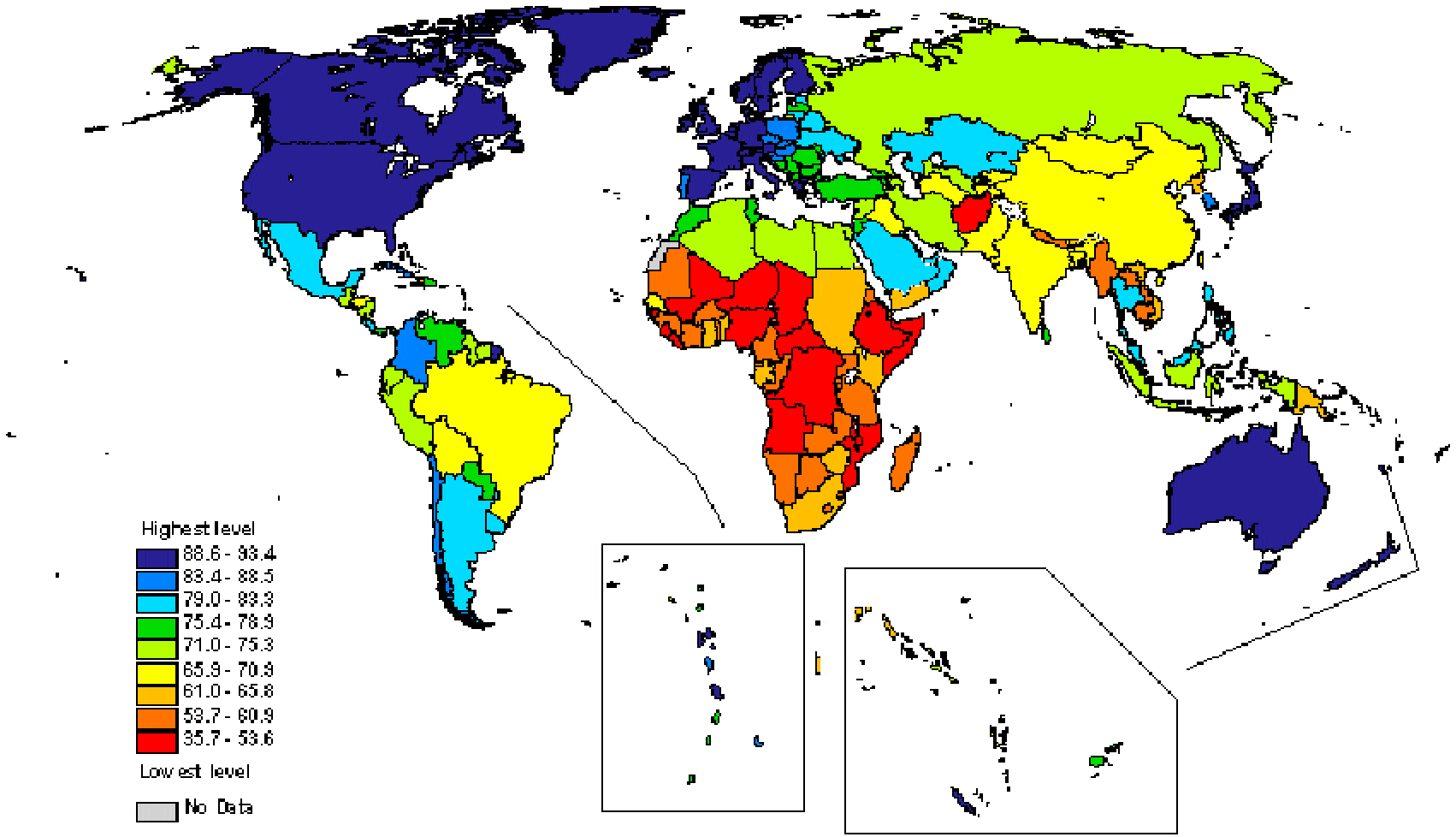
Global distribution of overall health system attainment, 191 member countries of WHO, estimates for 1997.



- **The top ten countries in order are Japan, Switzerland, Norway, Sweden, Luxembourg, France, Canada, Netherlands, United Kingdom and Austria.**

- **Countries with the lowest levels of attainment are concentrated in sub-Saharan Africa.**

- **This composite measure of overall health system attainment is highly rank correlated with UNDP's Human Development Index**
- **Both are measures of the social effort of society so that this is not surprising; the Human Development Index is constructed from measures of longevity, education, and income, all of which are likely to be correlated with not only population health outcomes but also with attainment of the non-health goals of health systems**

Annex Table 10 Attributable DALYs by risk factor, level of development and sex, 2000[a]

	High mortality Developing (AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D)		Low mortality Developing (AMR-B, EMR-B, SEAR-B, WPR-B)		Developed (AMR-A, EUR-A, EUR-B, EUR-C, WPR-A)	
	Males	*Females*	*Males*	*Females*	*Males*	*Females*
	(000)	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Childhood and maternal undernutrition						
Underweight	**62 730**	**61 668**	**6 576**	**6 020**	**427**	**379**
Iron deficiency	**11 898**	**14 272**	**3 242**	**4 050**	**617**	**979**
Vitamin A deficiency	**10 919**	**14 218**	**675**	**823**	**1**	**1**
Zinc deficiency	**13 544**	**13 237**	**587**	**534**	**71**	**62**
Other diet-related risks and physical inactivity						
Blood pressure	**10 963**	**9 664**	**10 824**	**9 454**	**13 132**	**10 232**
Cholesterol	**7 794**	**7 808**	**4 879**	**3 730**	**9 463**	**6 764**
Overweight	**2 344**	**4 064**	**5 119**	**5 996**	**8 080**	**7 813**
Low fruit and vegetable intake	**5 505**	**4 963**	**4 550**	**3 319**	**5 062**	**3 262**
Physical inactivity	**3 596**	**3 336**	**2 697**	**2 477**	**3 866**	**3 120**
Sexual and reproductive health risks						
Unsafe sex	**39 324**	**45 240**	**2 685**	**2 994**	**591**	**1 035**
Lack of contraception	**...**	**7 495**		**1 181**		**137**
Addictive substances						
Tobacco	**14 206**	**2 477**	**13 808**	**2 486**	**20 162**	**5 942**
Alcohol	**11 106**	**2 059**	**21 830**	**3 690**	**16 462**	**3 176**
Illicit drugs	**3 236**	**796**	**2 743**	**570**	**2 689**	**1 183**
Environmental risks						
Unsafe water, sanitation and hygiene	**23 157**	**23 026**	**3 846**	**3 304**	**429**	**396**
Urban air pollution	**1 454**	**1 231**	**2 272**	**1 736**	**687**	**484**
Indoor smoke from solid fuels	**15 534**	**14 859**	**3 252**	**4 343**	**253**	**297**
Lead exposure	**3 206**	**2 747**	**3 020**	**2 564**	**886**	**502**
Climate change	**2 535**	**2 667**	**156**	**138**	**10**	**12**
Occupational risks						
Risk factors for injury	**6 266**	**485**	**4 686**	**463**	**1 118**	**106**
Carcinogens	**207**	**44**	**449**	**148**	**481**	**91**
Airborne particulates	**449**	**37**	**1 815**	**128**	**507**	**102**
Ergonomic stressors	**187**	**132**	**214**	**148**	**85**	**53**
Noise	**1 190**	**505**	**1 136**	**615**	**462**	**243**
Other selected risks to health						
Unsafe health care injections	**3 846**	**3 090**	**2 396**	**952**	**115**	**63**
Childhood sexual abuse	**1 425**	**2 932**	**1 118**	**1 415**	**391**	**954**

[a]The combined effects of any group of risk factors in this table will often be less than the sum of their separate effects.

DALY = Disability Adjusted life Year

Physicians, Nurses, Mid-wives and Pharmacists per 100,000 population

WHO - The World Health Organization is the United Nations specialized agency for health.

It was established on 7 April 1948. WHO's objective, as set out in its Constitution, is the attainment by all peoples of the highest possible level of health.

Health is defined in WHO's Constitution as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

The Lowest Group

Country	Rate per 100,000 population									
	Physicians		Nurses		Midwives		Dentists		Pharmacists	
Liberia	**2.3**	*1997*	5.9	*1997*	4.3	*1997*	0.1	*1997*	…	…
Eritrea	**3**	*1996*	16	*1996*	2.2	*1996*	0.1	*1996*	…	…
Chad	**3.3**	*1994*	14.7	*1994*	2.3	*1994*	0.2	*1994*	…	…
Burkina Faso	**3.4**	*1995*	19.6	*1995*	3.4	*1995*	0.3	*1995*	…	…
Central African Republic	**3.5**	*1995*	8.8	*1995*	4.9	*1995*	0.2	*1995*	…	…
Gambia	**3.5**	*1997*	12.5	*1997*	8.2	*1997*	0.5	*1997*	…	…
Niger	**3.5**	*1997*	22.9	*1997*	5.5	*1997*	0.2	*1997*	…	…
Nepal	**4**	*1995*	5	*1995*	7.4	*1995*	…	…	…	…
Somalia	**4**	*1997*	20	*1997*	..	..	0.2	*1997*	0.1	*1997*
United Republic of Tanzania	**4.1**	*1995*	85.2	*1995*	44.8	*1995*	0.7	*1995*	…	…
Mali	**4.7**	*1994*	13.1	*1994*	3	*1994*	0.1	*1994*	…	…
Lesotho	**5.4**	*1995*	60.1	*1995*	47	*1995*	0.5	*1995*	…	…
Benin	**5.7**	*1995*	20.4	*1995*	7.9	*1995*	0.3	*1995*	…	…
Ghana	**6.2**	*1996*	72	*1996*	53.2	*1996*	0.2	*1996*	…	…
Democratic Republic of the Congo	**6.9**	*1996*	44.2	*1996*	…	…	1.1	*1996*	…	…
Zambia	**6.9**	*1995*	113.1	*1995*	…	…	…	…	…	…
Papua New Guinea	**7.3**	*1998*	67	*1998*	…	…	2.7	*1998*	…	…
Sierra Leone	**7.3**	*1996*	33	*1996*	4.7	*1996*	0.4	*1996*	…	…

The Median Group

Mauritius	**85**	*1995*	232.9	*1995*	…	…	13.5	*1995*	…	…
Nicaragua	**85.6**	*1997*	91.9	*1997*	…	…	18.6	*1997*	…	…
Saint Vincent and the Grenadines	**87.7**	*1997*	238.6	*1997*	…	…	5.3	*1997*	…	…
Cook Islands	**90**	*1997*	200	*1997*	30	*1997*	90	*1997*	…	…
Peru	**93.2**	*1997*	115.2	*1997*	…	…	39.6	*1997*	…	…
Guatemala	**93.3**	*1997*	27	*1997*	…	…	13	*1997*	…	…
Bahrain	**100**	*1997*	283	*1997*	..	..	9	*1997*	20	*1997*
El Salvador	**107.1**	*1997*	34.9	*1997*	…	…	35.6	*1997*	…	…
Paraguay	**109.8**	*1997*	23.9	*1997*	…	…	22.8	*1997*	…	…
Chile	**110.3**	*1994*	47.2	*1996*	…	…	41.5	*1996*	…	…
Palau	**110.4**	*1998*	144	*1998*	5.6	*1998*	11	*1998*	…	…
Antigua and Barbuda	**113.6**	*1996*	330.3	*1996*	…	…	18.2	*1996*	…	…
Colombia	**116**	*1997*	48.3	*1994*	…	…	40.3	*1994*	…	…
Saint Kitts and Nevis	**117.1**	*1997*	497.6	*1997*	…	…	19.5	*1997*	…	…
Turkey	**121**	*1998*	109	*1998*	64.4	*1998*	21	*1998*	33.6	*1998*
Philippines	**123**	*1996*	418	*1996*	163	*1996*	52	*1996*	…	…
Barbados	**125.4**	*1993*	330.3	*1993*	…	…	16.1	*1993*	…	…
Qatar	**126**	*1996*	289	*1996*	..	..	21	*1996*	51	*1996*
Brazil	**127.2**	*1996*	41.3	*1996*	…	…	85.1	*1996*	…	…
Libyan Arab Jamahiriya	**128**	*1997*	360	*1996*	..	..	13	*1996*	23	*1996*
Albania	**129**	*1998*	380	*1998*	59.1	*1994*	31.5	*1996*	40.6	*1994*

The Highest Group

United States of America	**279**	*1995*	972	*1996*	…	…	59.8	*1996*	…	…
Latvia	**282**	*1998*	549	*1998*	33.2	*1998*	43.5	*1998*	…	…
Denmark	**290**	*1994*	722	*1994*	21.1	*1997*	88.6	*1995*	18.2	*1994*
Portugal	**312**	*1998*	379	*1998*	8.3	*1984*	33.3	*1998*	75.3	*1998*
Armenia	**316**	*1998*	481	*1998*	48.1	*1998*	27.6	*1998*	3.8	*1998*
Switzerland	**323**	*1998*	779	*1990*	26.5	*1990*	48.8	*1997*	61.5	*1998*
Iceland	**326**	*1997*	865	*1998*	85.9	*1998*	105	*1997*	83.1	*1997*
Bulgaria	**345**	*1998*	713	*1998*	70.6	*1998*	58.6	*1998*	18.5	*1998*
Germany	**350**	*1998*	957	*1998*	11.3	*1997*	75.9	*1998*	57.7	*1998*
Republic of Moldova	**350**	*1998*	874	*1998*	87.1	*1998*	41.2	*1998*	67.5	*1994*
Kazakhstan	**353**	*1998*	649	*1998*	56.1	*1998*	25.1	*1998*	65.7	*1994*
Slovakia	**353**	*1998*	708	*1995*	39.3	*1995*	48.2	*1998*	33.8	*1998*
Hungary	**357**	*1998*	385	*1998*	18.6	*1998*	42.4	*1998*	47.3	*1998*
Azerbaijan	**360**	*1998*	767	*1998*	137	*1998*	27.1	*1998*	33.1	*1998*
Uruguay	**370.3**	*1996*	70	*1996*	…	…	126.3	*1996*	…	…
Israel	**385**	*1998*	613	*1998*	18.6	*1998*	116	*1998*	60.5	*1998*
Greece	**392**	*1995*	257	*1992*	18.5	*1993*	102	*1995*	69.2	*1988*
Belgium	**395**	*1998*	1075	*1996*	65	*1996*	68.2	*1998*	145	*1998*
Lithuania	**395**	*1998*	884	*1998*	43.5	*1998*	61	*1998*	57.8	*1998*
Norway	**413**	*1998*	1840	*1998*	59.1	*1998*	118	*1998*	57.1	*1998*
Russian Federation	**421**	*1998*	821	*1998*	62.5	*1998*	32.2	*1998*	6.2	*1998*
Spain	**424**	*1997*	458	*1997*	16.2	*1988*	38.5	*1997*	113	*1997*
Georgia	**436**	*1998*	474	*1998*	31.1	*1998*	35.3	*1998*	9.2	*1998*
Belarus	**443**	*1998*	1182	*1998*	67.6	*1998*	40.6	*1998*	30.7	*1998*
Cuba	**530.4**	*1997*	677.6	*1997*	…	…	84.5	*1997*	…	…
Italy	**554**	*1997*	296	*1989*	29.2	*1982*	64.4	*1997*	102	*1996*
Monaco	**664**	*1995*	1621	*1995*	35.7	*1995*	121	*1995*	218	*1995*

Rate per 100,000 population

	Physicians		Nurses		Midwives		Dentists		Pharmacists	
Canada	229.1	*1995*	897.1	*1996*	…	…	58.6	*1997*	…	…

What are some of the stresses on the Health Systems in developing countries?

