Chapter 2: Environmental Health

18. Since being launched in 2000, the Millennium Development Goals (MDGs) have become the most widely accepted measure of development efforts, and the Government of Bangladesh is committed to achieving the targets embodied in the Millennium Declaration by 2015. The health-related goals include the target of reducing infant and child mortality by two-thirds by 2015 from their levels in 1990. It is estimated that in Bangladesh about one-fifth of the total burden of disease may be associated with environmental factors (see Table 2.1 below). Two of the top three causes of death and sickness in Bangladesh are respiratory illnesses and diarrhoeal disease, both of which are strongly associated with the quality of the environment, and both of which have particularly significant impacts on the health of children. Management of these environmental risks presents an important development challenge, further compounded by widespread exposure to naturally-occurring arsenic, the growing significance of health risks posed by the pollution resulting from rapid urban and industrial expansion, and the increasingly intensive use of chemicals in agriculture.

I. Environmental Health: Risk Factors and Costs

19. The estimated shares of the top five causes of death and disease in Bangladesh, plus cancers (malignant neoplasms), as measured in Disability Adjusted Life Years (DALYs)[14], are shown in Table 2.1.

Table 2.1: Bangladesh – Share of Disability Adjusted Life Years (DALYs) Lost by Cause and Environmental Contribution

Cause	%	Environmental Factor	Share of Cause (%)	Share of Total (%)
Respiratory Infections and Disease	17	Indoor Air Pollution	30 – 50	5 – 8
		Urban Air Pollution	6 – 10	1 - 2
Perinatal Causes	14	Not Applicable	-	-
Diarrhoeal Disease	12	Low access to safe water, poor sanitation and hygiene	80 - 90	10 - 11
Injuries	11.5	Not Applicable	-	-
Nutrition/Endocrine	10	Not Applicable	-	-
Malignant Neoplasms	2	Agro-industrial toxics	5 – 25	0.1 - 0.5
Other	33.5	Arsenicosis[a]	-	0.3 - 0.4
Total	**100**		-	**16.4 – 21.9**

Sources: Streatfield (2001), Murray and Lopez (1996), Lokuge *et al* (2004), WHO (2002), World Bank staff.
(a): Disease burden due to arsenic levels >50 ppb, estimated by Lokuge *et al* (2004). May include portions of the burden of disease listed under other causes.

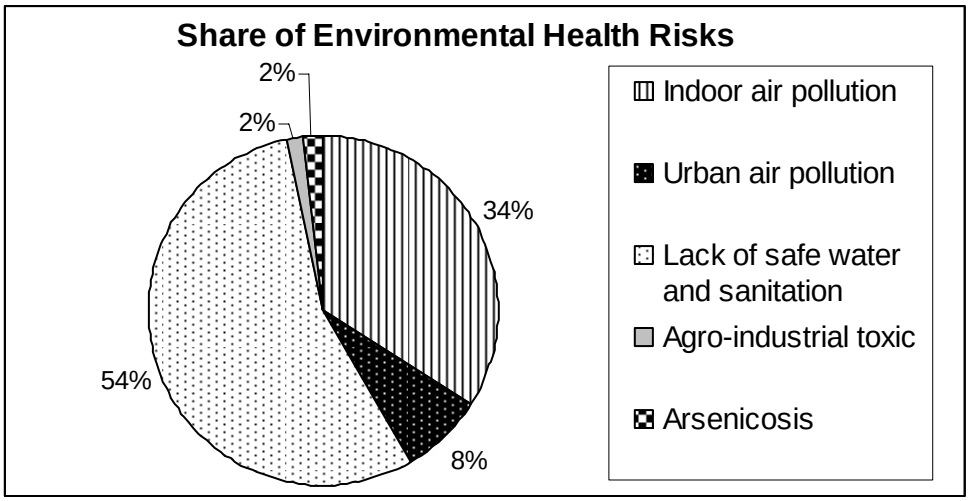
While the total number of DALYs lost per capita is comparable to the average for countries with high rates of adult and child mortality in South-East Asia[15], the share of the total burden of disease attributable to respiratory infections and disease is about one third higher than the average for these countries, and the proportion caused by diarrhoeal disease is almost double

[14] Estimated by Streatfield (2001), based on the Indian subcontinent pattern provided in the Global Burden of Disease study, with adjustments for Bangladesh. DALYs are calculated as the present value of the future years of disability-free life that are lost as the result of the premature deaths or cases of disability occurring in a particular year.
[15] WHO, 2002.

the average. The Table also indicates the estimated contribution of environmental factors, both as a share of each cause and as percentage of the total burden of disease.

20. Some 16.5%-22% of the total burden of disease is attributable to environmental health risks associated with (i) poor indoor and urban air quality leading to higher rates of respiratory infections and disease, (ii) lack of access to safe water combined with low levels of sanitation and hygiene, resulting in elevated rates of diarrhoeal disease, (iii) chronic exposure to toxic contaminants from agricultural and industrial sources, increasing the risks of certain cancers, and (iv) exposure to elevated levels of naturally-occurring arsenic in drinking water, contributing to a range of conditions, including a variety of cancers, heart disease, diabetes and non-malignant respiratory disease. The estimated contribution of these factors to the burden of disease imposed by environmental health risks is summarized in Figure 2.1 below.

Figure 2.1: Contributing Factors to Environmental Health Risks



21. Environmental health risks in Bangladesh are dominated by those contributing to the high rates of diarrhoeal disease. Globally, it is estimated that 90% of the diarrhoeal disease burden is related to poor sanitation and lack of access to clean water and safe food[16], with more than 90% of this burden being borne by children. In the two-week period before the 2004 Bangladesh Demographic and Health Survey (BDHS), 8% of children under five were reported to have suffered diarrhoea, rising to more than 12% in the most vulnerable 6-23 month age group. The second most significant set of environmental health risks are those contributing to respiratory infections and disease, either through exposure to smoke from cooking in the home or air pollution in urban areas. These sources contribute to acute respiratory infections in children and chronic lung disease in adults, estimated to account for 36%-60% of all respiratory infections and disease in Bangladesh. In the two-week period before the 2004 BDHS, 20% of children under five were reported to have suffered a respiratory illness. The third environmental health risk identified in Table 2.1 is exposure to high levels of toxic chemicals, which can lead to an increased risk of certain cancers, particularly those related to renal and gastric functions, as well as those of the skin and blood.

[16] WHO, 1997.

Malignant neoplasms are estimated to account for about 2.0% of the total burden of disease in Bangladesh. If between 5%-25% of these cancers are attributable to acute and chronic exposure to pesticides and industrial contaminants in the environment, this would suggest that up to 0.5% of the total burden of disease is due to toxic agro-industrial pollution, equivalent to the share attributable to malaria.

