



Cambodia

Environmental Health Country Profile

World Health Organization

As of December 3, 2004



1 Development, Environment and Health Status

1.1 *Development Pattern of the Country*

1.1.1 Maps / geography / demography / urban-rural trends

Cambodia is in South East Asia and is bordered on the north by Laos, on the south by the Gulf of Thailand, on the east by Vietnam and on the west by Thailand. It has a total land area of 181,040 km². Cambodia has a tropical climate, with relatively cool temperatures around November to February and hot temperatures from March to May.

Based on the latest 2004 estimate, the total population in Cambodia is around 13, 542, 410. About 84 percent of the population is concentrated in the Plain and Tonle Sap Lake regions with only 16 percent living in urban areas. The rest are sparsely distributed in the plateau and mountainous regions where average population density is 19 persons per km². Cambodia has a young population with 41.60 percent of the population below 15 years old and only 3.33 percent above 65.

Poor access to quality education has led to a low adult literacy rate of 69.40 percent. The male literacy rate is 80.50 percent, higher than for female, which is 58.20 percent. Like in most developing countries, child mortality indicators in Cambodia are poor. Infant mortality rate and under-five mortality rate per 1,000 live births were reported to be 95 and 124, respectively in 2000. Of the children under-five group, 20 percent had acute respiratory infection while 19 percent suffered from diarrhea.

1.1.2 General economy of the country

From 1994 to 2002, Cambodia's economy grew by an average of 6 percent annually. In 2002, the annual per capital income was US\$297. The service and agriculture sector accounted for almost 80 percent of the GDP with the industrial sector sharing the rest. In 2001, an estimated 36 percent of the population was below the overall poverty line, 93.8 percent of which live in the rural areas. The country's total expenditure on health is 11.8 percent of GDP.

The natural resources of Cambodia are timber, gemstones, some iron ore, manganese and phosphate, and hydroelectric potential from the Mekong River. Around 4,848,000 hectares (12 million acres) of the country are unforested. All are arable with irrigation, but only 2.5 million hectares are cultivated. Major products of Cambodia consist of rice, rubber, corn, meat, vegetables, dairy products, sugar, and flour. The land area used for agriculture, as percentage of the total land area, is 29.3 percent.

1.1.3 Development priorities

The types of industry prevalent in Cambodia are garment and shoe manufacturing, rice milling, tobacco, fisheries and fishing, wood and wood products, textiles, cement, some rubber production, paper and food processing. Services are used for tourism, telecommunications, transportation, and construction. Trade exports consist of garments, shoes, cigarettes, natural rubber, rice, pepper, wood, and fish.

In spite of recent progress, the economy of Cambodia continues to suffer from the previous decades of war and internal strife. Per capita income and education levels are lower compared to their neighboring countries. The infrastructure remains inadequate, as most households in the rural area depend on agriculture and its related subsectors. The manufacturing output is concentrated in the garment-manufacturing sector, which expanded rapidly in the mid-1990s and now employs more than 200,000 workers. The other major foreign currency earner is tourism mainly the Angkor Wat in Siem Reap, the country's popular international tourist attraction. The service sector is concentrated heavily in trading activities and catering-related services.

1.1.4 Human Development Index

This is a composite index developed by the United Nations Development Programme (UNDP) based on three indicators: longevity, as measured by life expectancy at birth; educational attainment, as measured by adult literacy and total primary, secondary and tertiary enrolment ratio; and standard of living, as measured by GDP per capita. According to the 2004 UNDP Human Development Report, Cambodia has an HDI of 0.56 and ranks 130 out of 177 countries.

1.2 Existing Service Levels

1.2.1 Proportion of population (national) with existing utilities (water supply, sanitation, solid waste collection, drainage, sewerage, electricity)

Access to safe drinking water is still a problem throughout the country. Only 31 percent of the whole population has safe water: 54 percent in the urban areas and 27 percent in the rural areas.

Poor sanitation is often the cause of water borne diseases such as diarrhea and cholera. In Cambodia, only 21 percent of the population has access to adequate excreta disposal facilities. A small percentage of households is connected to the sewerage system or uses septic tanks. Still a smaller fraction uses pit latrines. The majority of households do not have access to sanitary facilities.

1.2.2 Proportion of urban population served by piped water, sewers, electricity, municipal solid waste collection

At present a number of public electric plants exist in the urban areas in addition to the thousands of generating sets privately owned by consumers. Over 95 percent of the total electricity generated in Cambodia is thermal power. There is no refinery in the country and known coal resources remain unexploited thus all fossil fuel types are imported. Based on a 2000 study, only 16.6 percent of the

population is served with electricity, 60.6 percent in the urban areas with 9 percent in the rural areas.

1.2.3 Presence of other basic services such as fire fighting and emergency management (flood, earthquake, chemical emergency, etc.)

Cambodia has no capability to deal with poisoning cases and for chemical emergency response. There is fire fighting department and emergency management for natural disasters but they require additional HazMat training.