Health Issues and Health Informatics

Examples:

- **Water-related illnesses**
- **HIV/AIDS**

Water and sanitation

1 billion people lack access to improved water supply

2.4 billion people lack access to improved sanitation

Water and sanitation

1 billion people lack access to improved water supply

2.4 billion people lack access to improved sanitation

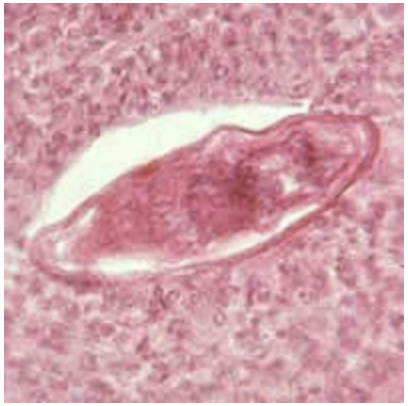
Access to piped water through household connections:

- Latin America and the Caribbean: 66%
- Asia: 49%
- Africa: 24%

Access to sanitation linked to a sewage system:

- Latin America and the Caribbean: 66%
- Asia: 18%
- Africa: 13%

Water and health



Schistosomiasis sp. eggs in liver tisue

Schistosomiasis (bilharziasis)

- More than 200 million people worldwide are infected by schistosomiasis.
- 88 million children under fifteen years are infected each year with schistosomes.
- 80 percent of transmission takes place in Africa south of the Sahara

Water and health

Sodium hypo chlorite (chlorine) solution

Diarrhoeal diseases

- **Every day, diarrhoeal diseases cause some 6,000 deaths, mostly among children under five.**
- **In 2001, 1.96 million people died from infectious diarrhoeas; 1.3 million were children under five.**
- **Between 1,085,000 and 2,187,000 deaths due to diarrhoeal diseases can be attributed to the 'water, sanitation and hygiene' risk factor, 90 percent of them among children under five.**
- **With simple hygiene measures such as washing hands after using the toilet or before preparing food, most of these deaths are preventable.**

Other water-related problems:

Malaria
Fluoride and Arsenic

Water and health

The mosquito *Anopheles gambiae* is something of a gourmet. It feeds almost exclusively on human blood. Its preference for humans and its ability to seek them out, in fact, are what makes the tiny insect such a deadly “vector” for the spread of malaria.

Malaria

- **Over 1 million people die from malaria every year.**
- **About 90 percent of the annual global rate of deaths from malaria occur in Africa south of the Sahara.**
- **Malaria causes at least 300 million cases of acute illness each year.**
- **The disease slows economic growth in African countries by 1.3 percent a year.**
- **Sleeping under mosquito nets would be one simple but effective way to prevent many cases of malaria, especially for children under five.**

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Suitability of climate conditions for the transmisson of malaria

World Health Organization

Malaria

The name *"mal aria"* was coined in Italy, as people believed that "bad air" brought about the disease. In truth, the cause of malaria is a parasite transmitted from person to person through the bite of the female *Anopheles* mosquito.

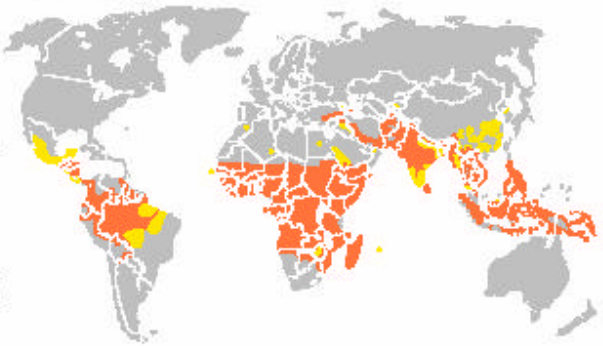
The environment is a key determinant of the spread of malaria – the deadliest of all the vector-borne diseases. Malaria flourishes within a certain temperature range and altitude, where favourable rainfall patterns and humidity prevail, and where animal or human blood is available. Any clean standing water provides a potential breeding site for mosquitoes.

Ninety per cent of the at least one million deaths a year from malaria occur in Africa, mostly among young children. Malaria also hampers children's education: because they miss school when ill, and because severe episodes of the disease may cause permanent neurological damage. Malaria has been estimated to cost Africa more than US$ 12 billion every year in lost GDP. The disease could be controlled for a fraction of that sum.

Preventive measures, such as insecticide-treated bed nets, stop mosquitoes biting children. Drugs, such as chloroquine, are available, but drug resistance means that new remedies are urgently being sought. Malaria is one of the major public health challenges undermining development. Long-term solutions are needed to stop an African child dying every

Malaria around the world

2004



Other vector-borne diseases

Schistosomiasis	Flat worms, whose life cycle partly takes place in freshwater snails, infect people by penetrating the skin. 200 million people, many of them children, are currently infected with schistosomiasis.
Japanese encephalitis	This is a virus transmitted by mosquitoes in Asia. 90% of the cases occur in children under five years.
Leishmaniasis	Transmitted by sand flies, this parasite causes skin lesions and damage to internal organs. It killed 59 000 people in 2001.
Dengue fever	Mosquitoes transmit the virus, which kills more than 10 000 children every year.
Lymphatic filariasis	Worms lodging in the lymphatic system can cause deformations in children as young as 12 years.

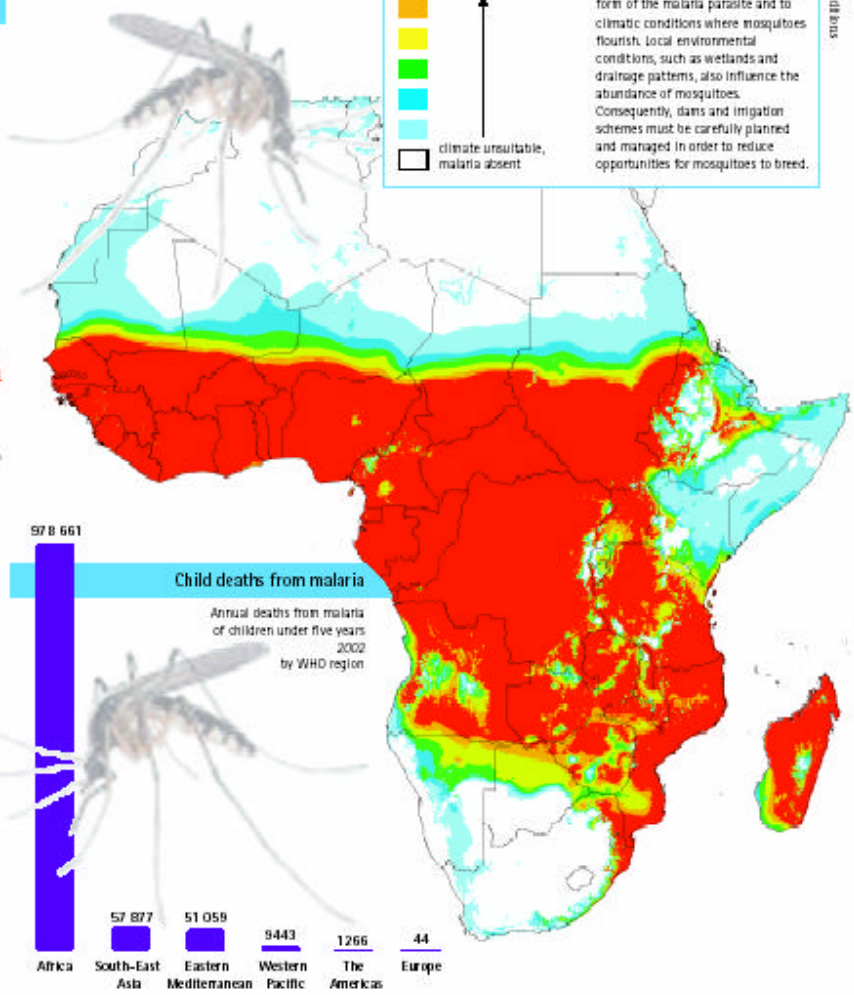
Malaria in Africa

Suitability of climate conditions for the transmission of malaria
2004

climate suitable, malaria endemic

climate unsuitable, malaria absent

Africa bears the overwhelming burden of malaria. It is home to the deadliest form of the malaria parasite and to climatic conditions where mosquitoes flourish. Local environmental conditions, such as wetlands and drainage patterns, also influence the abundance of mosquitoes. Consequently, dams and irrigation schemes must be carefully planned and managed in order to reduce opportunities for mosquitoes to breed.



Child deaths from malaria

Annual deaths from malaria of children under five years
2002
by WHO region

Produced by Myriad Editions

http://www.who.int/water_sanitation_health/en/

Adapted from *Inheriting the World: The Atlas of Children's Health and the Environment* © WHO 2004

World Health Organization

Fluoride and Arsenic in Drinking Water

In Kacharidih village, India, a group of children with limbs twisted out of shape hobble forward with the help of walking sticks. They grin with embarrassment because they cannot run like other children their age – fluoride poisoning has crippled their limbs.

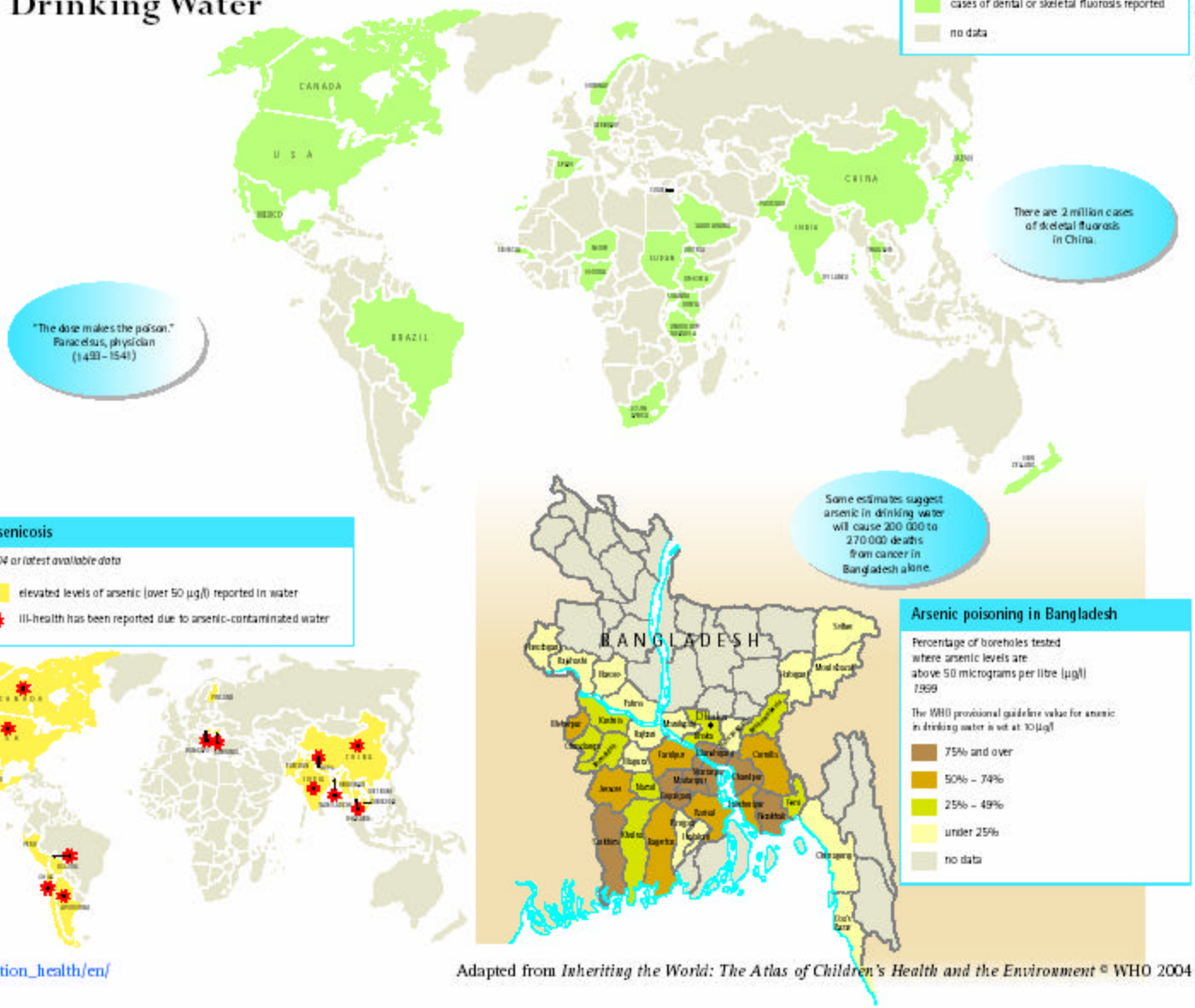
Millions of children are exposed to excessive amounts of fluoride through drinking water contaminated from natural geological sources. In China, the burning of fluoride-rich coal adds to the problem. Small amounts of fluoride are good for teeth; it is added to toothpaste and, in some countries, to drinking water. At higher doses, it destroys teeth and accumulates in bones, leading to crippling skeletal damage. With their bodies still growing, children are most at risk.

Like fluoride, arsenic is widely distributed throughout the earth's crust, and is present in almost all waters in very small amounts. In certain areas, however, there are dangerous levels of this toxin in children's drinking water. The most tragic example is Bangladesh, where thousands of wells are causing a mass poisoning of the population. Unsafe wells are marked with red paint, warning people that this water is not for drinking.