22. The extent of the environmental health risk posed by naturally-occurring arsenic in groundwater is only beginning to be understood. Tubewell testing indicates that some 29% of the population of Bangladesh is exposed to water with unsafe levels of arsenic (i.e. in excess of 50 ppb), and some 38,000 potential cases of arsenicosis have been identified.[17] Limited information on arsenic intake and the epidemiology of arsenicosis makes it difficult, however, to estimate associated rates of sickness and mortality. Using dose-response data from studies carried out in Taiwanese populations, it has been estimated[18] that about 0.4% of the total burden of disease in Bangladesh may be attributable to exposure to arsenic levels in drinking water in excess of 50ppb. This estimate includes a range of cancers, heart disease and diabetes considered to be attributable to arsenic, but does not include non-malignant respiratory disease, which recent work indicates may result from ingestion of arsenic.[19] Further doubt over the extent of the arsenic threat was cast by the 2004 BDHS, which tested the water that surveyed households were drinking on the day of interview. Almost half of the households that reported getting their drinking water from red-marked tubewells (i.e. those previously found to have levels of arsenic in excess of 50pbb) did not have unsafe arsenic levels in their drinking water. To some extent this may reflect tubewell switching, but also may indicate that either arsenic levels vary over time, or that there were errors in the testing and marking of tubewells, or may reflect the possibility that iron in the water may have reduced arsenic levels during water storage.

23. The death and disease caused by poor environmental quality imposes an economic cost associated with reduced quality of life, lost productivity, and health care costs. These costs can be reduced through investments to limit exposure to environmental health risks. An indication of the potential scale of such savings is provided in Table 2.2.

Table 2.2: Potential Reductions in Mortality and Morbidity, and Economic Savings By Reducing Exposure to Environmental Health Risks

Exposure Reduced	Deaths Avoided	Sickness Avoided	Saving (US$ mill.)	Saving (% GNI)
Indoor Air Pollution: reduce exposure by 20% - 80%	7,600 – 30,400	0.3 – 1.2 million DALYs	114 - 458	0.23 – 0.92
Urban Air Quality: reduce PM_{10} concentration by 20% - 80%	1,200 – 3,500	80 – 235 million cases	169 - 492	0.34 – 1.0
Water Supply and Sanitation: universal provision of improved water sources and sanitation	-	0.82 – 1.94 million DALYs	313 - 739	0.63 – 1.43
Arsenicosis: prevent exposure above 50ppb	9,100	0.13 – 0.17 million DALYs	48 - 66	0.1 – 0.13
Total			**644 - 1755**	**1.3 – 3.5**

Source: M. Khaliquzzaman, 2004.

[17] BAMWSP, 2004
[18] Lokuge et al (2004)
[19] Mazumder et al (2000)

24. As Table 2.2 shows, the estimated benefits of reducing exposure to indoor and urban air pollution by 20%-80%, of providing universal access to improved water sources and sanitation, and of interventions to prevent exposure to levels of arsenic in drinking water in excess of 50ppb, amount to 1.3%-3.5% of GNI.[20]

II. Water Supply and Sanitation

25. The statutory responsibility for the water supply and sanitation sector lies with the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C). Its Local Government Division (LGD) is responsible for policy making, planning, financial mobilization and allocations, framing of rules and regulations, as well as monitoring and evaluation. The Department of Public Health Engineering (DPHE) is responsible for planning, designing and implementing water supply and sanitation in rural and urban areas, except the cities of Dhaka and Chittagong. The Local Government Engineering Department (LGED) undertakes water and sanitation related activities in municipalities (Pourashavas) and with City corporations on a project basis.

26. City corporations are responsible for drainage, solid waste management, and maintenance of water supply and sanitation systems installed by DPHE or LGED. Dhaka WASA is responsible for water supply, sub-surface drainage and sewerage, while Chittagong WASA deals only with water supply. The statutory responsibilities of Pourashavas include provision, operation and maintenance of water supply, solid waste management and sanitation, but most have limited technical and organizational capacity, and rely on DPHE or LGED for design and construction. Water Supply and Sanitation Committees (WATSAN Committees) have been established in Union Parishads (UPs), and are playing a key role in sanitation, in collaboration with Upazila Development Coordination Committees.

Policies, Strategies and Plans: Recognizing the Need for Action

27. The National Strategy for Accelerated Poverty Reduction includes sanitation and safe water in the seven-point medium-term strategic agenda, with the specified goals being to (i) reduce the number of people who do not have access to safe water (26%) or sanitation (66%) by half by 2006, (ii) reduce waterborne morbidity and mortality, (iii) reduce the number of people subject to arsenic contamination, and (iv) ensure access to sanitary community latrines in villages, bazaars, mosques and schools, with particular attention to women's needs.

28. The main policies guiding water supply and sanitation are the National Policy for Safe Water Supply and Sanitation 1998 (NPSWS&S) and the National Water Policy (NWP). Both policies include the goal of ensuring that all people have access to safe drinking water. The NPSWS&S states that all people should have access to safe drinking and cooking water and sanitation services at an affordable cost, and emphasizes participatory planning and management, as well as decentralization and devolution of responsibilities to the local level. The policy also provides for variations in the extent of cost recovery for water supply and

[20] The estimates of sickness avoided and savings for indoor air pollution and urban air quality cannot be directly compared (i.e. cases of sickness are not equivalent to DALYs). If the same approach were used, the results for indoor air pollution would be four to five times greater than those for urban air quality, which is broadly in line with the difference in estimated rates of death from these two sources of risk.

sanitation investments depending on local conditions and the level of expenditure required to provide access to safe water.

29. The NPSWSS has been supplemented by the National Policy for Arsenic Mitigation 2004 and Implementation Plan (NPAM&IP). This establishes that villages in which more than 80% of tube wells are arsenic-contaminated are eligible for emergency response support. Under the emergency response, at least one safe water source is to be provided within a reasonable distance or for every 50 families, with no capital cost contribution required from the users.

30. A National Sanitation Strategy has been drafted, setting the goal of achieving 100% sanitation coverage by 2010. According to the Strategy, 100% sanitation requires (i) no open defecation, (ii) hygienic latrines available and used by all, (iii) proper maintenance of latrines for continual use, (iv) improved hygienic practices, and (v) proper management of solid waste. The guidelines for achieving these goals specify that sanitation is primarily about health and social values, creating and sustaining demand, behaviour change, and an approach that is gender sensitive, placing communities at the center of decision-making, with subsidies provided only for the poorest.