1.2.4 Housing: presence of building regulations, proportion of people living in informal settlements

As of 1999, about 44.5 percent of the population lived in informal settlements. There are no building regulations and enforcement in place.

1.2.5 Transport related: number of vehicles registered, number of motorcycles registered, rate (number per 100,000 population)

Due to improved road networks and growing income, there has been an increase in the number of registered vehicles in the country. From 2000 to 2003, the total number of registered vehicles has increased by almost 150 percent to 447, 428. Registered motorcycles also increased in 2000 to about 426, 571.

1.2.6 Capacity for monitoring environmental quality (drinking water, water resources, ambient air, noise, radiation, etc)

Several small government laboratories are capable of analyzing selected environmental quality parameters for drinking water, water resources, ambient air, noise and radiation but there is no national water quality assessment program. However, the Laboratory of the Ministry of Environment conducts routine monthly monitoring of key sources of drinking water such as the Mekong River, Tonle Sap River, and Tonle Bassac River.

1.2.7 Capacity for data collection and processing

There is some capacity in both private sector and government agencies to collect and process environmental quality data but there is no systematic process for utilization of data for decision making or planning purposes.

1.3 Environmental Quality

1.3.1 Air pollution (percentage of population using solid fuels, proportion of vehicles using diesel and unleaded gasoline, frequency of exceeding national air quality standards)

The ambient air quality in the urban part of Cambodia has been affected by industrialization, increasing number of transport vehicles, heavy use of fossil fuels in the energy sector and continued use of biomass fuels for cooking and heating. However, despite the presence of

national standards for air quality, there is no routine monitoring of air pollutants due to limited capacity and resources.

Cambodia relies heavily on biomass for its energy needs. Fuels from biomass include wood, charcoal, dung and agricultural residues. These are considered major sources of air pollution and green house gas emissions. In 1999, almost 97 percent of the population used biomass fuels for cooking or heating: 91.2 percent fuel wood, 5.1 percent charcoal and 0.5 percent agricultural residues including cow dung. In Phnom Penh, 39 percent of the households use charcoal with about 11 percent in other urban areas.

In 1998, about 73 percent of the total road lengths in Cambodia were either earthen or graveled. These types of dust roads are the main sources of total suspended particulates (TSP). During the dry season, heavy traffic along these roads increases the TSP levels in the atmosphere.

In recent years, the number of registered vehicles in Cambodia has increased tremendously (see Section 1.2.5 above). Most of these however, are second hand vehicles with low engine efficiencies which use low quality petroleum resulting to harmful emissions of CO, NO_x, SO₂ and lead.

1.3.2 Water pollution (frequency of exceeding national water quality standards, drinking water quality standards)

Among the major causes of water pollution are deforestation and erosion, industrial effluents and wastes (sanitary, hospital and household wastes), agrochemicals, mining and transboundary pollution from upstream countries. Cambodia's economy is agrarian based. The heavy use of agrochemicals including pesticides to increase yields has caused the pollution of surface and groundwater sources.

It is common practice to dispose of industrial effluents into water bodies with or without undergoing treatment. Wastes from hospitals, residential areas and slaughterhouses are also indiscriminately discharged into water bodies. Phnom Penh and vicinity, where about 100 industries are located, is now faced with serious potential for water pollution. In 2003, about 6 million m³ of wastewater from factories, handicrafts and business centers were produced. In addition, between 24, 322, 000 to 34, 456, 000 m³ of wastewater was generated annually from houses and hospitals.

Drinking water supply is still inadequate in many provinces. Water quality problems are mainly microbiological, followed by naturally occurring arsenic. Arsenic has been found in excess of 50 ppb in five provinces such as Kandal and Kratie. Use of banned pesticides (87) and fertilizers have the potential to contaminate rivers, ponds and groundwater.

1.3.3 Solid waste (generation of municipal solid waste, proportion of recyclables)

The average solid waste production in Phnom Penh is 0.46 kg per capita per day with a total daily generation of 800 tons. Total solid waste generated in 2002 was approximately 292, 000 tons in Phnom Penh.

1.3.4 Hazardous waste (generation of toxic chemicals, hazardous materials, health-care waste, nuclear waste)

There is no information on the amount of hazardous waste but is suspected to be generated especially among the SMEs. Health care waste has been estimated to be 301 tons per year with about 0.26 kg/bed-day. There are no proper treatment and disposal facilities for hazardous waste.

1.4 *Public Health Statistics*

1.4.1 Ten leading causes of morbidity and mortality

The ten leading causes of morbidity are acute respiratory infections, diarrhea, malaria, cough, gyneco-obstetrics, tuberculosis, road accidents, measles, dengue hemorrhagic fever, and dysentery. Majority of the cases for morbidity are due to ARIs with a rate of 7,182 per 100,000 population. In 2000, diarrhea and dysentery had combined cases of more than 300,000 with malaria as the third cause of illness with 129,384 cases. Tuberculosis is the sixth cause of illness with 14,758 cases.