Health effects

Fluorosis
- Tooth discoloration and decay
- Crippling skeletal damage

Arsenicosis
- Skin pigmentation changes and skin thickening (hyperkeratosis)
- Cancer of the skin, lungs, bladder and kidney



http://www.who.int/water_sanitation_health/en/

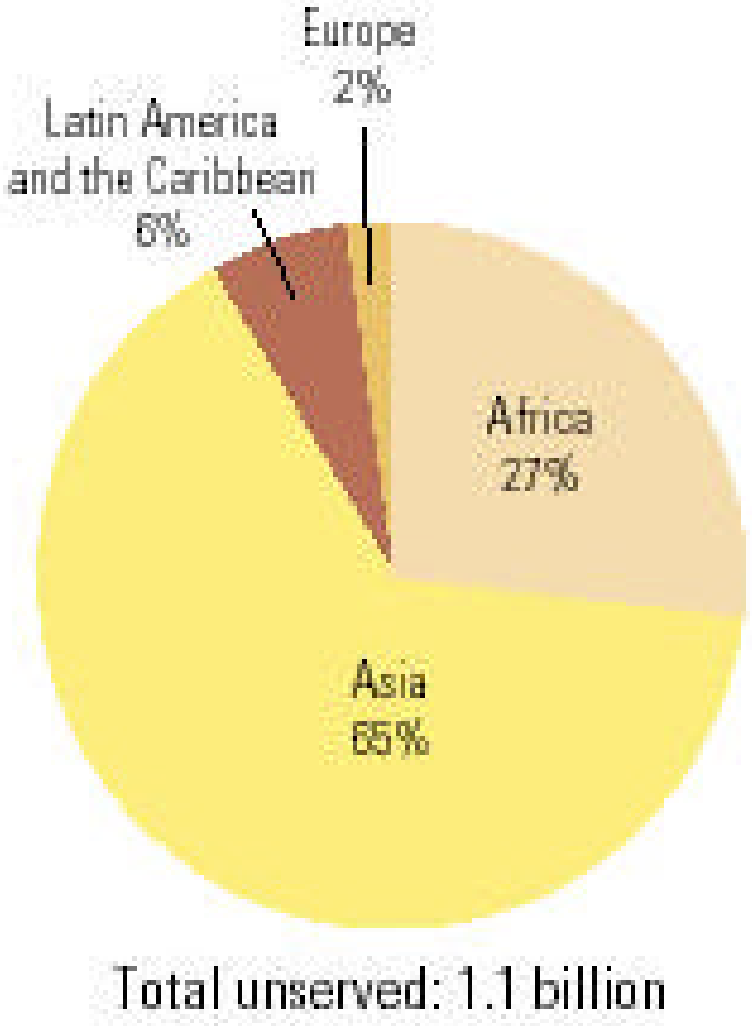
UN Millennium Development Goal (2000):

'***Reduce by half, by 2015, the proportion of people without sustainable access to safe drinking water.***‘

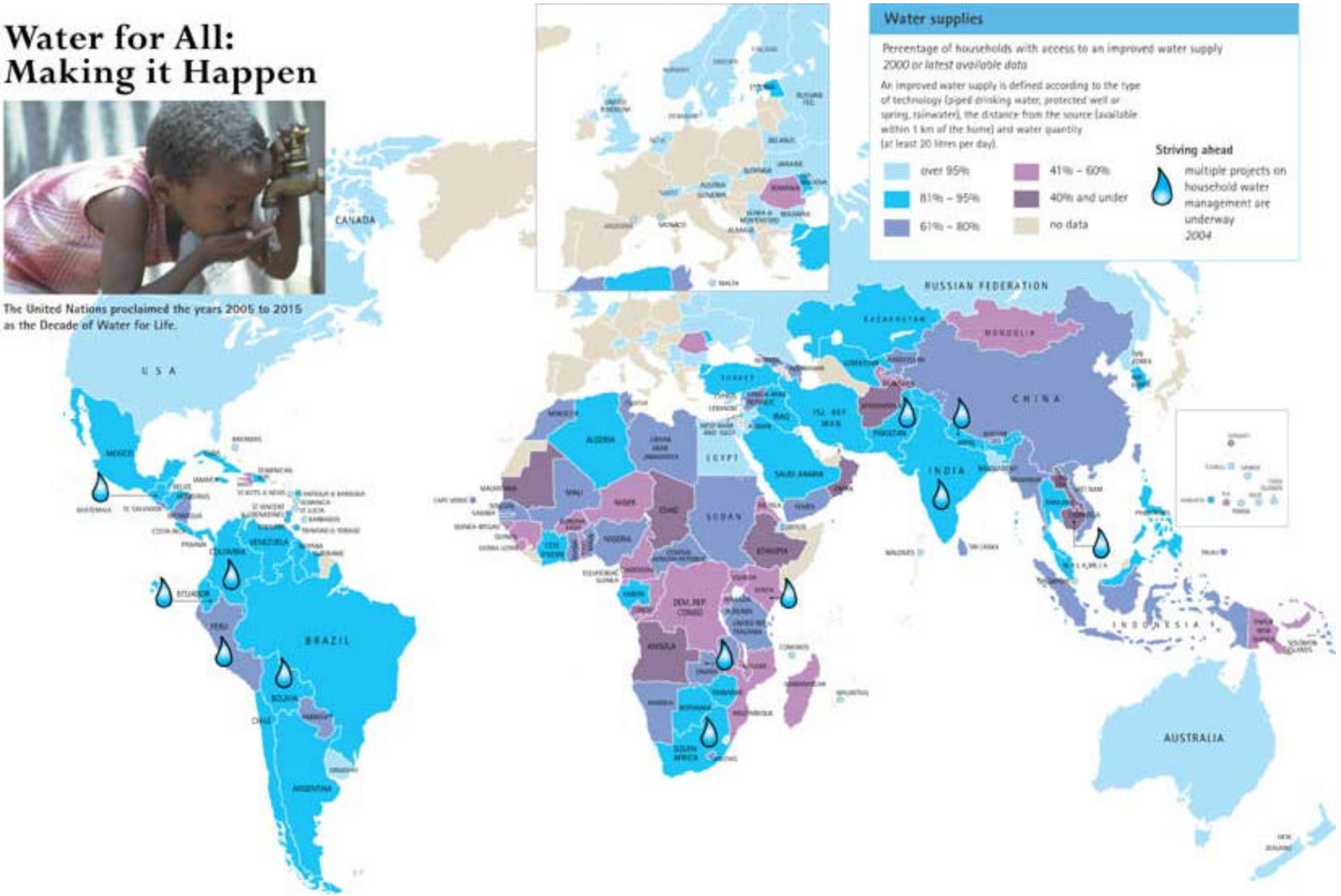
World Summit on Sustainable Development, Plan of Action (2002):

'***... we agree to halve, by the year 2015, the proportion of people who are unable to reach or to afford safe drinking water (as outlined in the Millennium Declaration) and the proportion of people who do not have access to basic sanitation.***'

Water supply, distribution of unserved populations



Percentage of households with access to an improved water supply

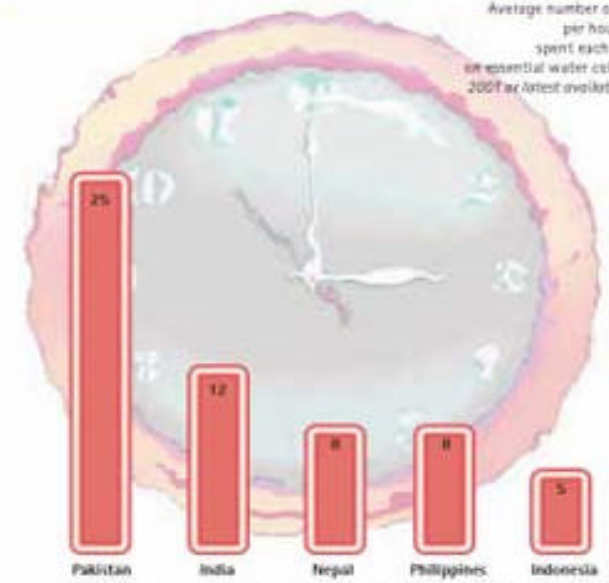


Percentage of Households that must travel more than 1 hour per day for water

To Fetch a Pail of Water

Time ticking away

Average number of hours per household spent each month on essential water collection 2007 or latest available data



Time spent on water collection represents time lost to household and national economies. Every month, the Indian economy misses out on over 100 million working days in this way. With its large population, Asia loses more time than any other continent.

A heavy burden

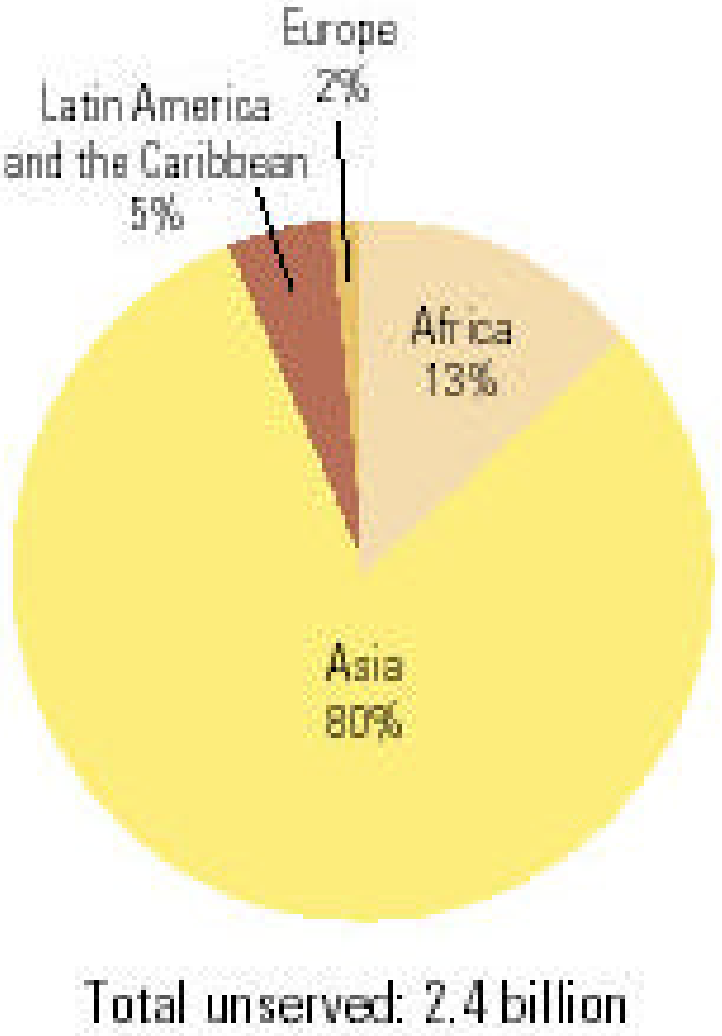
Percentage of people who must travel more than half an hour to fetch water and return home 2007 or latest available data

- over 50%
- 26% – 50%
- 25% and over
- no data

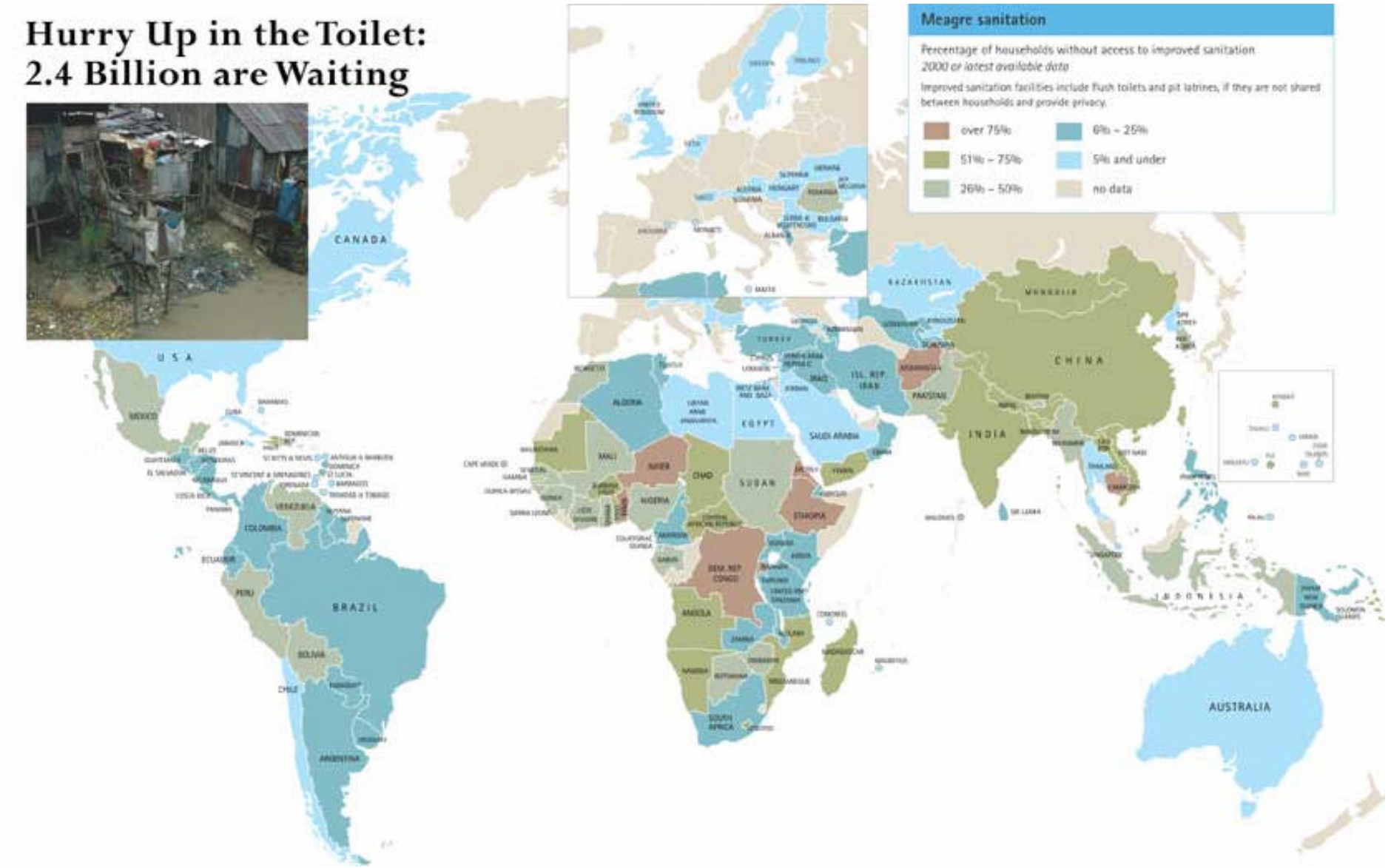
Halving the proportion of Africans without access to an improved water supply and improved sanitation would save US$ 1.2 billion in health treatment costs. Universal access for Africans to a piped water supply and sewerage connection in their homes would save US$ 6.4 billion.

Sanitation, distribution of unserved populations

Asia shows the highest number of people unserved by either water supply or sanitation; yet it is important to note that proportionally, this group is bigger in Africa because of the difference of population size between the two continents



Percentage of Households without access to improved sanitation



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To achieve the targets:

- **an additional 1.5 billion people will require access to some form of improved water supply by 2015, that is an additional 100 million people each year (274,000/day) until 2015;**

- **access to drinking water globally means that providing services for about 1.9 billion people are required to gain access to improved sanitation, that is an additional 125 million people each year (342,000/day) until 2015;**

- **in urban areas, more than 1 billion additional people will need access to both water supply and sanitation over the next fifteen years in order to meet the targets**

To achieve the targets:

- **It will also mean that an unknown (but large) number of people will have to be trained to build, maintain, operate, regulate and oversee all of the required installations.**

HIV/AIDS

Regional HIV/AIDS statistics and features, end of 2003

	Adults & children living with HIV/AIDS	Adults & children newly infected with HIV	Adult prevalence rate [%] *	Adult & child deaths due to AIDS
Sub-Saharan Africa	25.0 – 28.2 million	3.0 – 3.4 million	7.5 – 8.5	2.2 – 2.4 million
North Africa & Middle East	470 000 – 730 000	43 000 – 67 000	0.2 – 0.4	35 000 – 50 000
South and South-East Asia	4.6 – 8.2 million	610 000 – 1.1 million	0.4 – 0.8	330 000 – 590 000
East Asia & Pacific	700 000 – 1.3 million	150 000 – 270 000	0.1 – 0.1	32 000 – 58 000
Latin America	1.3 – 1.9 million	120 000 – 180 000	0.5 – 0.7	49 000 – 70 000
Caribbean	350 000 – 590 000	45 000 – 80 000	1.9 – 3.1	30 000 – 50 000
Eastern Europe & Central Asia	1.2 – 1.8 million	180 000 – 280 000	0.5 – 0.9	23 000 – 37 000
Western Europe	520 000 – 680 000	30 000 – 40 000	0.3 – 0.3	2 600 – 3 400
North America	790 000 – 1.2 million	36 000 – 54 000	0.5 – 0.7	12 000 – 18 000
Australia & New Zealand	12 000 – 18 000	700 – 1 000	0.1 - 0.1	<100
TOTAL	40 million [34 – 46 million]	5 million [4.2 – 5.8 million]	1.1 % [0.9-1.3]	3 million [2.5 – 3.5 million]

UNAIDS

UNAIDS · WFP · UNDP · UNFPA · UNICEF · ILO · UNESCO · WHO · WORLD BANK

* *The proportion of adults [15 to 49 years of age] living with HIV/AIDS in 2003, using 2003 population numbers*

The ranges around the estimates in this table define the boundaries within which the actual numbers lie, based on the best available information. These ranges are more precise than those of previous years, and work is underway to increase even further the precision of the estimates that will be published mid-2004.