31. Water supply and sanitation is included in the National Health Policy, National Education Policy and National Environment Policy, but has too often comprised disparate project activities without reference to a guiding framework. Recently, however, the Government has approved a Water Supply and Sanitation Sector Development Framework, intended to guide planning, coordination and monitoring with a focus on the devolution of authority to local government institutions, user participation, economic pricing, gender sensitivity, and partnerships between the public and private sectors, and NGOs.

Total Sanitation: Realizing the Full Health Benefits of Clean Water

32. One of Bangladesh's greatest successes has been to achieve near total access to drinking water that is largely microbiologically safe, with 86% of the population drinking water from hand pumps, and 10% connected to piped water. Despite the impressive progress in increasing access to clean water, slow progress in sanitation coverage, combined with poor hygiene habits, has held back the expected health gains. Significantly, the child mortality rate in districts where less than a quarter of households have access to a sanitary toilet is nearly 40% higher than districts in which more than one-half of households have sanitation access.[21] Nationally, some 30%-40% of the population has access to a sanitary latrine.[22] In rural areas, only 30%-35% of the population has such access, and while this total reaches 60%-75% in urban areas, a recent survey[23] found that only 17% of urban households are satisfied with the quality of sanitation services.

33. The goal of achieving total sanitation by 2010 was announced in 2003 by the Government as the objective of the Total Sanitation campaign, since when an increase of 15% in national sanitation coverage is claimed. This ambitious program has been launched based on the experience gained during integrated water supply, sanitation and social mobilization programs in the mid-nineties. With strong political support, a National

[21] World Bank (2005)
[22] PRSP (2004)
[23] GHK (2003)

Advisory Committee under the MoLGRD&C and a National Task Force under the Secretary of MoLGRD&C have been formed, with sanitation Committees formed at all levels of local government.

34. The focal point of the Total Sanitation campaign is the UP in rural areas, and Wards in Municipalities and Cities. The Government has earmarked 20% of Upazillas' Annual Development Program (ADP) allocation for improving sanitation coverage. Of this, 75% is to be used to procure sanitary latrines for distribution to the hardcore poor, and the remaining 25% is to be used for promotional activities. Planning and decisions are approved at the Upazilla Development Coordination Committee following guidelines provided by LGD. The assignment of subsidized latrines to the hardcore poor is based on lists prepared by the Ward Sanitation Committee using data from the 2003 national sanitation survey, with the production of latrine components being contracted out to private producers at the Upazila or UP level.

35. Recognizing the public health nature of improvements in sanitation, community-wide performance-based incentives for sanitation coverage have been introduced under the Total Sanitation program, consisting of additional resources for those UPs (Tk. 0.2 million/Union) and Upazilas (Tk. 0.5 million/Upazilla) that have achieved 100% sanitation. In the first round of awards, 95 UPs, 4 Pourashavas and 5 Upazilas were rewarded for achieving total sanitation by February, 2005. A guideline is being prepared by LGD on the use of the awarded funds, focusing on further social mobilization to sustain the sanitary achievements. This forms part of a phased approach, emphasizing elimination of open defecation and the use of hygienic latrines by all in the current first phase, followed by improved sanitation technologies and further social mobilization to sustain improvements in the subsequent phase. While there remain questions about the independence of the process, the Total Sanitation 2010 program incorporates a comprehensive monitoring system involving data collection by WATSAN committees, checked and approved quarterly by district Sanitation Secretariats of DPHE, combined with follow-up surveys to be conducted in 2005, 2008 and 2010.

36. The Government's commitment to Total Sanitation is an essential step towards addressing the single most significant environmental threat to the nation's health, and merits the full support of development partners and civil society. The combination of improved sanitation technologies with the community-wide promotion of hygienic practices will help realize the full health gains achievable as a result of near-universal access to clean water. Studies in rural Bangladesh have demonstrated that integrated water, sanitation and hygiene intervention can reduce diarrhoeal diseases among children by 25%[24], and a recent international comparison of water, sanitation and hygiene interventions found that sanitation interventions can reduce the risk of diarrhoeal disease by a third.[25]

Meeting the Total Sanitation Goal

37. Successful achievement of the goals of the Total Sanitation campaign will entail overcoming a number of challenges, however, not least of which is the allocation of sufficient resources. The PRSP estimates the cost of achieving total sanitation at about

[24] Aziz et al (1990)
[25] Fewtrell et al (2005)

US$450 million[26], equivalent to about US$30 per household currently without sanitation. While this level of investment may be more than sufficient for the provision of simple pit latrines (estimated to cost on average about $14), rehabilitation and expansion of municipal sewerage systems to meet the needs of Bangladesh's burgeoning urban population will require resources of at least this magnitude. The rehabilitation of Dhaka's existing sewerage and drainage system is alone projected to cost about $100 million.

38. Sanitation activities in urban areas have been slower than rural initiatives, and will require additional attention if the Total Sanitation 2010 goal is to be realized, particularly regarding the technologies being applied. Even in Dhaka, only about 27% of the population is connected to the public sewer system. The most common sanitation technologies in urban areas are pit latrines and septic tanks, but in densely populated areas, pits fill too fast and the effluent from septic tanks flows into open drains, making on-site sanitation options inappropriate for such settings. While the long-term aim must be to extend the public sewer system in urban areas, there are many new and expanding developments, as well as existing slums, that will not receive trunk connections in the foreseeable future. There is a clear need for the development of alternative solutions, including, for example, the use of Septic Tank Effluent Disposal Systems (STEDS), which would combine household septic tanks with small-bore connections to low-cost community effluent treatment facilities.

39. Seasonal flooding poses an additional technological and social challenge to the achievement of total sanitation. Flooding to a greater or lesser extent is an annual event in Bangladesh, and must be considered in the development and promotion of sanitation technologies in flood-prone areas. Flood-waters spread disease and contaminate water supplies, causing rates of diarrhea to increase some seven-fold during these episodes. Latrines become a high priority especially for women in shelters and affected households during floods. When asked to prioritize their needs during floods, 60%-70% of women named latrines as their number one concern. [27] To the extent possible, pit latrines should be constructed with concrete lining in properly compacted earth above flood levels, but such measures will not be possible in all locations. To achieve the goal of year-round sanitation, consideration must be given to providing temporary or permanent latrines in shelters or refuge sites adequate to meet the sanitary needs of the affected community during floods.

Arsenic: Threatening Safe Water Achievements

40. Since the 1970's, extensive awareness and motivation, technological and financial efforts have been undertaken by civil society, Government and development partners to change drinking water practice away from microbiologically-contaminated surface water to clean groundwater. As a result, there are now some 11 million tube wells installed in Bangladesh, supplying microbiologically clean drinking water to more than 90% of the population. However, widespread contamination of groundwater with naturally-occurring arsenic has reduced the percentage of the population with access to safe water to about 73%. According to the national survey conducted by DPHE, some 29 million people are exposed to arsenic contamination exceeding 50ppb, and 49 million to levels exceeding 10ppb. In the face of significant technological and institutional challenges, the response to arsenic

[26] PRSP, December 2004, p. 179
[27] B. Hoque et al (1997)

contamination has been slow, and concern is growing that a switch back to surface water sources will lead to an increased risk of microbiological contamination.