The ten leading causes of mortality are malaria, acute respiratory infections, road accidents, tuberculosis, meningitis, diarrhea, dengue hemorrhagic fever, gyneco-obstetrics, neonatal tetanus, other tetanus. Malaria still tops the leading cause of death (622) in Cambodia, followed by ARIs (449).

1.4.2 Diseases associated with agricultural and irrigation development (proportion of undernourished people, schistosomiasis, pesticide poisoning)

Malnutrition among women and children is a major health problem especially chronic malnutrition among children. It is estimated that 38 percent of the population are undernourished with a high prevalence (46 percent) among underweight children less than five years of age. Sustenance farming may not be sufficient to supply the required food and nutrition.

1.4.3 Respiratory diseases related to outdoor air pollution from energy, transport and industry sectors

Respiratory diseases such as cough; tuberculosis and acute respiratory infections are promoted by poor air quality such as elevated particulate matters from motor vehicles, thermal power plants, and industrial pollution. These diseases and risk factors are significant in Cambodia as they comprise the top causes of morbidity and mortality.

1.4.4 Traffic crashes (mortality due to traffic accidents, rate: deaths /100,000 population, injuries due to traffic accidents, rate: injuries/100,000 population)

According to the 2000 Cambodia health and demographic survey, there were 39,954 persons injured/killed due to traffic accidents. The Ministry of Public Works and Transport estimated 6.37 deaths per 100,000 population and 18.42 deaths per registered vehicle in 2003.

1.4.5 Diseases relating to poor housing (including pulmonary diseases, tuberculosis)

In 2002, the reported cases of tuberculosis of all types are 24, 610 with acute respiratory infections having 940,839 cases. These diseases have been associated with congestion and poor housing design especially when solid/biomass fuels are used for cooking. Another possible cause is second hand smoke from tobacco.

1.4.6 Water supply and sanitation-related diseases (such as diarrheal diseases, hepatitis, cholera, typhoid)

Of the communicable diseases, diarrhea had 309,933 cases in 2000, followed by typhoid fever with 4000 cases, hepatitis with 1,946 cases and cholera with 270 cases. These diseases have strong association with poor drinking water quality and unsafe food and could be eliminated with proper hygiene and adequate water supply and sanitation facilities.

1.4.7 Vector-borne diseases (such as malaria, plague, dengue fever and dengue hemorrhagic fever)

Most children in the hyper-endemic rural areas have tested positive for *Plasmodium falciparum*, the malaria parasite that is transmitted from person to person through the bite of a female Anopheles mosquito, which requires blood to nurture her eggs. An estimated 46,902 cases (457 deaths) of malaria were reported in 2002 with about 12,441 cases (153 deaths) for dengue/DHF. Dengue is caused by viruses transmitted by the mosquito *Aedes aegypti* that breeds in urban and semi-urban environment such as man-made containers like earthenware jars, metal drums and concrete cisterns used for domestic water storage, as well as discarded plastic food containers, used automobile tires and other items that collect rainwater.

2 Legal, Policy, and Institutional Structure

2.1 Legislative and Policy Framework

2.1.1 National policies, plans or strategies for environmental health

The National Environmental Action Plan, approved by the Council of Ministers in 1998, provides guidance on environmental matters to integrate environmental concerns into the economic development process and ensure the future maintenance of the absorptive and regenerative capacities of Cambodia's ecosystems. Six priority areas were identified: i) Forest policy, ii) fisheries and floodplain agriculture in the Tonle Sap region, iii) coastal fisheries, iv) biodiversity and protected areas, v) energy development and environment, vi) urban waste management.

2.1.2 Relevant legislation addressing environmental health issues

Cambodia has many laws to protect the public and the environment. These are the following:

- Law on Environmental Protection and Natural Resources Management (December 24, 1996)
- Sub-Decree on water pollution control (April 6, 1999)

- Sub-decree on solid waste management (April 27, 1999)
- Sub-decree on environmental impact assessment process (August 11, 1999)
- Sub-decree on air pollution and noise disturbance (July 10, 2000)
- Sub-decree on the management of agricultural materials (November 19, 1998)

Related Existing Legislation:

- Declaration on the provision of duties to carry out the sub-decree on water pollution control, sub-decree on solid waste management for urban and provincial environmental departments (June 2, 1999)
- Declaration on Water pollution control (August 20, 1999)
- Declaration on Industrial hazardous waste management (May 26, 2000)
- Declaration on Water pollution control at various pollution sources in cities and provinces (July 4, 2001)
- Declaration on Industrial sludge management (October 9, 2000)
- Announcement on water pollution monitoring at pollution source throughout provinces and cities (July 4, 2001)
- Declaration on medical waste management for referral hospitals and health centers (2002)

2.1.3 Decentralization and / or privatization policies dealing with environmental health

The central or national agencies are still in charge of environmental and health functions and policies on decentralization or privatization are not yet in place in Cambodia.