00002-E-2 – 1 December 2003

World Health Organization

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00002-E-2 – 1 December 2003

World Health Organization

Adults and children estimated to be living with HIV/AIDS as of end 2003

Total: 34 – 46 million

UNAIDS

00002-E-4 – 1 December 2003

World Health Organization

The Panos Institute
9 White Lion St
London N1 9PD
United Kingdom

“We believe that the characteristics of this pandemic, caused by a virus that takes up to 10 years between infection and symptoms to appear, and inextricably bound up with complex issues of sex and sexuality, prejudice and discrimination, poverty and inequality, demands a long-term strategy.

Very few experts and commentators on this pandemic expect it to be contained within the next 10 years, and most argue that any real impact will take at least two decades to achieve. No widely available vaccine or cure is expected to be developed within at least a decade”

The Panos Institute
9 White Lion St
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United Kingdom

The international community has committed itself through its Millennium Development Goals to have *"halted by 2015 and begun to reverse the spread of HIV/AIDS"*.

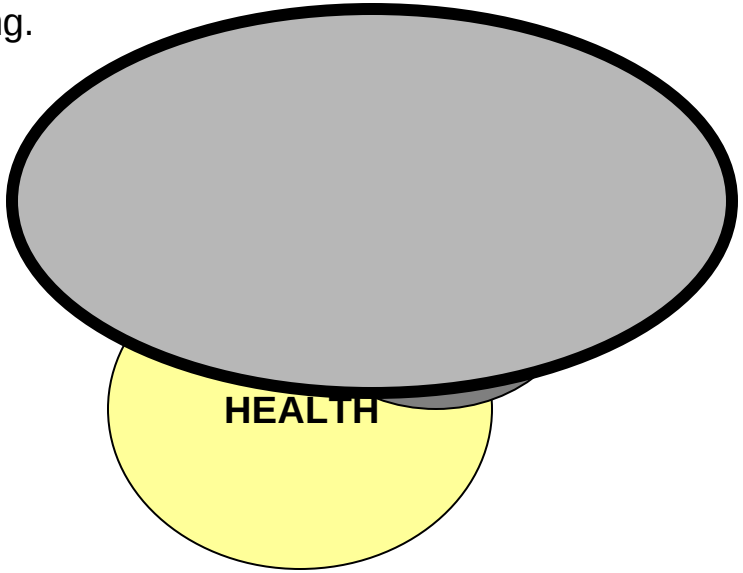
Panos argues that, despite many positive and courageous steps by initiatives such as the Global Fund to Fight AIDS, TB and Malaria (GFATM), funding structures and policies are poorly positioned to support the kind of long-term, cross-sectoral, difficult-to-evaluate and locally driven initiatives that constitute the most appropriate responses to HIV/AIDS.

There are several initiatives by large organizations to respond to these concerns, but unless these become more widespread and more deep seated, then the international response to HIV/AIDS will not be sufficient to meet the Millennium Development Goals

- The development of concepts, structures, frameworks, approaches, and systems to enable efficient and effective health services, including all aspects of health research, disease prevention, health promotion, healthcare, disease management, and terminal care.

  - Health data mining; knowledge discovery.
  - The nature and structure of health information; a health ontology.
  - The meta-analysis of clinical trials.
  - Health care guidance systems; decision-support systems.
  - Bio-medical computing.

- Anything in:



ICT sector

From: http://www.cs.uwaterloo.ca/health_info/health_docs/5

Infrastructure

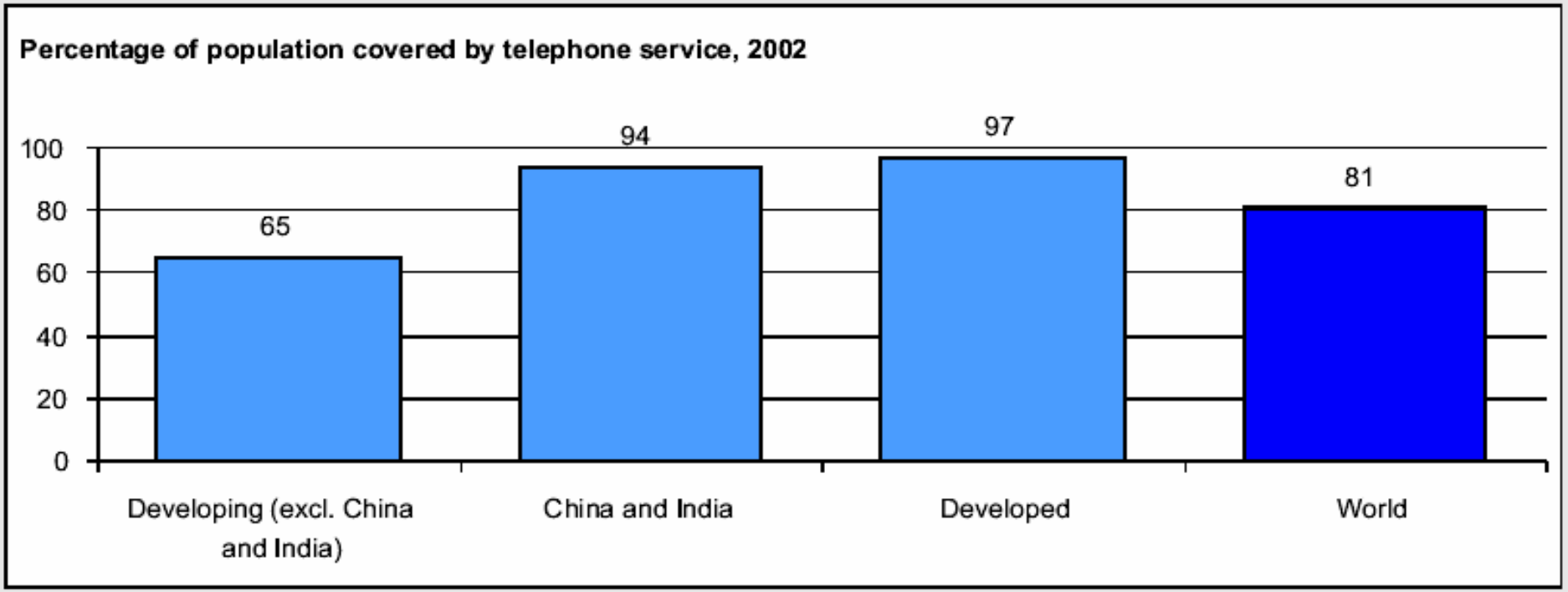
- Telecommunications
- Computing

Computing and Communications Infrastructure

Indicators are:

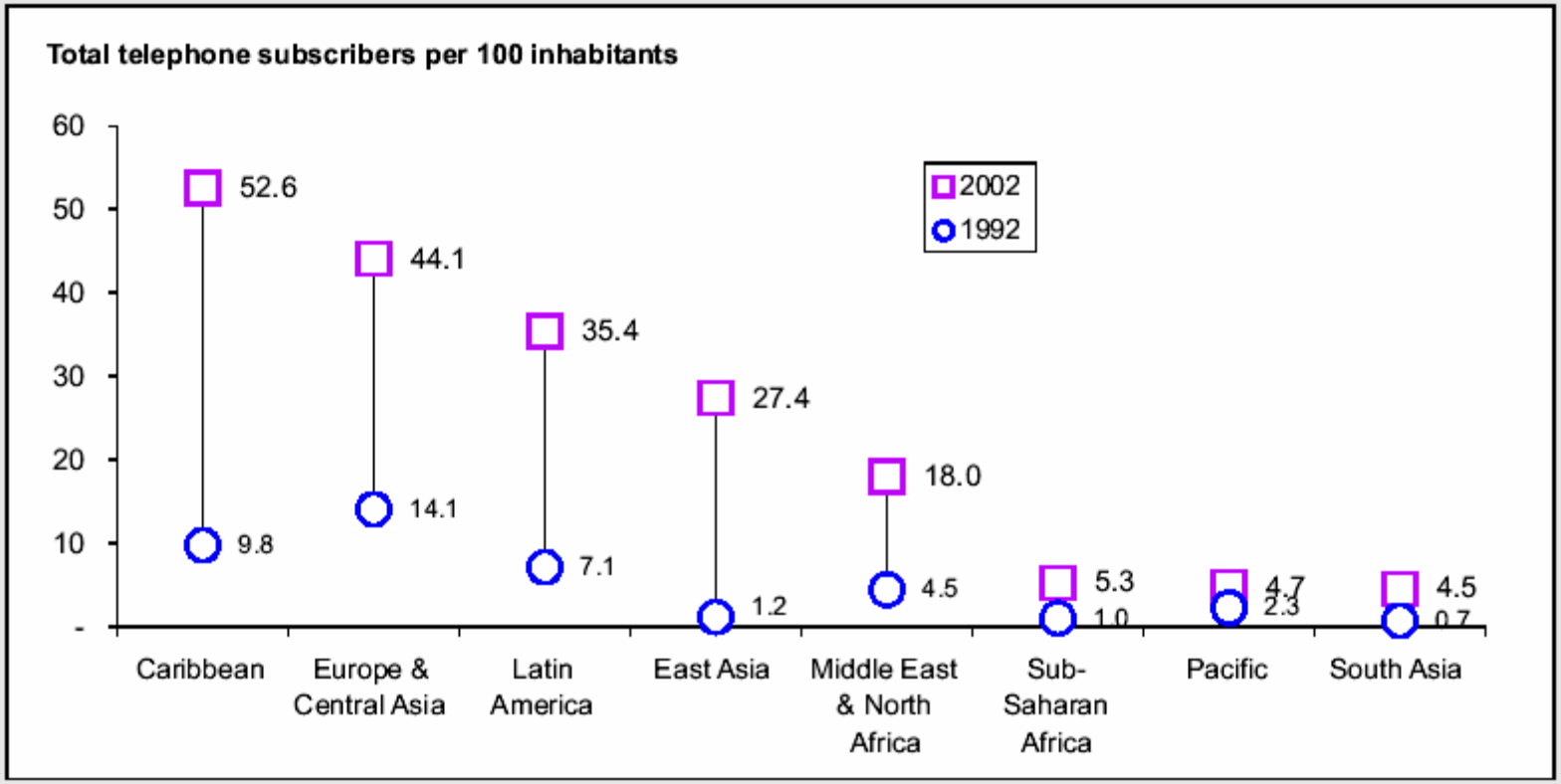
- **Telephone Installations**
- **Mobile Telephone usage**

Percentage of the world's population with access to telephone service, by income group, 2002



Source: ITU.

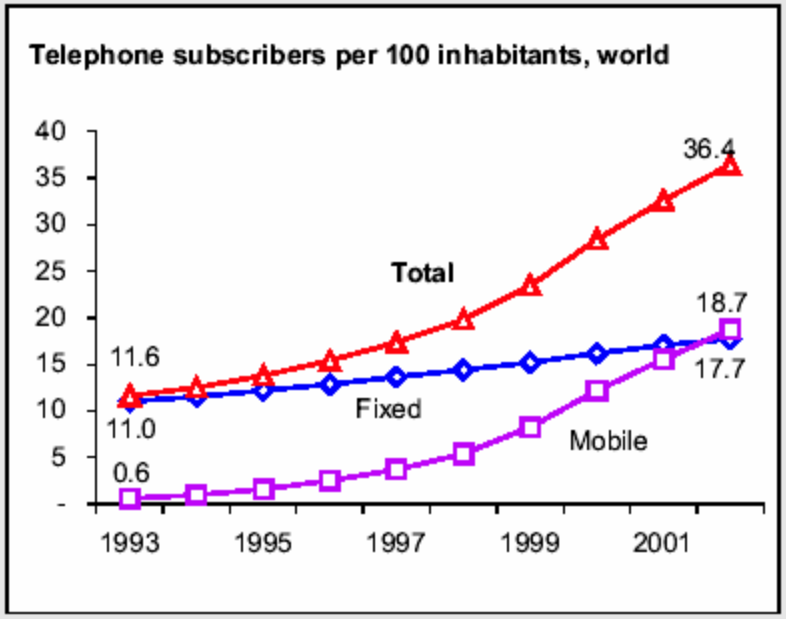
Total teledensity (main telephone lines and mobile users per 100 inhabitants), in 1992 and 2002, in developing regions

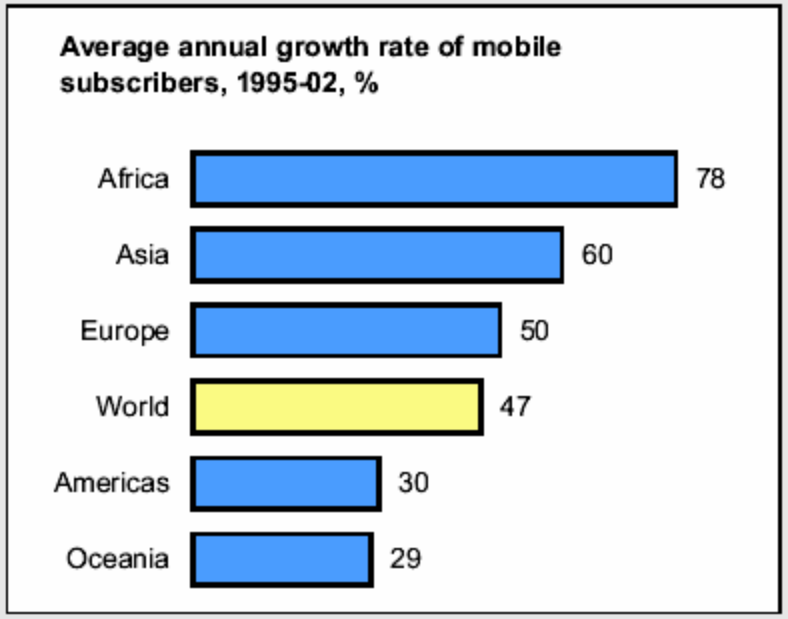


Note: Developed countries are excluded. For definitions of regions, see: www.worldbank.org/data/countryclass/classgroups.htm.
Source: ITU World Telecommunication Indicators database.

Note the significant improvements in 10 years in most regions!