41. It has been estimated that a transition back to untreated surface water sources such as unimproved dug wells or ponds could mean an increase in the risk of diarrheal disease by 20%.[28] Switching to a safe but more remote tubewell may also increase such risk by reducing the quantity of water used in the household, as may the use of arsenic filtration systems, as higher levels of microbial contamination have been found in filtered water than in the tubewells from which it was taken.[29] Based on a comparison of these risks, it is calculated that arsenic mitigation interventions provided to households exposed to levels of arsenic in excess of 50pbb need to achieve at least a 77% reduction in arsenic-related morbidity and mortality to result in a net reduction in the overall burden of disease. This conclusion underlines the importance of targeting arsenic mitigation interventions at households exposed to high levels of contamination, and ensuring that such interventions significantly reduce arsenic exposure without increasing the risk of waterborne disease.

Rising to the Arsenic Challenge: Technology Choices and the Role of Piped Water

42. The National Policy for Arsenic Mitigation (2004) sets the goal of providing access to safe water for drinking and cooking in arsenic-affected areas, giving preference to surface water over groundwater as a source. Despite this preference, the Government is supporting investments in deep tube wells in many arsenic-affected and coastal areas. Intervention studies of people's chosen water options have indicated that deep tube wells and piped water systems are in high demand and have performed satisfactorily[30]. Conversely, significant concerns remain regarding the microbiological safety of alternative options, such as dug-wells and Pond-Sand Filters (PSFs). Household rainwater technologies are growing, but the technology is costly, and the supply seasonal.[31] A few arsenic removal options have been recently approved by GOB and are undergoing further action research. Operation and maintenance (O&M) are important determinants of appropriate technologies. One of the main factors associated with the success and high demand for tube wells has been the low O&M requirements. In contrast, PSFs and most arsenic removal systems require regular cleaning, and the operational performance of rainwater harvesting systems and dug-wells is seasonally variable.

43. The need to match the service levels of household shallow tube wells with either surface water, which requires treatment, or deep tube wells, which entail higher levels of investment, argues for the promotion of piped water systems where feasible, as these spread investment costs while maintaining water delivery at the household level. In turn, the development of piped water systems requires arsenic mitigation to be addressed as part of a broader program to improve water supply service levels, with important roles to be played by local governments and the private sector. A recent World Bank study of arsenic contamination in South and East Asia suggest that this challenge presents the opportunity to transform government agencies from providers of services to facilitators assisting local governments to help themselves.[32] The Bangladesh Water Supply Program Project

[28] Lokuge et al (2004)
[29] Sutherland et al (2002)
[30] B. Hoque et al (2003, 2004)
[31] Arsenic Policy Support Unit (2004)
[32] World Bank (2005c)

implemented by DPHE with World Bank assistance supports the scaling-up of the provision of safe water in rural areas and small towns, promoting private sector participation in the provision of piped water systems. Project funds cover 50% of capital costs, with the remainder borne by the sponsor and users. The goal is to provide 450 villages with functioning piped water supply schemes, providing multiple house connections for wealthier households, yard standpipes for middle-income households, and shared standpipes for poor households.

44. More than half the urban population has access to piped water supply. The four large cities, Dhaka, Chittagong, Khulna and Rajshahi have piped water systems that serve 70%, 55%, 51% and 40% of the population respectively. In addition, 100 of the over 250 municipal towns have piped water systems. These systems primarily serve the urban core, with peri-urban and slum populations continuing to rely on tube wells. Urban areas will require major investment to meet the growing demand for water, in addition to significant improvements in cost recovery in order to meet operation and maintenance costs. That municipal water supply in Bangladesh can be financially viable has been demonstrated through the District Towns Water Supply and Sanitation Project, where all but two of the 18 municipalities generated profits before depreciation, and three generated profits after depreciation. Even in slum areas, 100% of water bills have been paid when NGOs were involved in their management. Although there is room for improvement in collections, both the Dhaka and Chittagong Water Supply and Sewerage Authorities (WASAs) are able to cover operating, maintenance, depreciation and financing costs from user fees.

Regulatory Roles and Private Sector Services: Partnerships for Safe Water Supply

45. As noted in the Bangladesh Country Water Resources Assistance Strategy[33], improved service levels in water supply will require greater involvement of local governments, the private sector and civil society. As well as supporting higher levels of investment, the private sector can provide services for operation, maintenance, billing and collection. To ensure the quality of these services, the Government should be supported in its plans to establish an independent regulatory framework to supervise and monitor performance, forming an element in the broader transformation of government agencies from service providers to facilitators and regulators.

46. In addition to enhancing the quality of service, achievement of the Government's goals for the supply of safe water will require an expansion of service coverage to better reach disadvantaged social groups. The potential of local governments to assist in attaining this goal has been demonstrated through pilot initiatives in which UPs control and manage funds, transferred directly to them in the form of annual block grants. Further support for the supply of safe water should continue to emphasize the role of local governments in the planning and management of water services.

47. An essential regulatory role in the provision of safe water is the monitoring of drinking water quality. While the arsenic crisis stimulated an impressive nationwide initiative to test tube wells for contamination and to strengthen the analytical capabilities of DPHE laboratories, there is not yet a systematic, quality-controlled program to regularly test public and private drinking water sources. Efforts to develop a water quality surveillance

[33] World Bank (2005b)

system are urgently required, combining monitoring by service providers, public provision of information, and the setting and enforcement of standards by a regulatory body, a role that could potentially be filled by DPHE or DoE.

Water Supply and Sanitation: A Good Investment

48. The PRSP states that water supply and sanitation will be recognized as a separate sector in the next Three Year Rolling Plan, and projects that US$4.9 per capita will be required to meet water supply and sanitation goals, implying a total cost of some US$650 million. As Table 2.2 indicates, the economic value of the health benefits achievable through universal provision of improved water sources and sanitation may amount to US$740 million annually, suggesting that the proposed level of investment would pay for itself within one year.

III. Air Pollution

49. Respiratory infections and disease account for a greater share of death and sickness in Bangladesh than diarrhoeal disease, and as Table 2.1 indicates, up to two-thirds of these health outcomes may be associated with environmental factors in the form of either Indoor Air Pollution (IAP) or poor urban air quality.