2.2 *Institutional Structure for Environmental Health*

2.2.1 Administrative / organizational set-up of the country

The four institutions that have been active on environmental health are: Department of Preventive Medicine and the National Centre for Health Promotion both under the Ministry of Health, the Ministry of Rural Development, and the Pollution Control Department of the Ministry of Environment. There is no formal environmental health unit in Cambodia. Other agencies also carry out environmental health functions (See Section 2.2.3).

2.2.2 Role of government, private sector, non-government organizations, international organizations and partnerships in environmental health

Nongovernmental organizations and international development agencies operating in Cambodia are many such as World Bank, Asian Development Bank, UNDP, WHO, UNICEF, Partnership for Development, among others.

2.2.3 Relevant agencies involved on environmental health

There are about 12 agencies in Cambodia that are involved directly or indirectly on environmental health. These are the following:

1. Ministry of Health (MoH) – National Center for Health Promotion and National Institute of Public Health
2. Ministry of Environment (MoE) – Department of Environmental Pollution Control
3. Ministry of Agriculture, Forestry and Fisheries (MAFF)
4. Ministry of Industry, Mine and Energy (MIME)
5. Ministry of Water Resources and Meteorology (MoWRM)
6. Ministry of Rural Development (MoRD)
7. Ministry of Land Management, Urban Planning and construction (MLMUPC)
8. Ministry of Tourism (MoT)
9. National Committee for Disaster Management (NCDM)
10. The Council for the Development of Cambodia
11. Ministry of Foreign Affairs and International Cooperation (MFAIC)
12. Cambodia National Mekong Committee (CNMC)

2.3 *Relevant International Conventions and Agreements Ratified or Signed*

Cambodia is a party to 18 international treaties such as the following:

- a) Framework Convention on Tobacco Control, 2004
- b) Basel convention on the control of transboundary movements of hazardous waste and their disposal, since 2001
- c) Montreal protocol on substances that deplete the ozone layer, ratified on June 27, 2001
- d) Global treaty on persistent organic pollutants (POPs), signed May 23, 2001
- e) Desertification convention, ratified February 9, 1995
- f) Ramsar Convention 1999
- g) International Trade of Endangered Species of Wild Flora and Fauna 1997
- h) Framework Convention on Climate Change 1996
- i) Convention on the Prevention of Marine Pollution 1996
- j) Coordinate Body of Southeast Asia Seas Agreement 1996
- k) Convention on Biological Diversity 1995
- l) International Convention for the Prevention of Pollution from Ships 1995
- m) International Convention on Civil Liability for Oil Pollution Damage 1995
- n) International Tropical Timber Agreement 1994
- o) Convention on World Heritage 1993
- p) Plant Protection Agreement for Asia and the Pacific Region 1969
- q) Convention on Fishing and Conservation of the Living Resources of the High Seas 1966
- r) Convention on Road Traffic 1956
- s) International Plant Protection Convention 1952

3 Human Resources Development Programs

3.1 *Environmental health workforce, professionals and their skills*

In Cambodia, there are no environmental health officers or inspectors but there are professional staff working within the Ministry of Health for environmental health in areas of preventive medicine and health promotion. It might be best to create positions for environmental/health inspectors or even pollution control officers within the government. There are various inspectors

from the Ministry of Industry, Mines, and Energy (MIME) and the Ministry of Rural Development (MRD), and Ministry of Environment that (MOE) that could be trained to fill those proposed posts.

3.2 Formal and informal training programs for environmental health

At the Royal University of Phnom Penh, there is a bachelor's degree in environmental science. There are short courses of one-week duration conducted by the National Center for Health Promotion of the Ministry of Health.

3.3 Government certification

There is no government certification or registration on environmental health and allied fields in Cambodia.

3.4 Professional associations

There are no professional associations yet formed in Cambodia in both the health and environmental fields and there are no local chapters of international associations.

4 Priority Environmental Health Issues

The following cross-cutting issues on environmental health have been recognized:

- a) Deforestation
- b) Over-fishing
- c) Siltation of rivers
- d) Wastewater collection and treatment
- e) High fuelwood and charcoal consumption
- f) No data to monitor air and water pollution and waste problems
- g) Limited management information on land use and natural resources
- h) Limited human resources, environmental experts and absorptive capacity of staff
- i) Coordination problems between concerned line agencies; and
- j) Lack of clear sector policies and responsibilities

4.1 Agriculture Sector

As Cambodia is still an agrarian society (270,000 ha is irrigated agricultural area), this sector is expected to grow over the years as part of the government's development programs. In 2001, the fertilizer consumption has been estimated to be about 223, 783 metric tons per year. Around 37 banned pesticides are still in use in Cambodia from a total of 117 pesticides present throughout the country. Although there are no reports of pesticides contamination of the environment, monitoring of pesticides in water and food should be carried out. About 94 percent of total water resources are used for irrigation, which could carry contaminants as runoff.