Main lines, cellular mobile and total telephone subscribers per 100 inhabitants, 1993-2002, world (left) and annual average growth in mobile cellular subscribers, 1995-2002, world regions, per cent (right)





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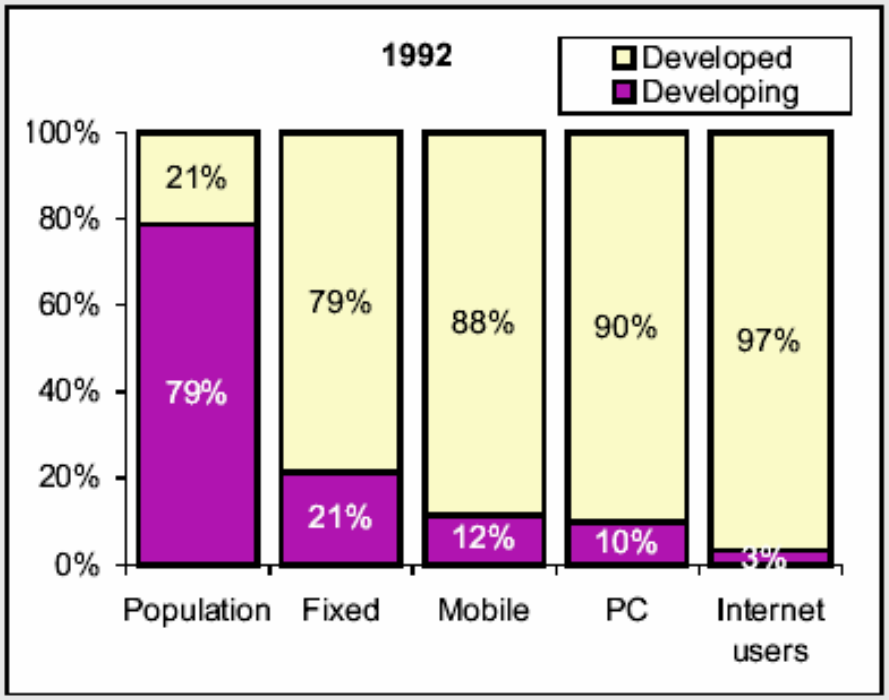
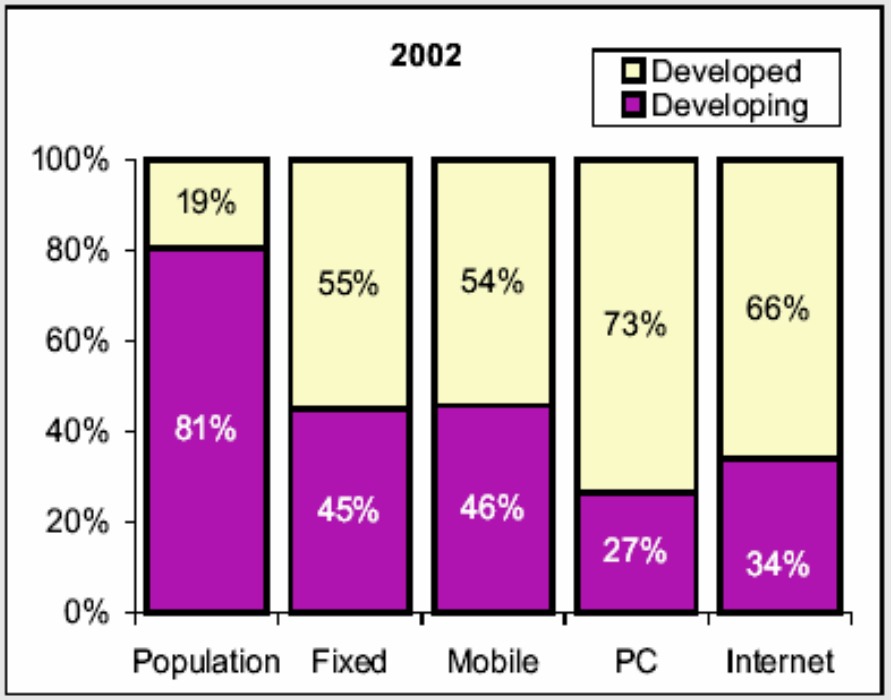
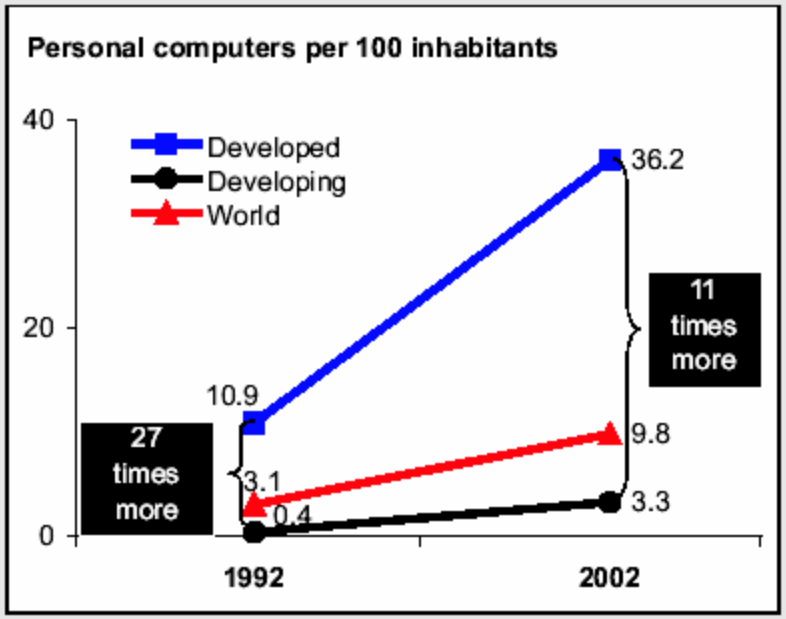
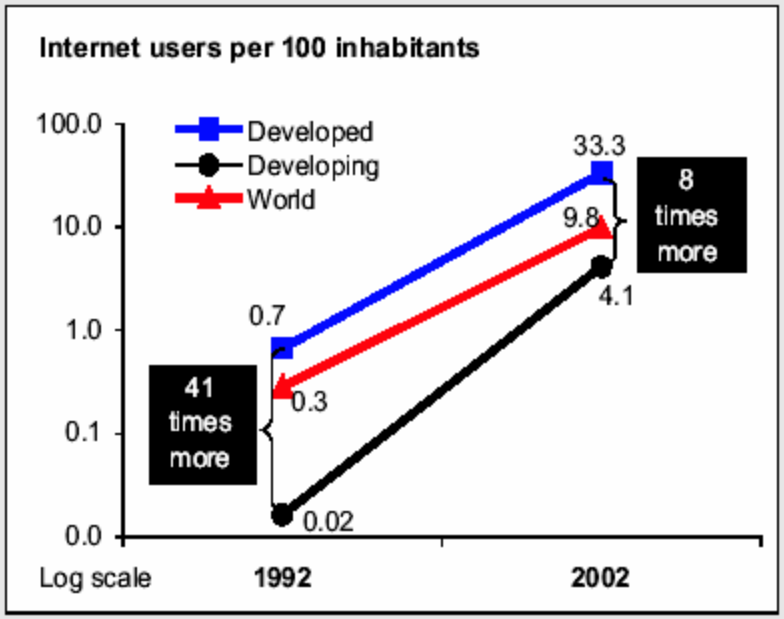




Progress 1992 to 2002

Note: Developed includes Western Europe, Australia, Canada, Japan, New Zealand and the United States. Developing refers to all other countries.
Source: ITU World Telecommunication Indicators database.





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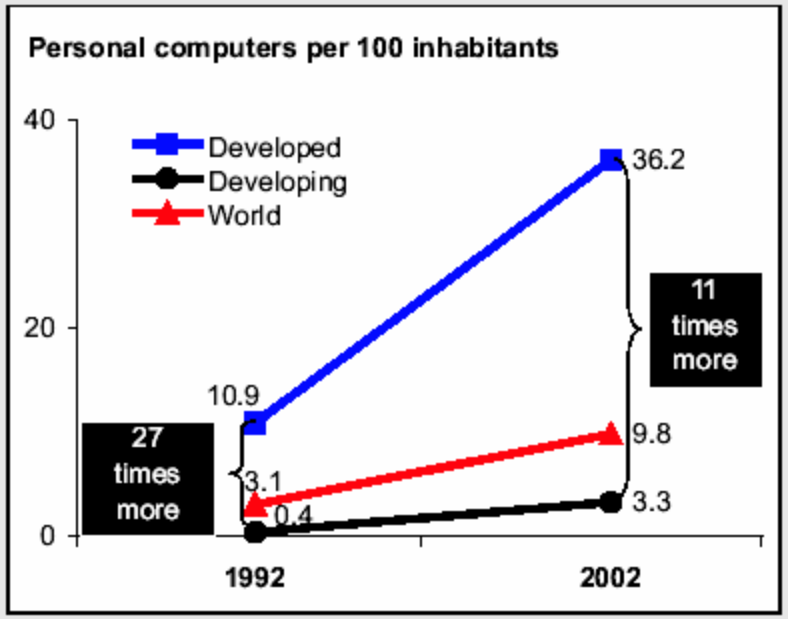

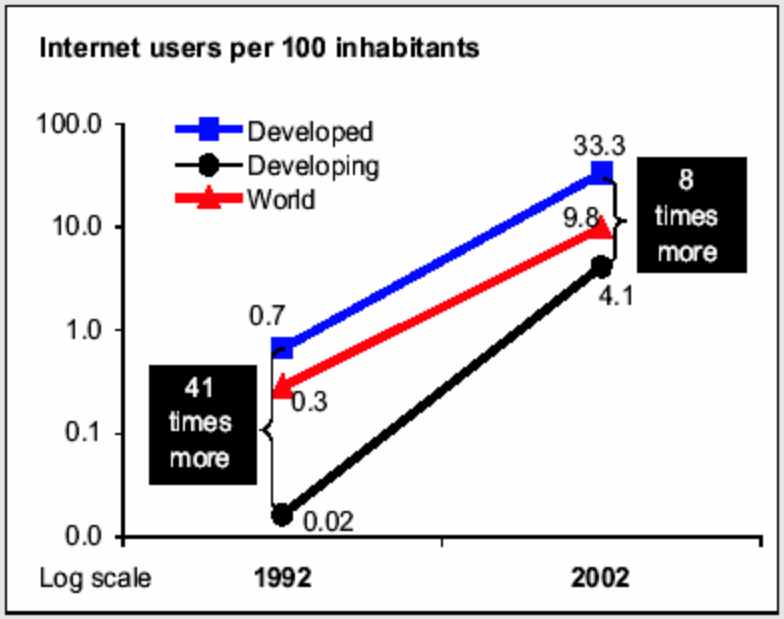

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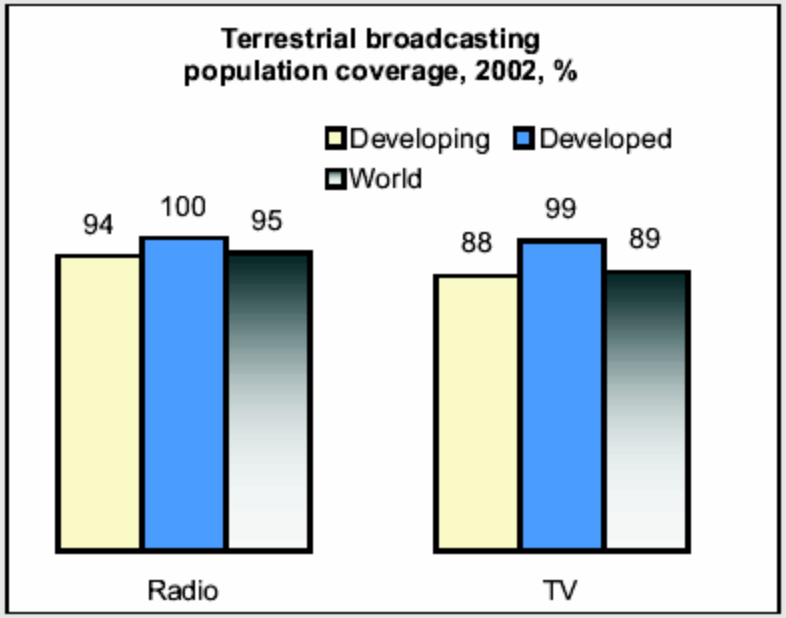
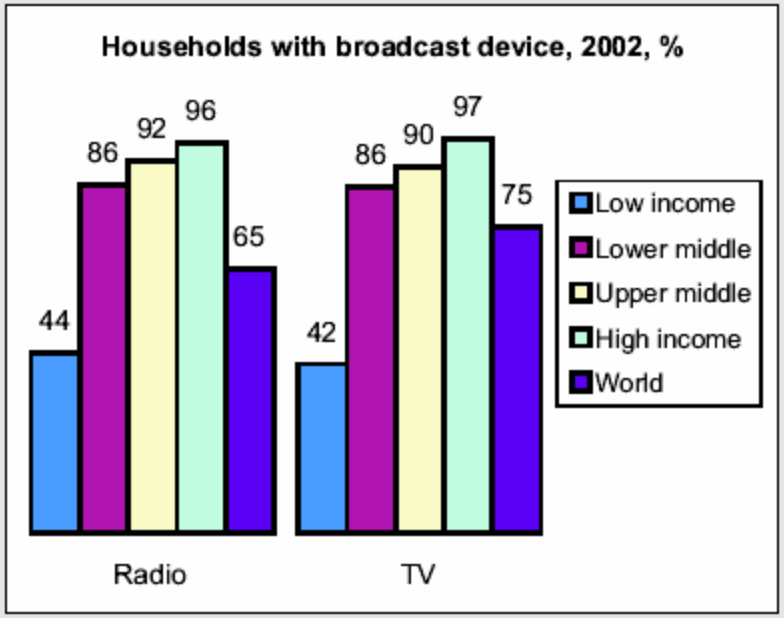
Source: ITU World Telecommunication Indicators database.