Indoor Air Pollution: A Serious Health Hazard

50. Recognition of the health impacts of IAP is growing worldwide.[34] Inhaling smoke from burning biomass can have both temporary and permanent consequences for health. Notable among these are chronic bronchitis among women and acute lower respiratory infections among children, especially pneumonia. Worldwide, it is estimated that about 60% of deaths caused by air pollution are among children under five as a result of exposure to smoke from dirty cooking fuels.[35] There is also moderate evidence associating solid fuel use with a range of further health outcomes, including cataracts and blindness, tuberculosis, asthma, adverse pregnancy outcomes, and possibly heart disease.[36]

51. Poor households in Bangladesh depend heavily on wood, dung and other biomass fuels for cooking. As a result, the health impacts of IAP are significant, estimated to account for as much as 8% of the total burden of disease, as shown in Table 2.1. These estimates were supported by a recent World Bank study[37], which detected dangerously high concentrations of particulates in indoor air for many poor households in Bangladesh[38], implying widespread exposure to a serious health hazard. Particularly high levels of exposure to IAP were recorded for women, children and adolescents of both sexes, and these were especially serious for children under five.

52. Fuel choice significantly affects indoor pollution levels, with natural gas and kerosene being cleaner than biomass fuels. The World Bank study in Bangladesh found, however, that household-specific factors apparently matter more than fuel choice in

[34] WHO, 2002
[35] World Bank, 1999
[36] Smith, 2000
[37] Dasgupta et al, 2004
[38] Concentrations of 300 ug/m^3 or greater were common in the samples analyzed for the study.

determining indoor concentrations of harmful particulate matter, with the choice of cooking location, construction material, and ventilation practices being particularly important. These factors were also found to be significant in a similar study conducted in India (see Box 2.1). In addition, the Bangladesh study found great variation during the day, with particulate concentrations during peak cooking periods exceeding those during the least smoky part of the day by a factor of 50 or more. There was little variation within households, however, implying that exposure to dangerous indoor pollution levels is not confined to cooking areas.

Box 2.1: A Comparative Assessment of IAP in Bangladesh and India

Two recently completed studies* measured exposures to indoor air pollution in rural settings in India and Bangladesh. Both studies provided quantitative information on concentrations and exposure to fine particulate matter for a variety of household fuels and conditions.

Both studies strengthen evidence that cooking with clean fuels reduces exposure to fine particulates compared to cooking with solid fuels, but there are significant differences between the two countries. In particular, concentrations in Indian households using solid fuel are up to 9 times higher than concentrations in those using gas, whereas the difference is only two-fold in Bangladesh. Consistently across the studies, fuel choice, cooking location and ventilation factors were found to be strongly associated with kitchen and living area concentrations. The India study, however, finds that fuel choice is the dominant factor, while the results for Bangladesh highlight the role of ventilation as being more significant in influencing IAP levels.

Together, the studies indicate the need for multiple interventions to reduce exposure to IAP, ranging from improvements in housing design and ventilation, to provision of better stoves that vent smoke outside the house, in addition to efforts aimed at accelerating the adoption of cleaner fuels.

(*World Bank, 2002; Dasgupta et al, 2004)

Changing Behaviour, Technology and Fuels to Reduce Exposure to Indoor Air Pollution

53. The health impacts of IAP can be mitigated through the use of cleaner fuels, improved efficiency in biofuel use, and improved ventilation. The policies necessary to promote these changes are cross-sectoral, affecting fuel pricing and distribution, small business development, and health education. The use of cleaner forms of energy, such as natural gas, kerosene and electricity, depends both on household income and the price of cleaner fuels relative to biofuels. As biofuels are more expensive in urban areas, where cleaner energy is cheaper, the use of cleaner forms of energy is higher in Bangladesh's towns and cities, particularly among households with a per capita income over US$2.00 per day. In rural areas, however, there is little likelihood of the widespread use of cleaner fuels in the new future.

54. International experience indicates that household concentrations of fine particulates can be reduced below 200 ug/m^3 through the use of a well-maintained improved stove.[39] While a number of pilot programs to promote the use of improved stoves have been undertaken in Bangladesh[40], these have not resulted in their widespread adoption. Despite such efforts, limited information is still a significant impediment to adoption of cleaner, more efficient stoves. Of the households sampled in the World Bank study, only 15% regarded improved stoves as a viable option, either because they had not heard of them or because they

[39] K. Ahmed et al, 2005

[40] For example, by the Bangladesh Council for Scientific and Industrial Research (BCSIR).

did not think they were locally available. Even among families that had considered the option, however, improved-stove use was limited because of concerns about convenience or initial investment cost. Careful assessment of successful improved stove programs in other countries (see Box 2.2) may provide valuable lessons for the development of a more effective approach in Bangladesh, particularly regarding the need to simultaneously stimulate demand and create an effective private sector response.

Box 2.2: The Successful Promotion of Improved Stoves in China

In the early 1980s, the Chinese government organized the world's largest publicly financed initiative to improve stoves, the National Improved Stoves Program (NISP), which aimed to provide rural households with more efficient biomass stoves, and later with improved coal stoves.

The primary objective of the NISP was to relieve pressure on biomass, rather than to reduce IAP, and consequently it was run by the Ministry of Agriculture (MoA). By the end of the first phase of the program, 130 million improved stoves had been installed, and pressure on biomass had eased in most parts of the country. In the second phase, during the early 1990s, the MoA provided support for stove manufacturers and energy service companies. In the final phase, from the mid-1990s onwards, support for the stove industry was replaced with extension services and certification systems to standardize stoves. The development and dissemination of improved stoves is now left mainly to market actors, with some local government oversight.

Based on household surveys, by the end of the 1990s about 55% of China's 236 million rural households had improved biomass or coal stoves. These surveys also confirmed that the use of improved stoves resulted in reduced indoor concentrations of fine particulates, and that the prevalence of childhood asthma and adult respiratory disease fell with the use of improved stoves.

(Source: Xiliang and Smith, 2004)

55. The World Bank study suggests, however, that poor rural families may not have to wait for clean fuels or improved stoves to enjoy significantly cleaner air, as some households already experience relatively clean conditions, even when biomass fuels are used. Since these arrangements are already within the means of poor families, the scope for cost-effective improvements may be larger than is commonly believed. Simple changes in ventilation characteristics of housing (including construction materials, space configurations, cooking locations, and the placement of doors and windows), as well as ventilation behavior (keeping doors and windows open after cooking) can produce large improvements in the quality of indoor air. For children in a typical household, pollution exposure can be halved by increasing their outdoor time from three to five hours per day, and concentrating outdoor time during peak cooking periods. Since better ventilation and longer outdoor time for children are affordable and acceptable for poor families in Bangladesh, and may reduce IAP exposure to much safer levels, promotion of these simple changes is strongly recommended for immediate action. Given the current low level of awareness of the consequences of IAP, however, achieving such behaviour change will require a concerted public education effort aimed at explaining the health benefits of reducing exposure to smoke from biofuels.