The Ministry of environment had identified the following issues in Cambodia:

- Run-off of agricultural chemicals including pesticides (insecticide, herbicide, fungicide) and fertilizers into receiving water

- Siltation and sedimentation of rivers due to land clearing for agricultural purposes from both large scale commercial plantations or small-scale subsistence farmers
- Gemstone mining activities at the western part of the country increases turbidity and heavy metals of Stung Sangker, a main tributary of the Tonle Sap Great Lake
- Solid and liquid discharges from slaughterhouses, livestock, especially piggery farms
- Poor aquaculture practices especially shrimp farming along coastal areas
- Unscrupulous fish catching such as calcium carbide.

4.2 *Energy Sector*

Cambodia relies mainly on biomass for its energy requirements. In 1995, about 85 percent of the energy source is biomass (82 percent of this is wood) and 15 percent is fossil fuel. This has implications for indoor air pollution due to exposure to smoke during cooking.

4.3 *Industry Sector*

In 1999, over 970 medium to large establishments were registered with about 25,000 smaller industrial establishments in 2000. Most of these industries are located around Phnom Penh which discharge untreated wastes and emissions to the environment.

4.4 *Transport Sector*

Cambodia has to deal with increasing concerns on road safety and noise due to its large number of motorcycles. Its record of traffic accidents is one of the highest in the region. Air quality should be monitored.

4.5 *Urban /Rural Development Sector*

The following issues have been identified:

- Wastewater and sewage discharges from various pollution sources such as enterprises, hospitals, households, ports, vehicle/engine workshops, (no treatment or inadequate treatment)
- Disposal of human liquid and solid wastes into water resources from slums, floating houses, floating restaurants, floating business areas
- Transboundary water pollution due to upstream development of riparian countries

In addition, Cambodia has to deal with less than half of its population living in informal settlements. These marginal settlements especially in urban areas create hygiene and sanitation problems.

4.6 *Cross-cutting issues*

Malaria and dengue are major causes of morbidity and mortality in Cambodia. Environmental management could reduce the incidence by removing their habitat. Health care waste is not properly managed as existing incinerators and landfills are not adequate.

5 Areas Requiring Improvement

5.1 Specific policies and legislation for environmental health

Implementation and enforcement of existing laws should be strengthened. The following pending legislation should be promulgated:

- Draft of Water Law
- Draft Law on industrial management
- Sub-decree on protected areas management
- Sub-decree on public participation
- Sub-decree on public health

5.2 Institutional development and intersectoral collaboration

To rationalize the environmental health functions within Cambodia, it might be best to establish an Environmental Health Division or Unit within the appropriate ministry. It could also perform coordinating functions among the various agencies currently involved on environmental health.

5.3 Human resources development

Capacity building in Cambodia should focus on laboratory analysis, conduct of sanitary surveys, factory inspections, and formal education on environmental health.

5.3 Monitoring and surveillance

With related agencies, the Ministry of Health and the Ministry of Environment should collaborate more in areas of water and air quality monitoring. Public health sentinels should be established.

5.5 Integration of health and environment in international/regional agreements

Being part of the Mekong region, Cambodia has signed the 1995 Mekong Agreement with three riparian countries namely Lao PDR, Thailand and Vietnam, which include environmental protection components. It has also made progress in signing agreements with its ASEAN neighboring countries. However, Cambodia should initiate steps to integrate environmental health concerns in future regional agreements.

5.6 Others

Appendix (Organizational Charts)

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CAMBODIA
Environmental Health Data Sheet
As of September 30, 2004

	INDICATORS	DATA	Year	Source
1	Development, Environment and Health			
1.1.1	Area (1000 km ²)	181.04	2000	5
1.1.1	Estimated population ('000)			
	- Total	13 542.41	2004est	1
	- Male	...		
	- Female	...		
1.1.1	Annual population growth rate (%)	2.49	2001	1
	Percentage of population			
	- 0-14 years			
	> Total	41.60	2003p	2
	> Male	43.49	2003p	2
	> Female	39.81	2003p	2
	- 65+ years			
	> Total	3.33	2003p	2
	> Male	2.81	2003p	2
	> Female	3.82	2003p	2
1.1.1	Urban population (%)	16.00	2001	1
1.1.1	Adult literacy rate (%)			
	- Both sexes	69.40	2002	3
	- Male	80.50	2001	3
	- Female	58.20	2001	3
1.1.1	Infant mortality rate (per 1000 live births)	95	2000	5
1.1.1	Under-five mortality rate (per 1000 live births)	124	2000	5
1.1.1	Newborn infants weighing at least 2500g at birth (%)	77	2000	6
1.1.2	General economy: narrative report (separate sheet)			
1.1.2	Per capita GDP at current market prices (US\$)	297	2002	2
1.1.2	Total expenditure on health as % of GDP	0.63	1999	8