But – this is insignificant compared to "traditional media" -------

Other dissemination pathways

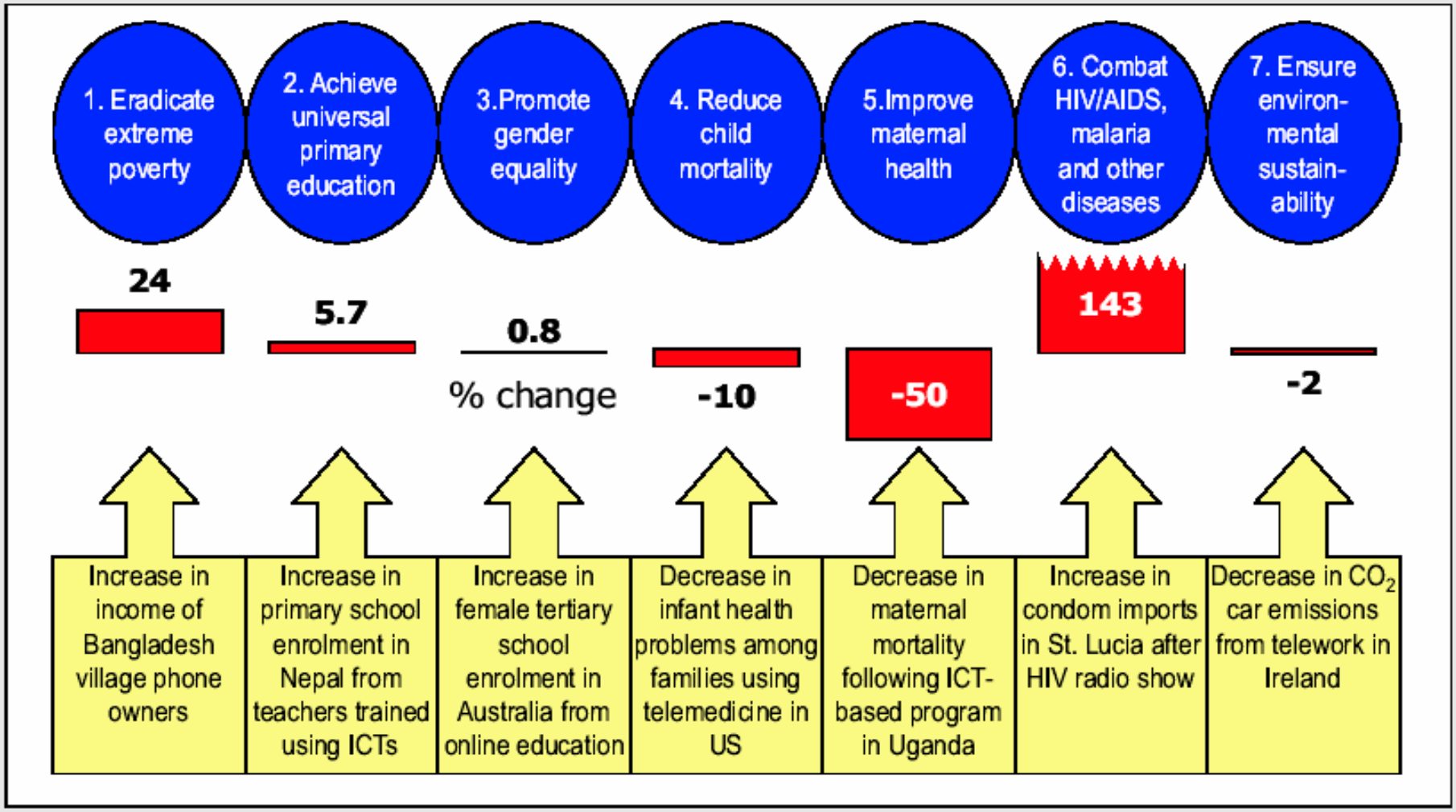
Percentage of population covered by terrestrial radio and television broadcasting (left) and households with a radio or television (right) by income group, 2002





Source: ITU World Telecommunication Indicators database.

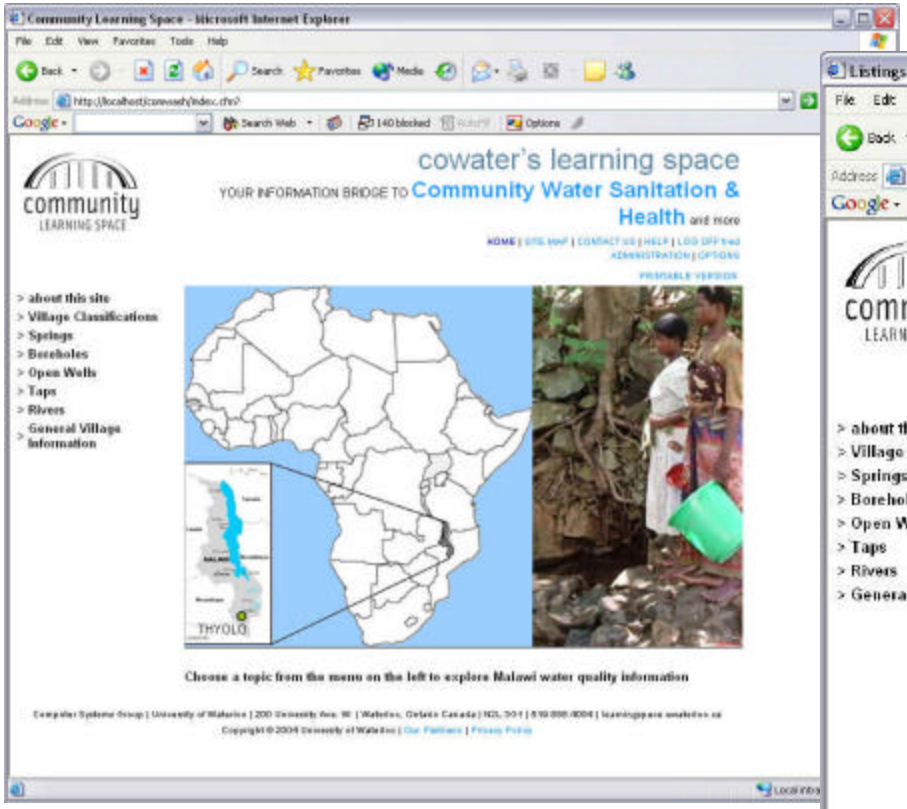
Improvements due to Telecommunications

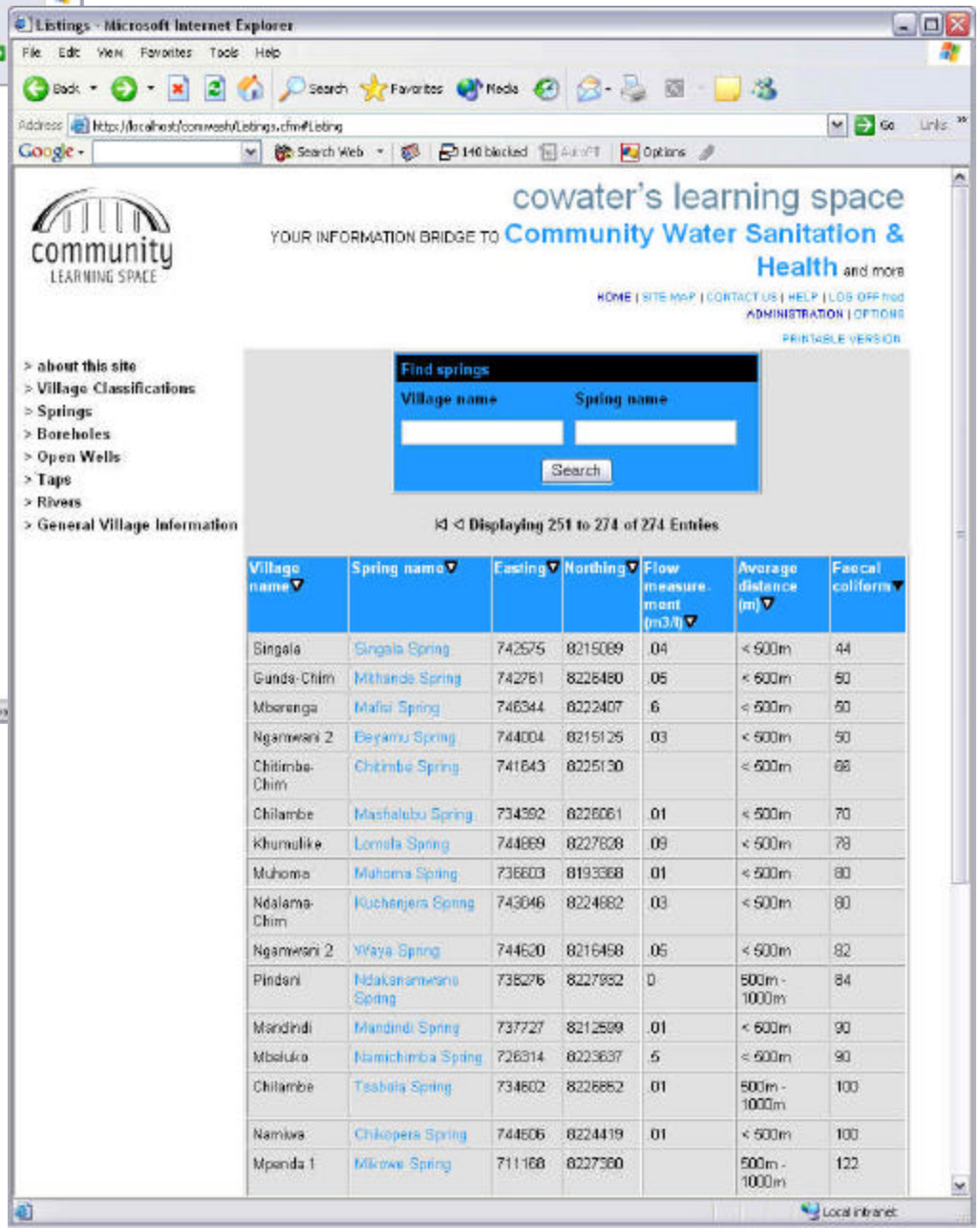


Projects and Cautionary Tales

A few examples of projects in Health Informatics and Related Areas

- **Detailed survey of water wells, their water quality and water uses in districts in Malawi**
- **Project funded by CIDA and completed by Cowater Inc.**
- **Data transferred to CDROM for distribution**
- **Converted into a web site where the information could be updated and modified by district offices directly over the Internet**





Village name	Spring name	Easting	Northing	Flow measurement (m3/h)	Average distance (m)	Fecal coliform
Singala	Singala Spring	742575	8215089	.04	< 500m	44
Gunda-Chim	Mthande Spring	742761	8226480	.05	< 500m	50
Mberenga	Mafisi Spring	746344	8222407	.6	< 500m	50
Ngamwani 2	Beyamu Spring	744004	8215125	.03	< 500m	50
Chitimba-Chim	Chitimba Spring	741643	8225130		< 500m	66
Chilambe	Mashalubu Spring	734392	8226061	.01	< 500m	70
Khumulike	Lomela Spring	744869	8227828	.09	< 500m	78
Muhoma	Muhoma Spring	736603	8193368	.01	< 500m	80
Ndalama-Chim	Kuchenjera Spring	743046	8224882	.03	< 500m	80
Ngamwani 2	Waya Spring	744620	8216458	.05	< 500m	82
Pindani	Ndakanamwano Spring	738276	8227852	0	500m - 1000m	84
Mandindi	Mandindi Spring	737727	8212599	.01	< 500m	90
Mbaluko	Namichimba Spring	726314	8223637	.5	< 500m	90
Chilambe	Tsabola Spring	734602	8226852	.01	500m - 1000m	100
Namiwa	Chikopera Spring	744606	8224419	.01	< 500m	100
Mpanda 1	Mikowe Spring	711168	8227360		500m - 1000m	122

Report - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

csg.uwaterloo.ca/learningspace/comwash/report.cfm?listtype=Rivers&id=127

Go Links

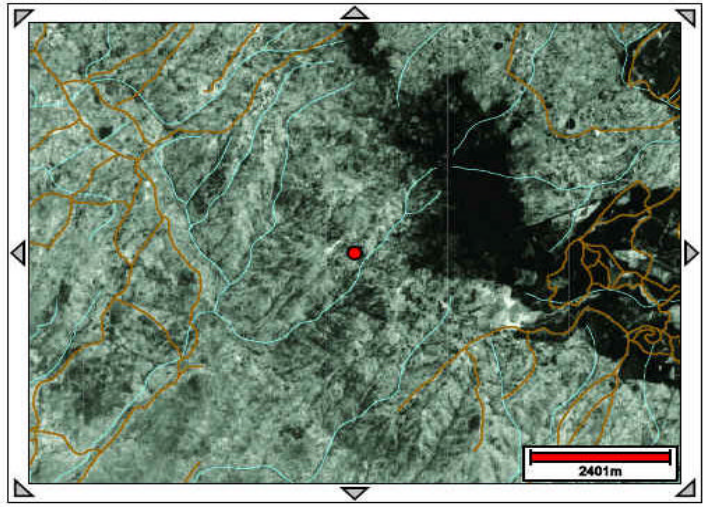
Search Web Site popups allowed AutoFill Options

Average distance (m):	500m - 1000m
Catchment status:	Forest
Human activity:	Yes
Water use (dry season):	Washing And Bathing
Water use (wet season):	Washing and Bathing
Water quality - pH:	7
Water quality - TDS:	23
Water quality - FC:	256

Image:

Map:

Start Info:



Internet

Listings - All Water Sources - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address http://localhost/comwash/Listings.cfm?ListType=allsources&MenuItemID=9&resultsperpage=2000

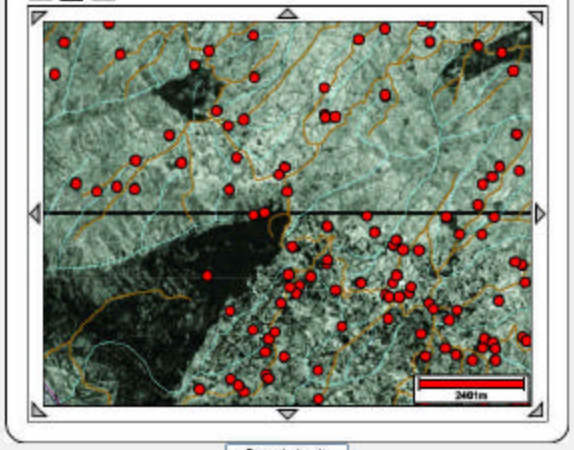
Go Links

Google Search Web Site popups allowed AutoFill Options

William-Mphu	William School	Borehole	718795	8218166	500m - 1000m	6
Wilson-Nsa	Wilson	Borehole	740754	8194294	< 500m	
Wilson-Thom	Chiwalo River	River	714031	8230238	< 500m	
Wilson-Thom	Namiseche River	River	713595	8231420	< 500m	200
Wilson-Thom	Not known	Borehole	713183	8230472	< 500m	
Wilson-Thom	Wilson	Well	713958	8231147	< 500m	
Wilson-Thom	Wilson VG	Borehole	714034	8231047	500m - 1000m	
Wilson-Thom	Wilson VG	Borehole	714193	8230963	< 500m	
Wilin	Nakondwe Spring	Spring	713940	8219558	500m - 1000m	42
Wilin	Wilin	Borehole	713570	8218911	500m - 1000m	8

Find currently displayed locations on the map

Start Search Info: Click on the map to zoom in



Search Again

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Done Local intranet

community LEARNING SPACE

cowater's learning space

YOUR INFORMATION BRIDGE TO **Community Water Sanitation & Health** and more

> about this site
> Village Classifications
> Springs
> Boreholes
> Open Wells
> Taps
> Rivers
> General Village Information

Spring Details

Village name:	Matchuana
Spring name:	Mphalapala Spring
Waypoint number:	113
Easting:	727275
Northing:	8215895
Elevation:	771
Flow measurement (m3/l):	1.5
Origin:	Large Spring
Dry up months:	0
Housholds:	50
Average distance (m):	500m - 1000m
Catchment status:	Mixed Farming
Human activity:	Y
Water use (dry season):	Drinking and Cooking
Water use (wet season):	Drinking and Cooking
Water quality - pH:	7.1
Water quality - TDS:	110
Water quality - FC:	140
Image:	

The Republic of Georgia

1. Telecardiogram Project:

The Republic of Georgia, on the eastern coast of the Black Sea, is seeking to bring its Soviet-era health service into the 21st century with telemedicine and Internet technology. The projects, funded largely by foreign donors, will test the value of advanced health informatics to other former Soviet republics.

