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Health Aspects of Cost-Benefit Analysis in Water Supply and Sanitation

Financing water supply and sanitation in EECCA
Conference of EECCA Ministers of Economy/Finance, Environment and Water and their partners from the OECD

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This paper is a contribution of the WHO to the conference documentation

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HEALTH ASPECTS OF COST-BENEFIT ANALYSIS IN WATER SUPPLY AND SANITATION

World Health Organization – Regional Office for Europe

EXECUTIVE SUMMARY

In preparation of the Ministerial Conference on Financing the Urban Water Supply and Sanitation Sector in EECCA countries (Yerevan, Armenia, 18 November 2005), several assessments have been made of the total investment costs required by the EECA countries to meet the millennium development goals (MDG). Current estimates are however weakened by the omission of direct and indirect health benefits. WHO applied a cost benefit analysis applied earlier at the global level to the specific environment in the EECCA countries in an effort to provide additional information and thus contribute to making future cost-benefit analysis more realistic.

The model started from an assessment of the current disease burden, based on population data provided by the UN population division; data on access to water supply and sanitation gathered through the WHO-UNICEF Joint Monitoring Program; information on diarrhoea incidence rates by age group provided by the EIP program of WHO. Global literature reviews, complemented with detailed studies from the EECCA region, were used to assess health benefits by different interventions expressed as a reduction in diarrhoeal disease rate.

Five types of interventions were considered:

- Intervention 1: achieving the MDGs
- Intervention 2: providing access to improved water supply and improved sanitation services to the unserved population living in urban and rural areas by 2015
- Intervention 3: increasing access to improved water supply sources and improved sanitation services **and** providing water treatment at point of use to the unserved population living in urban and rural areas by 2015
- Intervention 4: Increasing access to in-house piped water and sewerage connections, with water quality monitoring and partial treatment of waste waters to the urban and rural poor by connecting those segments of the population that are not connected to centralized piped water and sewage network systems by 2015.
- Intervention 5: Improving water quality in the piped water supply network by better water treatment, regulation and monitoring so that residual chlorine can be detected at tap.

Economic benefits resulting from a reduction of diarrhoeal disease were assessed at three levels:

- Health sector benefits: direct expenditures avoided, due to reduced morbidity
- Patient benefits: direct expenditures avoided (due to less illness from diarrhoeal disease), income gained (due to reduction in days lost from work), days of school absenteeism avoided, avoidance of loss of productive days by caregivers

- Savings in convenience time: including water collection time saved, sanitation access time saved, opportunity cost of lost time.

The results of this analysis are covered in the table below:

Table 1 Economic gains from reduced morbidity due to diarrhoeal diseases (millions USD/year)

Intervention ->	**1**	**2**	**3**	**4**	**5**
Caucasus	163	325	401	797	22
Central Asia	647	1,294	1,571	2,937	63
Eastern Europe	212	424	714	2776	153
TOTAL	1,022	2,043	2,686	6,510	238

The table shows that the economic value of the health benefits resulting from improvements in water supply and sanitation ranges from USD 1 billion for intervention 1 to up to nearly USD 6,5 billion for intervention 4.

In assessing this information, it must be borne in mind that:

- The calculation is based only on one type of health outcome, diarrhoeal disease. Expert meetings held under the Protocol on Water and Health identified in addition the following priority diseases: cholera, shigellosis, viral hepatitis A, typhoid/paratyphoid as priority diseases to be combated by improvements in water supply and sanitation. Economic benefits from reduction in these diseases can be calculated using the same model and would lead to the expression of additional benefits.

- The model used by WHO expresses benefits on a per annum basis. Infrastructure improvements done in the lead-up to the target year of the MDGs (2015) are likely to remain operational for a significant number of years after 2015 so that cost benefit analysis should also take the disease averted during this period into account.

- The cost of achieving the MDGs in EECCA have also been assessed on an annual basis: this would require the doubling of financial flows for operation, maintenance and capital costs to about € 7 billion. Hence the annual additional costs that should be compared to the annual health benefits is about €3.5 billion, which is significantly less than the benefits that derives from controlling diarrhoeal diseases.