	INDICATORS	DATA	Year	Source
1.1.3	Development priorities: narrative report (separate sheet)			
1.1.3	Land area for agriculture (as percentage of total land area)	29.3	2001	13
1.1.4	Human development index (Highest = 1)	0.56	2002	3
	Human development index Rank (out of 177 countries)	130	2002	3
1.2.1	Population with access to safe water (%)			
	- Total	31.00	2000	5
	- Urban	54.00	2000	5
	- Rural	27.00	2000	5
1.2.1	Population with adequate excreta disposal facilities (%)			
	- Total	21.00	2000	5
	-Urban	60.00	2000	5
	- Rural	14.00	2000	5
1.2.1	Solid waste collection (% of total waste generated)	...	...
1.2.1	Proportion of urban population served by municipal solid waste collection (%)	80	2001	21
1.2.2	Proportion of urban population served by sewerage system (%) National or major city	...	...
1.2.1	Proportion of population with electricity (%)			
1.2.2	Total	16.6	2000	5
	Urban	60.6	2000	5
	Rural	9.0	2000	5
1.2.3	Poison center service (Y/N list, year)	N		
1.2.3	Chemical emergency preparedness (Y/N list, year)	N		
1.2.4	Proportion of population living in informal settlements (%)	44.5	1999	16
1.2.4	Presence of building regulations and inspection (Y/N list, year)	N		
1.2.5	Number of registered vehicles	179 820	2000	16
		447 428	2003	14
	Rate (number per 100,000 population)			
	Number of registered motorcycles	426 571	2000	16
	Rate (number per 100,000 population)			
1.2.6	Presence of government/private laboratories and			

	INDICATORS	DATA	Year	Source
	equipment for monitoring			
	Drinking water (Y/N; G/P)	Y; G		
	Water resources (Y/N ; G/P)	Y; G		
	Ambient air (Y/N ; G/P)	Y; G		
	Noise (Y/N ; G/P)	Y; G		
	Radiation (Y/N ; G/P)	Y; G		
1.2.7	Presence of government/private system for data collection and processing (Y/N; G/P)	Y; G/P		
1.3.1	Proportion of population using solid/biomass fuels for cooking or heating (%)	>95 96.3	2000 1999	9 16
1.3.1	Proportion of vehicles using diesel (%)	...		
1.3.1	Proportion of vehicles using unleaded gasoline (%)	...		
1.3.1	Average number of times national air quality standards are exceeded in a year: a. short-term (1-hour average) frequency of exceedance b. long-term (8-hour average) frequency of exceedance	...	2003est	11
1.3.2	Average number of times national water quality standards are exceeded in a year a. In three major rivers b. In major drinking water supplies	...	2003est	11
1.3.2	Industries generating wastewater (number)	>100	2003est	11
1.3.3	Solid waste generated (kg/per capita/day) (Phnom Penh)	0.46	2000	15
1.3.3	Solid waste generated (tons per year) (Phnom Penh 800 tons/day)	292 000	2002	16
1.3.3	Proportion of recyclable solid waste (%)	...	....
1.3.4	Toxic and hazardous wastes generated (tons/year)	...	...
1.3.4	Industries generating toxic and hazardous wastes (number)	...	...
1.3.4	Health-care waste generation (tons per year)	301	2003	20
	(kg/day)	825	2003	20
	(kg/bed-day)	0.26	2003	20
1.3.4	Nuclear waste generation (tons per year)	NR		
1.4.2	Cases of pesticide poisoning (number)	...	...
1.4.2	Proportion of undernourished population (%)	38	2001	3
1.4.2	Prevalence of underweight children under five years of age (%)	46	2000	10
1.4.4	Motor and other vehicle injuries (number)	535	2002	11

	INDICATORS	DATA		Year	Source
1.4.4	Road traffic crashes:				
	Number of accidents (within a year)				
	Rate (Injuries/deaths per 100,000 population)	308		2000	5
	Rate (deaths per 10,000 vehicle registration)	18.42		2003	14
	Total persons injured/killed	39 954		2000	5
	Rate (deaths per 100,000 population)	6.37		2003	14
1.4.1- 1.4.7	<i>Ten leading causes of morbidity</i>	<i>Number</i>	<i>Rate per 100 000 population</i>		
	1. Acute respiratory infections	940 839	7182.77	2000	6
	2. Diarrhoea	309 933	2366.00	2000	6
	3. Malaria	129 384	987.70	2000	6
	4. Cough (of at least 21 days)	54 695	417.54	2000	6
	5. Gyneco-obstetrics	35 639	272.06	2000	6
	6. Tuberculosis	14 758	112.66	2000	6
	7. Road accidents	9 823	74.99	2000	6
	8. Measles	3 925	29.96	2000	6
	9. Dengue haemorrhagic fever	2 868	21.89	2000	6
	10. Dysentery	1 976	15.08	2000	6
1.4.1- 1.4.7	<i>Ten leading causes of mortality</i>	<i>Number</i>	<i>Rate per 100 000 population</i>		
	1. Malaria	622	4.75	2000	6
	2. Acute respiratory infections	449	3.43	2000	6
	3. Road accidents	184	1.40	2000	6
	4. Tuberculosis	131	1.00	2000	6
	5. Meningitis	109	0.83	2000	6
	6. Diarrhoea	70	0.53	2000	6
	7. Dengue haemorrhagic fever	40	0.31	2000	6
	8. Gyneco-obstetrics	20	0.15	2000	6
	9. Neonatal tetanus	19	0.15	2000	6
	10. Other tetanus	16	0.12	2000	6