In the largest telemedicine project, patients with heart disease have access to specialist care 24 hours a day via a trans-telephonic electrocardiogram. Patients record their own heartbeats and send them by telephone to a monitoring center at Guli Cardiac Clinic in the capital, Tbilisi.

2. Radiology Project:

This connects the Institute of Radiology in Tbilisi through the Internet to a diagnostic imaging center in Lausanne, Switzerland, for specialist second opinions. Future plans include the use of telemedicine for blood pressure monitoring, asthma control and fetal monitoring.

The Republic of Georgia

3. Evidence-based medicine through a shared online database:

The system will automatically generate Web pages from medical text entered online in remote parts of the country. The idea is to build a health information infrastructure of six databases, each with more than 150,000 Web pages, covering key medical specialties.

ITU is planning further telemedicine projects in the former Soviet republics of Uzbekistan and Kirgistan, according to Leonid Androuchko, a consultant to the organization.

Access to medical journals at low (or no) cost is essential for Health Systems and Health Informatics

Journal of Medical Internet Research

Developing Countries Must Invest in Access to Information for Health Improvements

Akintola B. Odutola1, MD, PhD, FRCS(Edin)
1Centre for Health Policy & Strategic Studies, Lagos, Nigeria

Systematically-harnessed information and communication technologies have been shown to improve the health of populations in many developed countries through empowerment of those who access and use information from the simple homemaker and working mother to the highest-ranking policymaker.

These technologies have also been shown to democratize the public space by fostering freedom of choice and expression as well as rapid access to and sharing of information.

These highly-cherished values of participatory democracy have in turn clearly helped to engender better health in individuals and communities. Fascinating and beneficial as these technologies may sound, the deep-rooted factors militating against access to information and the daunting challenges thereto in developing countries are well known

Developing and evaluating low-cost store and forward telemedicine for use in developing countries

TeleMedMail is a system to facilitate store and forward telemedicine in developing countries.

It allows users to import images, modify them and add clinical data. These cases are then compressed, encrypted and emailed to the specialist. Alternatively, the archive can be sent to a server and the specialist then views these over a secure web connection.

This system is operating in South Africa and a pilot project of its use for HIV management is being set up.

The code for the TeleMedMail client program is available from the Sourceforge open source software site.

Hamish S. F. Fraser *Children's Hospital Informatics Program, Boston, MA, and MIT Laboratory for Computer Science, Cambridge MA,*

http://medg.lcs.mit.edu/people/hamish/telemed-medinfo.pdf

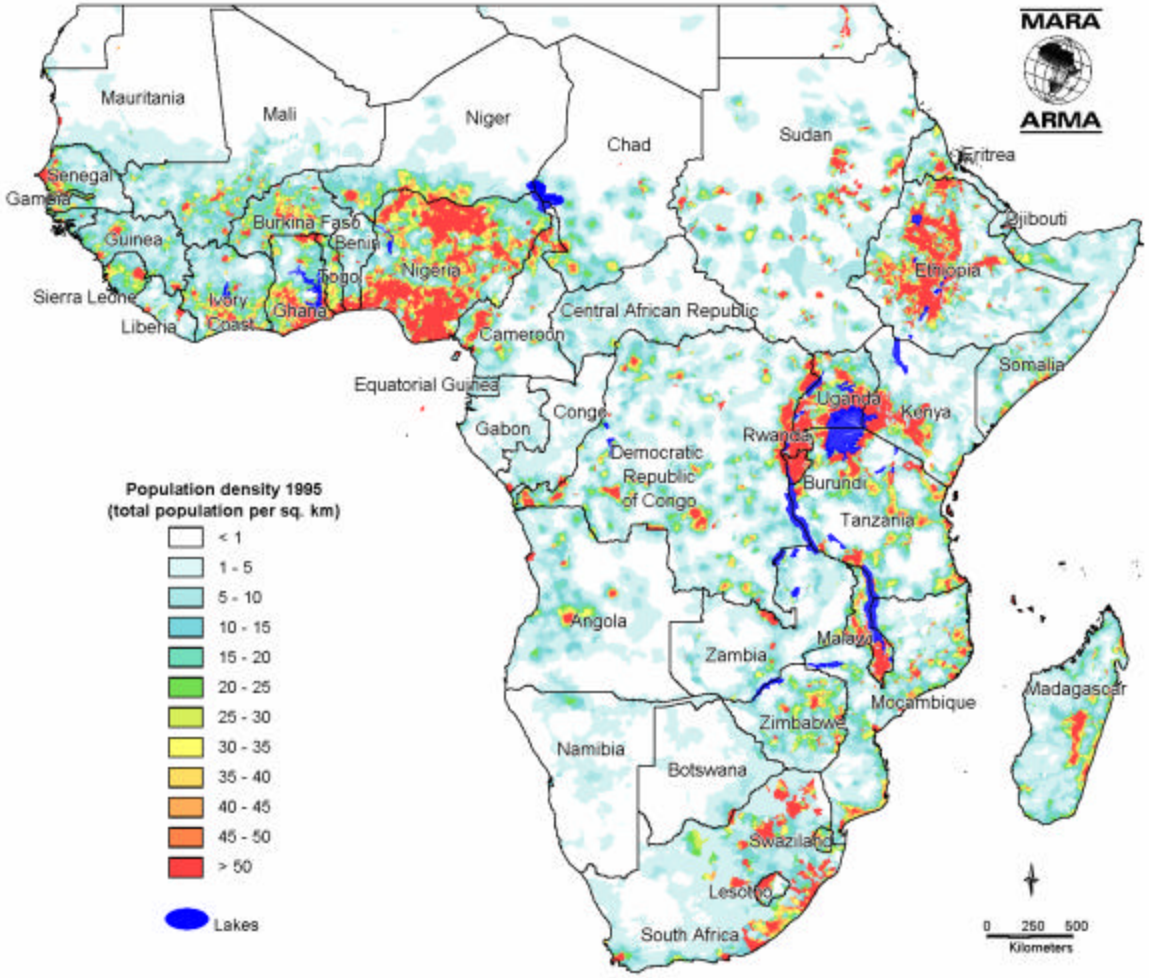
About the MARA/ARMA Project

[What is MARA/ARMA?](#) [The MARA/ARMA team past and present](#) [Slide Show](#)

The MARA/ARMA collaboration was initiated to provide an Atlas of malaria for Africa, containing relevant information for rational and targeted implementation of malaria control.
The MARA/ARMA initiative is non-institutional and runs in the spirit of an open collaboration. A group of dedicated African scientists, based at institutions across the continent, work co-operatively towards achieving the overall objectives.

- Background
- Objectives
- Achievements
- Scientific Achievements
- Empirical data
- Scientific Outputs
- First regional empirical malaria risk map
- Spatial statistics and modelling
- Capacity development
- Application / relevance
- Marks of success
- Historical overview
- Acknowledgments

Total Population Distribution 1995



This map is a product of the MARA/ARMA collaboration (http://www.mara.org.za). July 2001, Medical Research Council, PO Box 17120, Congella, 4013, Durban, South Africa
CORE FUNDERS of MARA/ARMA: International Development Research Centre, Canada (IDRC); The Wellcome Trust UK; South African Medical Research Council (MRC);
Swiss Tropical Institute, Multilateral Initiative on Malaria (MIM) / Special Programme for Research & Training in Tropical Diseases (TDR), Roll Back Malaria (RBM).
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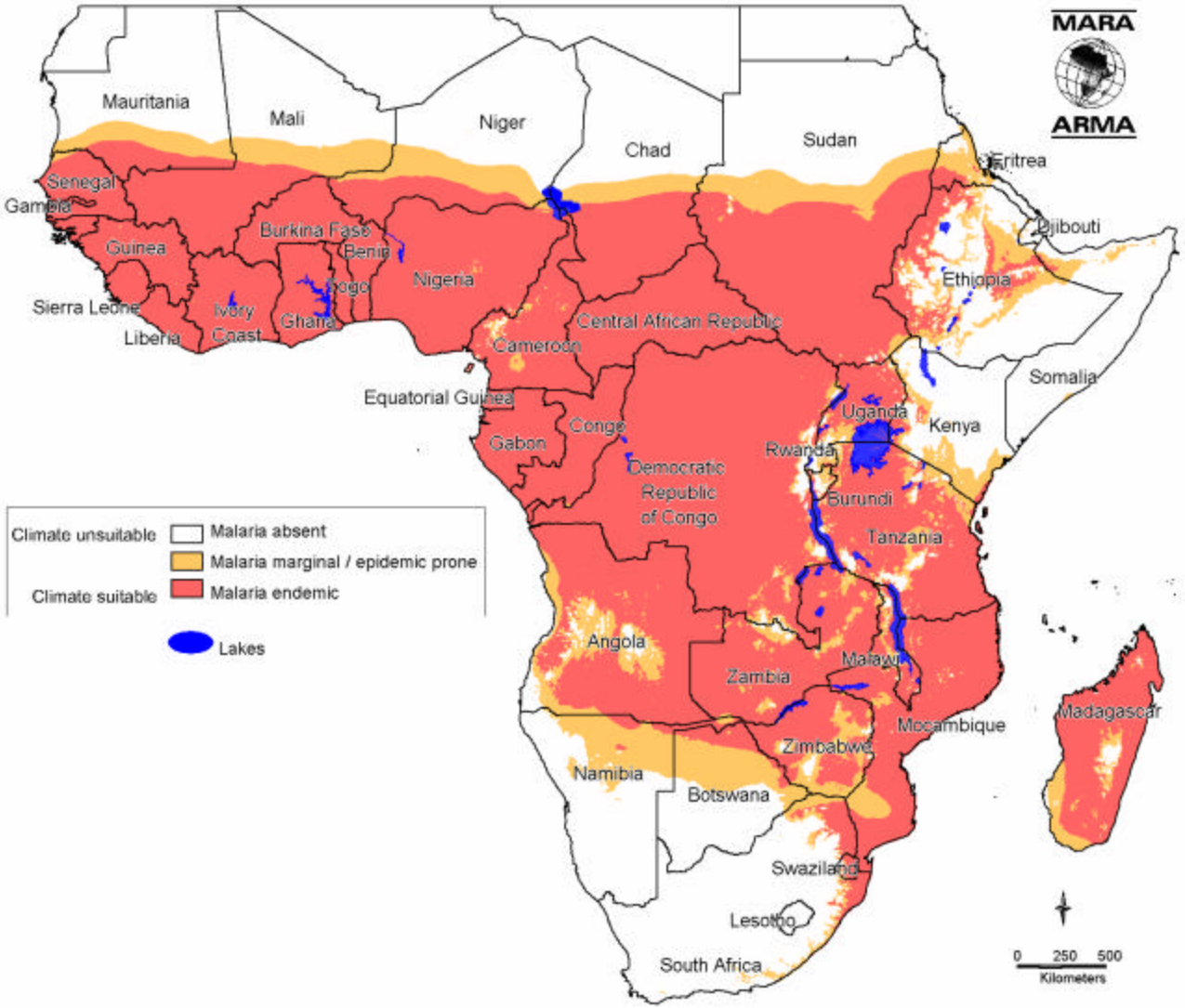
Distribution of Endemic Malaria



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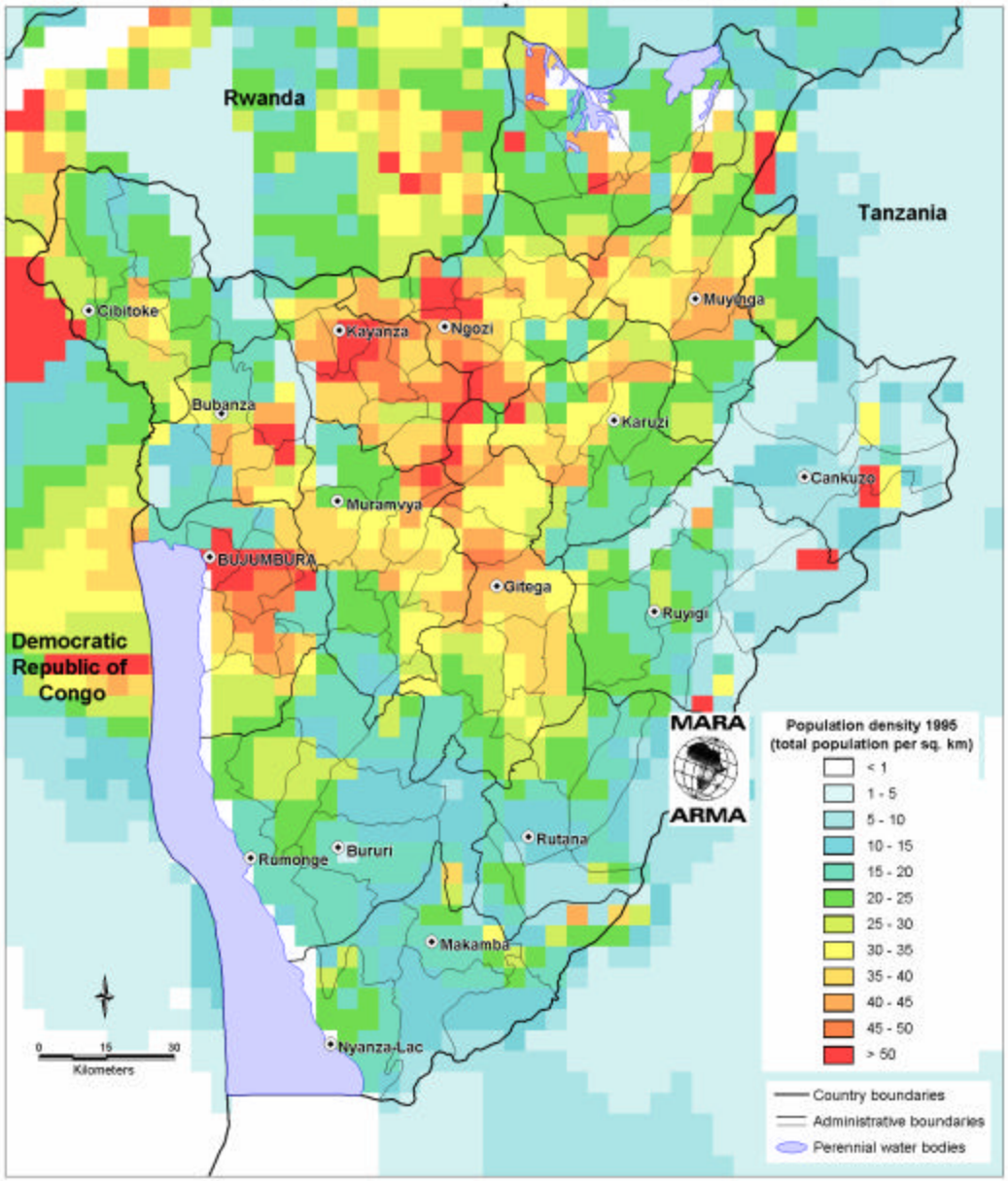
Burundi: Total Population Distribution 1995