Urban Air Quality: Targeting Gross Polluters

56. Up to 10% of respiratory infections and disease in Bangladesh may be attributable to urban air pollution, as indicated in Table 2.1. While the problem is most severe in Dhaka, where air quality is worst and the most people are exposed, air pollution is a growing concern in other major cities. Measurements in Dhaka indicate that particulate matter is the most

significant pollutant, especially fine particulates that cause the most severe health effects. The effect is seasonal, however, with particulate concentrations falling within acceptable levels during the summer rainy season. Currently, other pollutants rarely exceed standards for ambient air quality.

57. A first important step in addressing urban air quality was taken with elimination of leaded gasoline in 1999. A further significant improvement in the quality of air in Dhaka was achieved through the ban on two-stroke three-wheelers (known as baby-taxis) instituted in January, 2003, which reduced ambient concentrations of fine particulate matter by about one-third. Nevertheless, concentrations of particulate matter in Dhaka remain high, exceeding national standards on more than 100 days of the year, and the gains achieved through the baby-taxi ban are being rapidly eroded, in particular through rising emissions from the growing fleet of diesel vehicles providing public transport.

58. To reduce concentrations of particulate matter, measures need to be taken to improve the quality of fuel and to curb emissions from gross mobile and industrial sources. More specifically, the sulphur content of imported diesel should meet international specifications (i.e. not exceeding 500ppm), and initiatives to control emissions should focus on gross diesel polluters, particularly trucks and buses. Reducing fuel sulphur content will reduce emissions from the existing diesel vehicle fleet[41], as will improved maintenance and operation. In addition, lower diesel sulphur will allow the effective use of cleaner engine technology, which should be promoted through fiscal and regulatory incentives for vehicle upgrades once cleaner fuel is available, especially for fleets of diesel vehicles operating within Dhaka. To get the full benefit of diesel sulfur reduction, it will be necessary to upgrade the bus fleet to Euro-II or higher equivalent standards. Alternatively, bus fleet renewal using CNG as fuel may be pursued, as emission levels of dedicated CNG buses correspond to Euro-III or better.

59. Initiatives aimed at reducing emissions from industrial sources should be based on assessments of their relative contributions to the particulate load. To the extent possible, such efforts should draw on win-win solutions that provide energy savings in combination with emissions reductions. Such an approach will not only help build private sector support, but also raises the possibility of receiving carbon financing for reduced greenhouse gas emissions. The DoE has largely succeeded in promoting the use of 120 ft. high stacks for conventional brick kilns across the country, which has helped reduce local pollutant concentrations. This is an interim solution, however, and the Government has adopted an initiative with UNDP support to promote energy-efficient brick kiln technology for the reduction of emissions from these sources.

60. To target emission reduction efforts, monitor their effectiveness, and build the necessary public support for such initiatives, it is essential to sustain and expand the monitoring of ambient air quality. Currently this is conducted in a limited fashion only in Dhaka, but should be extended to other major cities, as well as to provide better coverage in the capital. While other criteria pollutants should be covered, the primary focus should remain particulates, particularly the respirable fraction, and greater consideration should be given to the potential role of the private sector in providing the technical services required for data collection.

[41] Gwilliam et al, 2004

IV. Reducing Exposure to Toxic Pollutants

61. With the fastest industrial growth rate in South Asia (averaging 7.1% per year from 1990-2003, compared with 5.9% for the region as a whole[42]), and rapid intensification in the use of agro-chemicals (pesticide consumption doubled between 1994 and 2001[43]), the impacts of toxic chemicals on human health and the environment in Bangladesh are an increasingly important concern. Of the various toxic chemicals, Persistent Bio-accumulative Toxics (PBTs) that degrade slowly and accumulate in living organisms are of particular concern. While a number of inorganic PBTs, particularly heavy metals, merit increased consideration in Bangladesh (see Box 2.3), a particular class of PBTs known as Persistent Organic Pollutants (POPs) has attracted special attention, both nationally and internationally.

Box 2.3: Persistent Bio-accumulative Toxics - Lead and Mercury Emissions in Bangladesh

Two of the inorganic PBTs of greatest concern in Bangladesh are lead and mercury. The electrical apparatus and supplies sector is the largest generator of lead in Bangladesh, which includes lead-acid storage battery producing units, as well as wire and cable producing plants located primarily in Dhaka, Chittagong, Khulna and Kushtia. Other sectors with potentially significant lead emissions include the iron and steel, and the tile and ceramic manufacturing sectors. Paper and pulp facilities release significant amounts of mercury into the atmosphere, and important among these are the Karnafuli Paper Mill and Karnafuli Rayon Complex (Omar et al, 1985).

62. POPs are highly stable organic compounds produced both directly and as by-products of a range of economic activities, in the agriculture, health, industry, energy and mining sectors, among others. All persist for years before breaking down, and travel great distances through various media from their point of origin, accumulating in the tissue of most living organisms, via food, water and the air. Worldwide, the known effects of POPs (particularly DDT) include their role in thinning eggshells in fish-eating birds and reductions in their reproductive rates. POPs have also been linked to cancer and reproductive abnormalities, while their effects on reproductive and nervous system disorders are also well established.

63. Twelve POPs[44] have been singled out under the Stockholm Convention for urgent action and control based on their usage and emission characteristics (see Box 2.4). As a signatory to this Convention, which came into force in May 2004, Bangladesh is now faced with the challenge of establishing sustainable POPs management practices and cost-effective solutions for their replacement and safe disposal. The dimensions of this challenge were indicated in the recently completed World Bank South Asia Regional Strategy on POPs[45] and other analyses[46] that point to a number of potential sources of POPs, such as rapidly increasing pesticide use, a range of manufacturing industries, and an unregulated ship-breaking sector, and have been considered in detail in the DoE's POPs Project.

[42] 2005 World Development Indicators
[43] Department of Plant Protection Wing, Bangladesh. Cited in Meisner, 2004
[44] The pesticides aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene, the industrial chemicals hexachlorobenzene (HCB) and polychlorinated biphenyls (PCB), and dioxins and furans which are unintended byproducts of combustion and industrial processes
[45] Issues and Options in Addressing the Objectives of the Stockholm Convention on Persistent Organic Pollutants in India and the South Asia Region, April 2004
[46] Report on Pesticide Hotspots in Bangladesh, September 2004; Final Report on Industrial Pollution: Sources and Impacts GIS Database September 2002

Box 2.4: The Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants was ratified in May 2004. Some of the key objectives of the Convention include:

- Eliminate production and use of specific pesticide POPs: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, and toxaphene.
- Restrict production and use of DDT in disease vector control in accordance with WHO guidelines;
- Develop strategies for identifying stockpiles of POPs and products containing POPs;
- Manage and dispose POPs wastes in an environmentally sound manner
- Develop remediation programs for POPs contaminated sites
- Manage PCBs in an environmentally sound manner and by 2025, take action to remove from use PCBs found above certain thresholds;
- Develop and implement an action plan to identify the sources and reduce releases of POPs byproducts. Promote the use of Best Available Techniques (BAT) and best environmental practices.