	INDICATORS	DATA		Year	Source
	<i>Selected Communicable Diseases</i>	<i>Number of cases</i>	<i>Number of deaths</i>		
1.4.5	Tuberculosis (All types)	24 610		2002	12
1.4.5	Rheumatic fever and rheumatic heart diseases	...	...
1.4.6	Acute respiratory infections	940 839	449	2000	6
1.4.6	Hepatitis viral	1946	...	2000	6
1.4.6	Cholera	270	...	2000	4
1.4.6	Typhoid fever (and paratyphoid fever)	4000	...	2000	4
1.4.6	Diarrhoeal diseases	309 933	70	2000	6
1.4.7	Plague	...	...
1.4.7	Malaria	46 902	457	2002	12
1.4.7	Dengue/DHF	12 441	153	2002	12
2	Legal, Policy, and Institutional Structure				
2.1.1	National environmental health policy (Y/N list, year)	N			
2.1.1	National environmental policy (Y/N list, year) <ul style="list-style-type: none"> • National Environmental Action Plan (1998-2003) 	Y		1997	15
2.1.1	Policies/legislation to reduce exposure to environmental tobacco smoke (Y/N list, year)	Y			
2.1.1	National policies for healthy settings (such as healthy cities) (Y/N list, year)	Y		1997	18
2.1.2	Environmental/Health Acts promulgated: (Y/N list, year) <ul style="list-style-type: none"> a. Water b. Air c. Solid Waste d. Toxic chemicals/Hazardous Waste e. Others 	Y			7, 19
	<ul style="list-style-type: none"> • Law on Environmental Protection and Natural Resources Management (December 24, 1996) • Sub-Decree on water pollution control (April 6, 1999) • Sub-decree on solid waste management (April 27, 1999) • Sub-decree on environmental impact assessment process (August 11, 1999) • Sub-decree on air pollution and noise disturbance (July 10, 2000) • Sub-decree on the management of agricultural materials (November 19, 1998) • Law of Land Management of 				

	INDICATORS	DATA	Year	Source
	<p>Urbanization and Construction 1994</p> <ul style="list-style-type: none"> • Joint Prakas of the Ministry of Environment and the Ministry of Agriculture on Prohibition of Hunting and Catching of Wildlife Animals 1996 • Declaration on the provision of duties to carry out the sub-decree on water pollution control, sub-decree on solid waste management for urban and provincial environmental departments (June 2, 1999) • Declaration on Water pollution control (August 20, 1999) • Declaration on Industrial hazardous waste management (May 26, 2000) • Declaration on Water pollution control at various pollution sources in cities and provinces (July 4, 2001) • Declaration on Industrial sludge management (October 9, 2000) • Announcement on water pollution monitoring at pollution source throughout provinces and cities (July 4, 2001) • Declaration on medical waste management for referral hospitals and health centers (2002) 			
2.1.2	<p>Environmental impact assessment as an official requirement (Y/N list, year)</p> <ul style="list-style-type: none"> • Law on Environmental Protection and Natural Resources Management (December • Sub-decree on environmental impact assessment process (August 11, 1999) 	Y	1996	
2.1.2	<p>Health impact assessment as part of EIA (Y/N list, year)</p>	N		
2.1.3	<p>Policies for decentralization such as for environmental health and monitoring (Y/N list, year)</p>	N		
2.1.3	<p>Policies for privatization such as for environmental health and monitoring (Y/N list, year)</p>	N		
2.2.1	<p>Organizational structure for environmental health (separate sheet) -See MOH and MOE organizational structures - Refs</p>	Y		4,11
2.2.2	<p>List of agencies and partners for environmental health other than government (separate sheet) - PSBK Company for solid waste collection</p>	Y		
2.2.3	<p>List of relevant government agencies and their</p>	Y	2003	19

	INDICATORS	DATA	Year	Source
	<p>functions :</p> <ul style="list-style-type: none"> • Ministry of Health (MoH) – National Center for Health Promotion and National Institute of Public Health • Ministry of Environment (MoE) – Department of Environmental Pollution Control • Ministry of Agriculture, Forestry and Fisheries (MAFF) • Ministry of Industry, Mine and Energy (MIME) • Ministry of Water Resources and Meteorology (MoWRM) • Ministry of Rural Development (MoRD) • Ministry of Land Management, Urban Planning and construction (MLMUPC) • Ministry of Tourism (MoT) • National Committee for Disaster Management (NCDM) • The Council for the Development of Cambodia • Ministry of Foreign Affairs and International Cooperation (MFAIC) • Cambodia National Mekong Committee (CNMC) 			
2.3	Relevant international conventions/agreements (List, year signed/ratified)	Y		15
	<ul style="list-style-type: none"> • Framework Convention on Tobacco Control, 2004 • Ramsar Convention 1999 • International Trade of Endangered Species of Wild Flora and Fauna 1997 • Framework Convention on Climate Change 1996 • Convention on the Prevention of Marine Pollution 1996 • Coordinate Body of Southeast Asia Seas Agreement 1996 • Convention on Biological Diversity 1995 • International Convention for the Prevention of Pollution from Ships 1995 • International Convention on Civil Liability for Oil Pollution Damage • International Tropical Timber Agreement 1994 • Convention on World Heritage 1993 • Plant Protection Agreement for Asia and the Pacific Region 1969 			