It is also recognized that the present study addresses only one aspect of water-related diseases. Other important water-related diseases such as hepatitis A, dysentery, cholera and typhoid have not been addressed in the present calculations. Completion of the model by including reduction of these disease burdens would further sustain the argument.

Although incomplete, the current study indicates that health benefits should be seen as an important component in any cost-benefit analysis when improvements in urban and rural water supply and sanitation are being considered. WHO is ready to work with the EECCA countries and international donors in the further development this work.

INTRODUCTION

Within the framework of the Environment for Europe process, ministers of the eastern Europe, Caucasus and central Asia (EECCA) held a major conference on urban water supply and sanitation in Almaty in 2000. The Almaty Conference led to:

- the adoption by the EECCA Ministers of economy/finance and environment of guiding principles for the reform of urban water supply and sanitation sector;
- a mandate to the EAP task force to monitor the implementation of the guiding principles, and to develop a work program to support implementation; and
- an agreement to hold a follow-up conference in 2005.

The Almaty Conference formed a lead-up to the adoption of the Millennium Development Goal 7 Target 10, later strengthened by the World Summit on Sustainable Development to:

Halve, by 2015, the proportion of people without sustainable access to safe water and sanitation.

These goals have been reinforced at the recently concluded 2005 World Summit.

At the Environment for Europe Ministerial Conference in Kiev, May 2003, the participants adopted the EECCA environment strategy. The World Health Organization's Regional Office for Europe joined this effort to facilitate the water supply and sanitation area of work under the Strategy, in particular by strengthening its cooperation with the EAP Secretariat at the OECD.

Several assessments have been made of the likely costs of meeting the Millennium Development Goals. The total MDG investment cost was estimated at around €14.6 billion for all EECCA countries for the entire MDG period[1]. However, the model used in this estimate addresses solely expenditures, and does not balance these expenditures with the economic benefit from disease avoided and productivity gained by reducing the burden of water-related disease. The present paper discusses a methodology to address this element of cost calculation, applies the methodology in the case of diarrhoeal diseases to the EECCA countries, and indicates possible areas for refining the outcome.

METHODOLOGY

GEOGRAPHICAL FOCUS

In order to arrive at consistency with current WHO geographic regions, the analysis focussed on three subregions:

- the Caucasus comprising Armenia, Azerbaijan and Georgia;
- the central Asian region, comprising Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan; and
- the eastern European region, comprising the Russian Federation, Belarus, the Republic of Moldova, and Ukraine.

INTERVENTIONS

For each sub-region, a set of potential interventions improving access to safe water and sanitation service levels was assessed. The term "improved" water supply and sanitation refers initially to low technology improvements and is based on the definitions presented in the report of the WHO-UNICEF Joint Monitoring Programme.[2,3]

- "Improved" water supply generally involves better access and protected water sources (e.g. standpost, borehole, protected spring or well, or collected rain water). Improvement does not mean that the water is necessarily safe, but rather that it meets the minimum criteria for accessibility and measures are taken to protect the water source from contamination.
- "Improved" sanitation generally involves better access and safer disposal of excreta (septic tanks, simple pit latrines, or ventilated improved pit-latrines). Isolation of excreta means less chance of contamination of human environments. However, under these options there is no (or very limited) treatment or re-use of wastewater, and sewerage either stays in the location (such as a latrine) or is discharged to the wider environment.

Further improvements that make water or sanitation services safer or more convenient include:

- Water treatment at point of use, for example using chlorine to disinfect water.
- Regulated water supply through a household connection, giving water that is safe for drinking, and connection to sewer system thereby removing contact between humans and their waste.

In this study, five different "interventions" were modelled starting from the baseline. These scenarios are described in Table 1 below.