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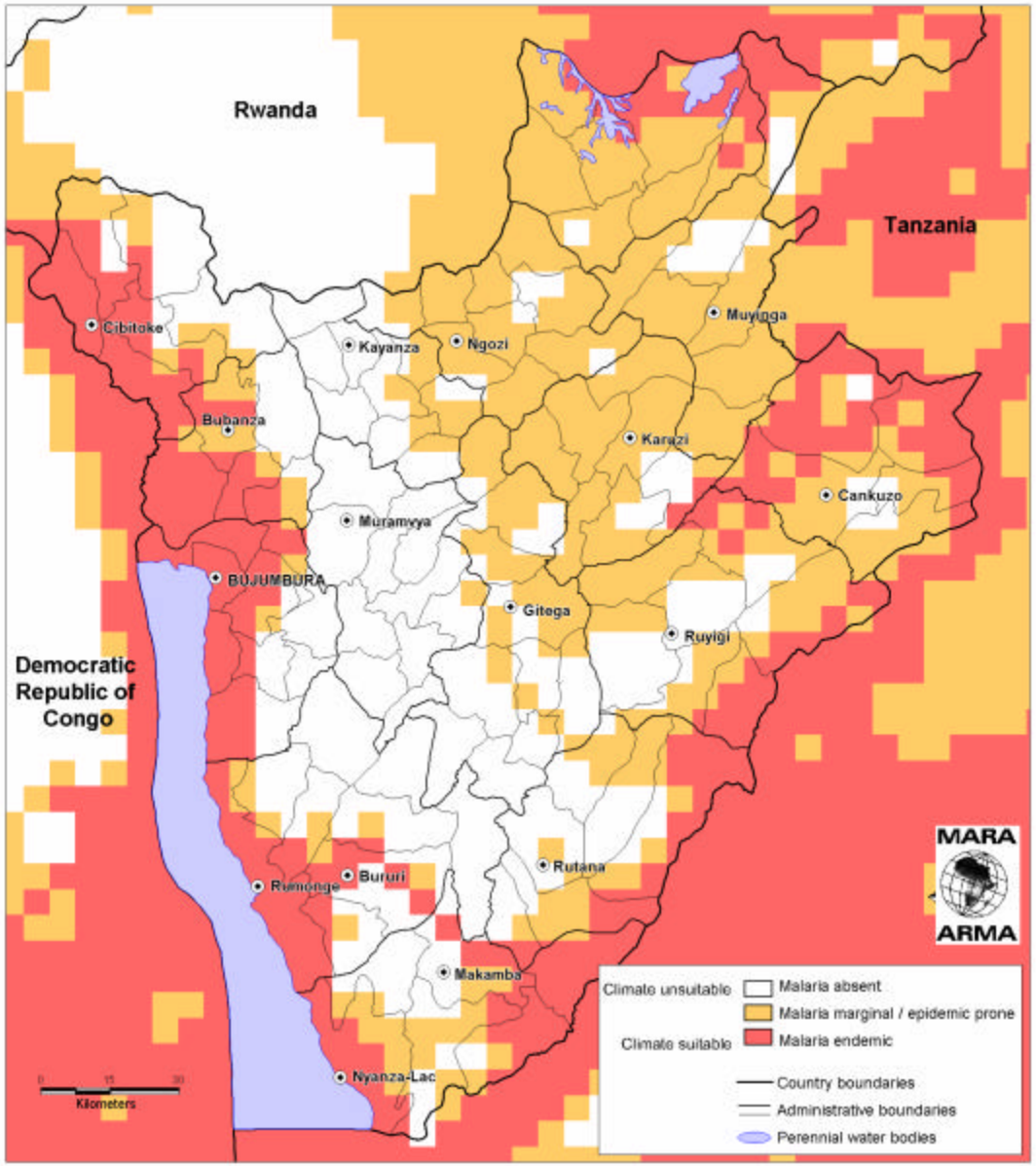

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Capacity Building in ICT

- **Capacity to use new information technologies**
- **Ability to use the technologies themselves as tools in capacity development**
- **Capacity to turn information into practice**
- **Capacity development is much broader than using technology for access to health information it includes primary health care and people's general capacity for self-determination.**

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The prevailing tendency to neglect capacity development was evident in the World Banks Infodev project that dropped in computers but made no provision for training and capacity development

Capacity Building in ICT

- **It is important to start with the existing channels and techniques of communication, and then to make links with others, including the commercial sector.**
- **Supporting people in present jobs might also slow down the brain drain that takes newly skilled people away.**
- **Experience in Nepal was that the communities took responsibility for training, more than anyone else, and they also bore most of the costs of ICT projects.**
- **Experience with telecentres in Mexico showed that where there were economic incentives to use them, such as with fishermen, they could be supported, but it was far more difficult in the case of health. Technology could also be a hindrance to good communication.**

Health Informatics

Commentary by Pejman Azarmina, MD
Honorary Research Fellow, CHIME, UCL, and Research Fellow, Department of Primary Care and Population Sciences, UCL

1 – Infrastructure

Basically, we could expect health informatics programmes and projects to succeed in countries where the following infrastructure is in place: computers, networks and the Internet. For many developing countries, such infrastructure is already available for secondary and tertiary health care services, but for primary health care, it seems that the traditional paper-based information flow is still more appropriate. Research and development programmes have to take into account existing infrastructure.

2 - Human Resources and Education

Almost all health informatics courses are based in developed countries. Consequently, developing countries rely on graduates whose education is not specifically geared to the needs of developing countries, making it difficult for them to find appropriate solutions for such countries. As health informatics is still a new discipline, most current health informatics experts seem to come from other disciplines and the much needed experts to develop and manage databases, networks and websites are usually IT specialists with little or no experience of health system contexts.

Therefore, in a developing country, health informatics projects usually lack the combined perspective that a health informatics graduate could bring and they become either too simplistic or too technical.

Commentary by Pejman Azarmina, MD
Honorary Research Fellow, CHIME, UCL, and Research Fellow, Department of Primary Care and Population Sciences, UCL

3 - Health Information Management

Health care administrators and managers with a special interest in health information could take on this role and specialise in health information management. Such administration and management does not have to be through computer systems and networks, even an efficient paper-based administration system could provide benefits.

4 - Access to Health Care Libraries and Information

One of the critical issues in health care research and development in any country is easy access to full-text articles, either electronically or via inter-library loans. Cost and limited access to such databases are key factors restricting R&D in developing countries.

Overview

Health Information

- Professionals – access to new medical publications and research materials, communications between health professionals and related disciplines
- Public access to information – through all appropriate means – Internet, CDROMs, bulletins, brochure, community centres, radio, TV, newspapers, magazines, teaching materials. Re-use of material in different media is an important goal

Managing Health Institutions

- Patient record-keeping and distribution
- Access to health records by health professionals
- Aggregating epidemiological information
- Reporting
- Capacity Building

Overview

Medical Research

- Access to medical and related research publications
- Access to databases and bioinformatics resources
- Publication of research results
- Capacity Building

Infrastructure

- Computing Infrastructure and Capacity Building
- Health infrastructure and Capacity Building
- Health Informatics Capacity Building

Capacity Building

Some examples

INDEHELA-M

The Methods for Informatics Development for Health in Africa (INDEHELA-M) project uses Nigeria as a proxy for other African countries.

The Made-in-Nigeria Primary Healthcare and Hospital Information System (MINPHIS) is the product of a ten year old joint research project between the Department of Computer Science and Engineering Obafemi Awolowo University(OAU), the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) and the University of Kuopio Computing Centre, Finland.

The project focused on developing computer-based Hospital Information System (HIS), Primary Health Care (PHC) and Information System Development (ISD) methods

Current capabilities of INDEHELA-M

- **Records of basic demographic, clinical and admission data on all in-patients admitted to the two hospital units (Ife State Hospital (ISH) and Wesley Guild Hospital, Ilesha (WGH))**
- **Morbidity/Mortality data**
- **List of Patients on the ward and Daily bed statements**
- **Monthly diagnostic Statistics**
- **Periodic feedback to consultants concerning patients admitted under their care**
- **Out Patient Scheduling**
- **Research access**
- **Patient inquiries service**

Two main issues were identified

a) Human and technical resources

b) Financial Resources

Possible Solutions:

1. Local software companies **can invest in developing a software package meeting the requirements of Nigerian or African hospitals, with a prospect of selling the package afterwards profitably to a sufficient number of hospitals.**

2. National health authorities **in Africa can pool the resources of the health sector itself together, and hire a suitable private or public sector organisation to develop appropriate software packages.**

3. Skilled and knowledgeable Health Informatics experts are not readily available.

4 *International development agencies* can likewise fund the twin activities of capacity building and software development. However, local institutions and national authorities must still be the prime actors. The objectives and the motivation cannot be set from the outside.

African degree course in medical informatics, in Durban, South Africa

This course started enrolling students in January 2003 and is part time with students attending for intensive one month blocks every 6 month plus work assignments at home.

It is being run by the new department of telehealth at the Nelson Mandella Medical School

Healthlink Worldwide

Healthlink Worldwide (formerly AHRTAG) is an international development agency committed to strengthening primary health care and community-based rehabilitation in developing countries by maximising the use and impact of information, providing training and resources, and actively supporting the capacity building of partner organisations.

Partnerships in Health Information

Partnerships in Health Information is a registered charity that aims to "help to relieve poverty, sickness and distress by contributing to improvements in health care in developing countries, and to advance education by encouraging the more effective flow of medical knowledge between nations, using appropriate technology".

They do this by encouraging active partnerships between UK medical information services and developing countries.

Summary

- **Funding Issues – Donors want to fund projects that they choose – recipients want projects that they need**
- **High Profile projects are favoured – some projects are difficult to fund simply because they are not novel or do not generate media attention. Sanitation projects suffer from this!**
- **Management Issues – Donors want strict expenditure controls and transparency – recipients want funds spent locally, value for funds expended and rapid response**
- **Timing Issues – Projects may take years to get going and funded – original participants may have moved on by then**
- **Duration – Projects tend to be only 3 to 5 years - maybe extended to a further 3 to 5 years. Problems take decades to resolve.**
- **Sustainability issues – What is left behind? What can be continued without continued funding? CCF – the Culture of Continuous Funding**

- **Many Health, Health Informatics and Water and Sanitation developments and installations are funded by international donors, NGOs, the World Bank or regional development banks.**
- **“Tied” versus “untied” funding is an issue**
- **Applications of highly developed technologies sometimes inappropriate (due to “tied” funding or other reasons)**
- **Repayment terms for World Bank and Regional Development Bank funding can be onerous**
- **Sustainability of projects after funding stops often doubtful**
- **Capacity building efforts not usually a high priority**

Challenges in Health Informatics in Developing Countries

1. **Very low income and income disparities within countries**
2. **Few health professionals, hospitals and institutions**
3. **Poor, but quickly improving, communication tools (ICT)**
4. **Access to information difficult (for all – professionals and public)**
5. **Usually poor medical data and epidemiological data (with notable exceptions)**
6. **Very large medical issues including drinking water and sanitation, AIDS, etc.**
7. **Intensive Capacity Building efforts are difficult but needed on a broad front**
8. **Capacity Building for the Health and Informatics professions often leads to either the developed world or private industry in the country "poaching" the trained professionals, technicians, or other trained workers.**

Challenges in Health Informatics in Developing Countries

10. **Many projects have not been sustained and were probably counter-productive (loss of enthusiasm, cynicism towards later projects, loss of data, etc)**
11. **Many data-gathering Health Informatics projects have not trained local people, and often retain the data outside of the country with restricted access for local health professionals**
9. **Health Information dissemination is an extremely important function but has to be done with local knowledge and input and by appropriate means (radio, tv, bulletins, brochures, health clinics, NGO groups, the Internet, etc)**

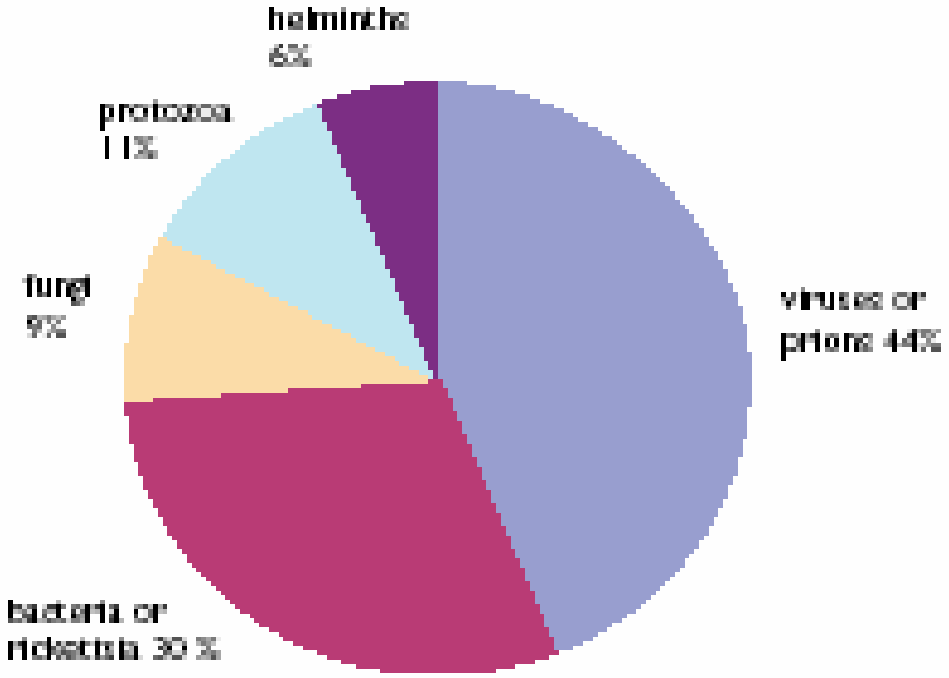
Opportunities in Health Informatics in Developing Countries

The same situations that raise barriers and challenges can also lead to very significant opportunities to make a real difference.

Some Examples:

- **AIDS information dissemination**
- **Water and Sanitation information dissemination**
- **Training of health and water professionals can make a large difference**
- **General capacity building in the informatics sector as a whole is a prerequisite for applications of Health Informatics in many regions – this has many "spin-off" benefits**
- **Epidemic "early warning systems" and epidemiological data are of interest to all nations now because of the emerging and re-emerging pathogen problem**

Distribution of emerging pathogens by group



The distribution of emerging pathogens according to the main group of micro-organisms to which they belong. The figure shows that nearly half of all emerging pathogens are viruses or prions (adapted from Taylor, Latham & Woolhouse, 2001).

Cautionary Notes

- **Expenditures on Health Informatics have to be balanced against all other expenditures on basic health, water, sanitation, AIDS, etc. from a low yearly per capita sum (I$82.00 in Africa).**
- **The return on investment of any Health Informatics project or program should be obvious, immediate and large to justify such investment in competition with the many other potential uses of the funds**
- **Simple Projects may produce such beneficial results more easily than complex, high-technology HI projects**
- **Health Information dissemination and Capacity Building efforts can be such relatively simple programs**
- **All programs, aid and projects should take into account local conditions and expertise and have some form of capacity building as a prime goal – not as an add-on project.**

In Conclusion ……

The other end of the spectrum ?

http://wvlc.uwaterloo.ca/HealthInformatics/developingcountryHI.htm