Pesticides – a Continuing Source of POPs?

64. In Bangladesh, POPs pesticides were completely banned for use in agriculture from 1997, although most were banned much earlier in 1985. Their continued use has been reported[47], however, possibly attributable to cross-border transfer, continued local formulation, inadequate product labeling and farmers' lack of information.[48] Significantly high pesticide levels have been found in the food chain. A study of pesticide residues in Mymensingh and Dinajpur districts indicated the widespread presence of DDT and its metabolites in water, soil and rice plant samples[49]. In a survey undertaken by the World Bank[50], the use of two POPs (heptachlor and endrin) was reported by farmers in the districts of Comilla, Chittagong, Dhaka, Rajshahi and Mymensingh. DDT, at levels well above the WHO guideline, has been found in a number of samples of surface and groundwater taken in Bangladesh.[51] Direct evidence of human exposure has been provided through the identification of DDT in the breast milk of mothers in coastal areas where dried fish are widely consumed.[52] Analyses of dried fish conducted in 1998 found the presence of DDT (allegedly used in the curing process), in some cases at exceptionally high levels presenting a hazard for human consumption[53], although more recent work suggests alternative chemicals are now being used.[54] Additionally, significant risks from pesticide POPs are posed by a number of contaminated sites that are likely to require remediation, such as the closed DDT plant in the BCIC Chemical Complex in Chittagong, and obsolete stocks in several agricultural pesticide godowns in Khulna, Chittagong and Bogra districts, as well as the DOH warehouses in Chittagong, together amounting to about 500 MT.

[47] Awal, 2001, SUNS 1998, SOS-arsenic.net, 2004, Toxic Link, 2004
[48] Ramaswamy, 1992
[49] Alam et al. 1999, and Matin et al 1998, cited in Hossain, 2005
[50] Meisner, 2004
[51] Malek et al 2002, cited in Hossain, 2005
[52] Personal communication with Dr Shahadat Hossain, Institute of Marine Science, University of Chittagong, Bangladesh
[53] Khan 1998. The use of DDT in drying fish was first reported in Bangladesh by the Aquatic Research Group, Institute of Marine Sciences, Chittagong University
[54] DoE POPs Project

Manufacturing – a Variety of Likely POPs Sources

65. An estimation of sector-wise pollution based on applying standard pollution coefficients to manufacturing data for Bangladesh[55] identified the following the industrial sectors to be of greatest concern (i) steel, (ii) industrial chemicals, (iii) cement, (iv) textile dyeing and finishing, and (v) pulp and paper. Among the POPs produced by these sectors, PCBs are estimated to pose the gravest risks, and the most affected districts are Chittagong, Naryanganj, and Dhaka, which together account for an estimated 90% of the POPs generated by these sectors. The principal modes of POPs generation in these sectors are as follows:

- steel – scrap from the ship-breaking industry, used as raw material in this sector contributes to the formation of dioxins and furans, and even possibly PCB;
- chemicals – the main sites are the old DDT plant in Chittagong and a privately-owned owned caustic soda facility, producing elemental chlorine and other chlorine based products;
- cement - POPs are released in the kiln of clinker-producing cement plants, two of which exist in Bangladesh;
- textiles – textile and leather plants contribute more than 20% of the total dioxins and furans emissions due to usage of chlorinated chemicals[56], or dioxin-contaminated dyestuffs.[57] The textile plants located along the Dhaka-Chittagong economic corridor and the leather plants located in Hazaribagh (Dhaka) are hotspot areas;
- pulp and paper – the use of chlorine and chlorinated compounds in bleaching and de-inking processes causes dioxin and furan contamination of effluent from this sector, possibly one of the largest sources of dioxins and furans in the country.

66. Other industrial sectors that warrant particular attention for the control of POPs include oil refining and brick-making. Oil refining is known to produce dioxins, furans and PCBs, and the same POPs are likely to be generated by the use of a range of dirty fuels in brick-making, including lignite, tires and furnace oil.

Ship-Breaking – a Potential POPs Hotspot

67. At present, more than 30 ship-breaking yards operate on the beaches of Chittagong, dismantling some 60-80 large ocean-going ships every year. These beaches constitute the largest ship-scrapping facility for large vessels in the world, accounting for more than half of all vessels above 200,000 dwt scrapped worldwide in 1997-98. Dating from a period when PCB-use was widespread, it is expected that many of these ships contain PCBs in their paint, cables, waste oil, lubricants and electrical systems, estimated to total some 250-800 kgs per ship.[58] Activities relating to the ship breaking sector that augment the risk of dioxin and PCB contamination include unregulated disposal of wastes (open-air burning of PCB-based PVC cables), recycling of waste oil and use of metal scraps in the iron and steel industry. An

[55] M. Huq, 2004
[56] Especially PCP (pentachlorophenol) and chloronitrofen. Das (2005)
[57] For example dioxazines or phthalocyanines
[58] Toxics Link, 2004

investigation of soil samples from steel plate reprocessing plants at ship-breaking yards found elevated levels of PCBs, although these were not detected in adjacent sea sediments.[59]

Power Sector – a Legacy of PCBs

68. The amount of PCBs that exist in the transformers and oil circuit breakers of the power sector in Bangladesh, as well as the amount that may be stored either for replenishment or as waste, has been quantified as part of the draft POPs National Implementation Plan. While recently-imported equipment is understood to be PCB-free, it is estimated that older equipment may contain some 500 tonnes of PCBs, with perhaps a further one-tenth of that amount in storage or waste containers. Seven PCB-contaminated sites have been identified in Bangladesh, which mainly include electric workshops for transformers and capacitors in Gazipur, Bogra, Chittagong, Dhaka and Jessore.

Other Significant Sources

69. A number of miscellaneous sectors contribute significantly to dioxins and furans emissions. These include waste disposal and incineration activities (28%), fossil-fuel power generation and biomass heating including household heating and cooking (15%) and uncontrolled burning (22%), as reported in the Draft National Implementation Plan.