Table 2. Intervention scenarios

Intervention	Description
Intervention 1	Achieving the MDG, which is halving the population without access to improved water supply and sanitation by 2015.
Intervention 2	Providing access to improved water supply and improved sanitation services to the unserved population living in urban and rural areas by 2015.
Intervention 3	Increasing access to improved water supply sources and improved sanitation services **and** providing water treatment at point of use to the unserved population living in urban and rural areas by 2015.
Intervention 4	Increasing access to in-house piped water and sewerage connections, with water quality monitoring and partial treatment of waste waters, to the urban and rural poor by connecting those segments of the population that are not connected to centralized piped water and sewage network systems by 2015.
Intervention 5	Improving water quality in the piped water supply network by better water treatment, regulation and monitoring so that residual chlorine can be detected at tap.

ESTIMATES ON WATER AND SANITATION COVERAGE

Estimates on coverage of water and water supply systems were taken from the results of the 2004 survey exercise undertaken in the framework of the WHO-UNICEF Joint Monitoring Programme.[4,5]

The figures maintained for the present study are summarized in Table 2 below.

Table 3. Access to improved sources of water supply and sanitation in 2002

	Access to improved water supply (%)				Access to improved sanitation (%)	
	Total served	House connection	Other types of access	Not served	Total served	Not served
Armenia	92	85	7	8	84	16
Azerbaijan	77	47	30	23	55	45
Georgia	76	58	18	24	83	17
Kazakhstan	86	61	25	14	72	28
Kyrgyzstan	76	48	28	24	60	40
Tajikistan	58	40	18	42	53	47
Turkmenistan	71	52	19	29	62	38
Uzbekistan	89	53	36	11	57	43
Russian Federation	96	81	15	4	87	13
Belarus	100	62	38	0	90	10
Republic of Moldova	92	41	51	8	68	32
Ukraine	98	78	20	2	99	1

ASSESSMENT OF HEALTH BENEFITS

Infectious diarrhoea is mainly responsible for the burden caused by water-related diseases. Improving access to safe water supply and sanitation services is a preventive intervention, whose main outcome is a reduction in the number of episodes of diarrhoea and accordingly a proportionate reduction in the number of deaths. Many individual studies have reported additional results of interventions intended to reduce illness through improvements in drinking-water, sanitation facilities and hygiene practices in the developing world.

There seems to be a dearth of studies on health impact of water supply and sanitation in the European Region, an issue that will be discussed in greater detail later in the paper. Nevertheless, this analysis estimated the health benefits of improving access to safe water and sanitation in the three sub-regions based on a limited number of published reviews, surveys and multi-country studies:

- Improved water supply can reduce diarrhoea morbidity by up to 25%, if severe outcomes are included.[6]

- Improved sanitation reduces diarrhoea morbidity by 32%.[7]

- When providing both improved water supply and improved sanitation facilities, a reduction of 37.5% in diarrhoeal disease rates can be achieved.[8]

- Hygiene interventions including hygiene education and promotion of hand washing can lead to a reduction of diarrhoeal cases by up to 45% .[9]

- Improvements in drinking-water quality through household water treatment, such as chlorination at point of use, can lead to a reduction of diarrhoea episodes by between 35% and 39%.[10]

- Improving water quality in the piped water supply network by better water treatment, regulation and monitoring so that some detectable chlorine residual can be detected at the tap would lead to a 30% decrease in diarrhoeal diseases.[11]

- Achieving full coverage in regulated in-house piped water and sewage connection, with water quality monitoring and partial treatment of waste waters, corresponding to a situation typically occurring in developed countries, would lead to a reduction of 77% in diarrhoeal disease rates.[12]

The number of diarrhoea cases averted by increasing access to improved water and sanitation services would vary from one sub-region to another as they depend on the existing levels of water supply and sanitation access and the country-specific levels of morbidity and mortality due to diarrhoeal diseases. Health impacts would be greater in regions where the number of unserved is high and where the diarrhoeal disease burden is significant.

HEALTH DATA INPUTS

To estimate health impact, a number of data inputs are required such as: population numbers by age group and by country; diarrhoea incidence rates by age group and by country; distribution of population by exposure scenario and by country; percentage reduction of diarrhoea incidence rate for each selected intervention.

Table 3 below shows a summary of the type of data, sources, and assumptions used in the health benefit assessment. Where possible, country-specific data were used; where such data were not available or could not be collected in a quality-satisfactory manner in the time available, regional or global averages were applied.