	INDICATORS	DATA	Year	Source
	<ul style="list-style-type: none"> • Convention on Fishing and Conservation of the Living Resources of the High Seas 1966 • Convention on Road Traffic 1956 • International Plant Protection Convention 1952 			
3	Human Resources Development Programs			
3.1	Environmental Health workforce	NR		
	- environmental health officers			
	- health/sanitary inspectors			
	- assistant sanitarians			
	- environmental engineers			
	- sanitary engineers			
	- pollution control officers			
	- others			
3.2	Tertiary degrees related to environmental health (Y/N list) - Royal University of Phnom Penh (BS Environmental Science)	Y		
3.2	Short courses and duration related to environmental health (Y/N list) - National Center for Health Promotion	Y		
3.3	Government certification for environmental workforce (Y/N list)	N		
3.4	Professional associations related to environmental health (Y/N list, memberships)	N		
3.4	International associations' local affiliates (Y/N list, memberships)	N		
4	Priority Environmental Health Issues			
4.1	Soil erosion (mm/year)	>2000	1998	16
4.1	Fertilizer consumption (metric tons/year)	223 783	2001est	16
4.1	Pesticide consumption (metric tons/year)	...	...
4.1	Percentage of farmers using pesticides	87	2001	16
4.1	Banned pesticides used (number)	37	2003	17
4.1	Water resources withdrawal for irrigation (annual withdrawal as percentage of total water resources)	94	2000	15
4.1	Irrigated agricultural area (1000 ha)	270	2001	13
4.2 - 4.6	Inputs from Chapter 1			
4.6	Carbon dioxide emissions (per capita metric tons)	0.1	1999	10
4.6	Consumption of ozone-depleting CFCs (ODP metric tons)	...	...	10

Notes:

- ... Data not available.
- NR Not relevant.
- NA Not applicable.
- p Preliminary/ provisional.
- est Estimate

Sources:

- 1 General Population Census of Cambodia 1998: Population projection 2001-2021, Ministry of Planning
- 2 National Institute of Statistics, Ministry of Planning, Cambodia - <http://www.nis.gov.kh>
- 3 Human Development Report 2004: Cultural liberty in today's diverse world, UNDP, New York, 2004. <http://www.undp.org>
- 4 Information furnished by Ministry of Health, 28 July 2004
- 5 Cambodia Demographic and Health Survey 2000
- 6 National Health Statistics Report of Cambodia 2000
- 7 United Nations Environment Programme Regional Centre for Asia and the Pacific
<http://www.rrcap.unep.org/>
- 8 Ministry of Health Briefing Note Government Expenditure on Health in 1999, March 2000.
- 9 World Health Report 2004 - <http://www.who.int/whr/en/>
- 10 Asian Development Bank Statistics - <http://www.adb.org/statistics/>
- 11 Ministry of Environment Cambodia - <http://www.camnet.com.kh/moe/>
- 12 Number of confirmed malaria cases and deaths. Furnished by the Malaria, Vector-borne and Parasitic Diseases Unit of the WHO Regional Office for the Western Pacific, 10 March 2004.
Tuberculosis Cases 2002. Furnished by the Stop TB Unit of the WHO Regional Office for the Western Pacific, 04 March 2004.
- 13 Food and Agriculture Organization Statistics - <http://apps.fao.org/default.jsp>
- 14 Country Report of Mr. Ung Chunhour, Deputy Director-General, Ministry of Public Works and Transport, and Director, Land Transport Department, 26-30 January 2004
- 15 Greater Mekong Subregion ATLAS of the Environment. Asian Development Bank. 2004
- 16 Compendium on Environment Statistics of Cambodia, 2003. National Institute of Statistics, Ministry of Planning, Cambodia.
- 17 WHO Mission Report of Dr. G. L. Peralta to Cambodia, 26 May - 22 June 2003; data obtained from the Pesticide Reduction Network/CEDAC.
- 18 Healthy City Phnom Penh, Compilation of reports, papers, and workshop outcomes 2000-2002, Phnom Penh Municipality

- 19 Phet Picchara and Tuy Tanrathy (2003) Cambodia Country Report to the WHO Workshop on the Assessment of Health Impacts of Environmental Hazards, 25-28 August 2003, Kuala Lumpur, Malaysia.
- 20 WHO Mission Report of Dr. L. F. Diaz WPRO , 11 September – 13 December 2003, Manila.
- 21 Prak Piseth Raingsey, Po Samnang, Chea Sina (2001) Cambodia Country Report on Assessment and Management of Environmental Health Hazards, WHO Consultation on Strengthening National Capacity in Environmental Health, 4-7 June 2001, Manila, Philippines