Institutions and Policies

70. Issues associated with the management of POPs and other toxic chemicals raise a range of challenges for Bangladesh. As a first step in meeting these, the registration of all POPs pesticides has been withdrawn, along with all authorizations for the use of chlorinated hydrocarbons as pesticides. In addition, all nine intentional POPs are banned in manufacture, use and trade, except DDT, for which restricted use for vector control is permitted until safer methods can be adopted. As a signatory to the Stockholm Convention, Bangladesh is preparing a National Implementation Plan (NIP) to develop POPs management practices and solutions. This exercise is being led by MoEF, which under the Environmental Conservation Act of 1995 is responsible for chemical safety, in collaboration with the Department of Agricultural Extension (DAE) and Bangladesh Power Development Board (PDB) as co-implementing agencies. On the basis of inventory analysis, infrastructure assessment, and disposal options, the draft NIP proposes a list of priority actions, divided into short- and long-term initiatives. The short-term actions focus on building institutional capacity and establishing the policy framework, while the longer term proposals include POPs control action plans.

Elements of a POPs Management Strategy

71. The broad elements of a strategy for strengthening the management of POPs would include the following:

- establishing dialogue and partnerships with relevant government agencies and other stakeholders (including industry associations, bilateral agencies and civil society), since recognition of the POPs issue is at a nascent stage;

[59] Det Norske Veritas, 2000

- identifying POPs-related priorities based on a sound technical understanding of the chemicals management issues as well as relevant national and international policies;
- identifying sustainable intervention programs and policies that deal with cleaning up contaminated sites or obsolete stockpiles, monitoring of exposure and effect, building institutional capacities and implementing cleaner technologies, among others; and,
- engaging in information dissemination and awareness-raising.

V. Environmental Health: Recommendations and Areas for World Bank Support

72. Environmental health concerns are multi-sectoral issues, so institutional arrangements are critical to the success of all initiatives. For any particular initiative, it is important to identify a lead agency to push the agenda and coordinate others effectively. It is also important to build awareness of the extent of the health risks involved, as well as the understanding of cost-effective mitigation measures, in order to build broad-based support for their management.

Sanitation

73. The Government's commitment to Total Sanitation is an essential step towards addressing the single most significant environmental threat to the nation's health, and merits the full support of development partners and civil society. Successful achievement of the goals of the Total Sanitation campaign will entail overcoming a number of challenges, however, not least of which is the allocation of sufficient resources. To achieve the goal of year-round sanitation, consideration must also be given to providing temporary or permanent latrines in shelters or refuge sites adequate to meet the sanitary needs of the affected community during floods.

74. In urban areas, while the long-term aim must be to extend the public sewer system, there are many new and expanding developments, as well as existing slums, that will not receive trunk connections in the foreseeable future. For these areas, there is a clear need for the development of alternative solutions. In addition to the technical assistance provided by the Water and Sanitation Program to the Total Sanitation campaign, the World Bank is also proposing to provide support for improved sanitation through the planned Dhaka Chittagong Water Supply and Sanitation Project, and the Dhaka Environment and Water Resource Management Project.

Safe Drinking Water Supply

75. The provision of arsenic-safe, microbiologically-clean drinking water remains a major challenge for Bangladesh. Efforts in this area should be accelerated, aimed at providing a choice of technologies to meet the varied situations of the unserved population, targeting arsenic mitigation interventions at households exposed to high levels of contamination, and ensuring that such interventions significantly reduce arsenic exposure without increasing the risk of waterborne disease.

76. Achievement of the Government's goals for the supply of safe water will require an expansion of service coverage to better reach disadvantaged social groups. Urban areas will

require major investment to meet the growing demand for water, in addition to significant improvements in cost recovery in order to meet operation and maintenance costs. Improved service levels in water supply will require greater involvement of local governments, the private sector and civil society. To ensure the quality of these services, the Government should be supported in its plans to establish an independent regulatory framework to supervise and monitor performance. As indicated in the Bangladesh Country Water Resources Assistance Strategy,[60] the World Bank will continue to be involved in this sector through both the Bangladesh Water Supply Program Project, the Dhaka Chittagong Sewerage and Drainage Sector Project, and the proposed Dhaka Integrated Environment and Water Management Project.

Indoor Air Pollution

77. Opportunities should be explored to integrate the mitigation of IAP into existing programs, for example through rural energy (Ministry of Energy), clean cooking technologies (including improved stoves and biogas, with leadership from the Ministry of Science and Technology), and village sanitation (Local Government Division). While such initiatives may include a subsidy, at least in initial stages, these should be targeted towards the sustainable private sector provision of such technologies in the longer term.

78. Since better ventilation and longer outdoor time for children are affordable and acceptable for poor families in Bangladesh, and may reduce IAP exposure to much safer levels, promotion of these simple changes is strongly recommended for immediate action. Given the current low level of awareness of the consequences of IAP, however, achieving such behavior change will require a concerted public education effort aimed at explaining the health benefits of reducing exposure to smoke from biofuels. One possible mechanism to promote greater public awareness would be to incorporate IAP messages in the Total Sanitation campaign. The World Bank could support further exploration of this approach through the provision of non-lending technical assistance.

Urban Air Pollution

79. Mobile sources remain the priority for emissions control in urban areas. Measures aimed at controlling the age of vehicles need to be assessed, as well as the further promotion of public transport. Diesel vehicles are a particular concern in Dhaka, and the World Bank-supported Air Quality Management Project has commissioned a study to assess the options for controlling emissions from these sources. It is clear, however, that the sulfur content of imported diesel should meet international specifications (i.e. not exceeding 500ppm), and that initiatives to control emissions should focus on gross diesel polluters, particularly trucks and buses. More generally, it is essential to sustain and expand the monitoring of ambient air quality. Currently this is conducted in a limited fashion only in Dhaka, but it should be extended to other major cities, as well as to provide better coverage in the capital. The World Bank will continue to support initiatives in this area through the Air Quality Management Project, for which a follow-up operation may be considered.

[60] World Bank, 2005b

Persistent Organic Pollutants

80. Although POPs pesticides were completely banned for use in agriculture in Bangladesh from 1997, and recently-imported electrical equipment is understood to be PCB-free, the health risks associated with POPs are an emerging concern in Bangladesh, for which it will be important to establish dialogue and partnerships with relevant government agencies and other stakeholders (including industry associations, bilateral agencies and civil society). The identification of POPs-related priorities must be based on a sound technical understanding of the chemicals management issues, as well as relevant national and international policies. Once priorities are agreed, intervention programs may be established for cleaning up contaminated sites and obsolete stockpiles, monitoring exposure and effects, engaging in information dissemination and awareness-raising, and adopting cleaner technologies. The World Bank can assist the Government in accessing global grant resources to provide technical and financial support for these activities.