Table 4. Overview of data sources, year of collection and coverage range

Data type	Data source	Data year	Data coverage
Demographic and epidemiological			
Population size and structure	UN population division	2015	Country-by-country data
Current WS&S coverage rates	JMP report	2004	Country-by-country data
Diarrhoea incidence rates, by age group	EIP/WHO	2002	Country-by-country data
Risk reductions with improved WS&S	Literature: Prüss et al. 2002, Esrey et al., 1996, Fewtrell et al., 2005 and Egorov et al., 2002	Various	Global averages

ADDITIONAL BENEFITS OF INCREASING ACCESS TO SAFE WATER SUPPLY AND SANITATION FACILITIES

Beyond reducing the water-borne and water-washed diseases, providing better access to improved water and sanitation confers many other diverse benefits ranging from the easily identifiable and quantifiable (costs avoided, time saved) to the more intangible and difficult to measure (convenience, well-being). As much as feasible, these must be taken into account in a cost-benefit analysis

One set of benefits related to the health impacts that are relatively easy to quantify, are the cost-offsets. These are the costs avoided due to less illness. The related benefits accrue to both the health sector and to patients themselves. Cost savings in health care are mainly due to the reduced number of treatments of diarrhoeal cases. Also, patients will avoid costs incurred by seeking treatment, including expenditures on care, drugs and transport and the opportunity costs of time spent on seeking care.

Another set of benefits related to less illness are the **avoided days lost**, with respect to formal or informal employment, other productive activities in the household, or school attendance. They are traditionally split into two main types: gains related to **lower sickness (morbidity)** and gains related to **less**

death (**mortality**). This analysis adopted the convention that time spent ill represents an opportunity cost that is valued at a rate linked to minimum wages.

Finally, one of the major benefits of improving access to water and sanitation derives from the **time saving** associated with closer location of the facilities. Time savings occur due to, for example, the relocation of a well or borehole to a site closer to user communities, the installation of piped water supply in house and closer access to latrines. They translate into increased production, higher school attendance and more leisure time. In this analysis, the value of convenience time savings was estimated by assuming a daily time saving per individual for water and sanitation facilities separately, and multiplying these by the minimum wage rate for each region.

BENEFIT DATA INPUTS

Health sector costs saved

Unit costs of health services vary by region, and data are available from each of the countries representing the regions. Unit costs available from EIP were low and high values, from which a mid value was calculated. A reasonable range was assumed around the mid value. Unit costs were assumed to include the full health care cost (consultation, medication, overheads, etc.). Values for other variables necessary to estimate cost per case are presented. The number of outpatient visits per case was assumed to average 0.3 (30% of the population will visit a health care centre with a case of diarrhoea) with a range of 0.1 to 1 used. Once hospitalised, the average length of stay was assumed to equal 3.5 days (range 2.5-4.5). In the base case 8.2% of cases were assumed to be hospitalised, and the rest ambulatory (91.8%).

Patient treatment cost saved

To estimate costs to the patients themselves, fees were not included in this analysis as their inclusion would double count the health sector costs, and there is a variation between countries and regions concerning the proportion of the cost usually supported by the patient. The most tangible patient cost included was the transport cost. In the base case it was assumed that 50% of patients take some form of transport at US$0.50 per return journey, excluding other direct costs associated with journey, giving an average of US$0.25 per patient visit. In the low cost scenario, 0% is assumed to pay for transport, and in the high cost scenario 100% are assumed to pay for transport (giving low and high values of US$0 and US$0.50). Other costs associated with a visit to the health facility were also assumed, and added to transport costs, giving US$0.50 per outpatient visit and US$2 per inpatient admission (including food purchased).

Time savings due to better W&S access

Time savings are expected for those with better access to water and sanitation facilities outside the house (for example, a new well or borehole in the village), as well as for those with a new household water connection. Table below shows the values used in the analysis. For water, the value for time savings per household should take account of the different methods of delivery and the rural/urban locations. Based on latest Demographic Health Survey data collected in Kazakhstan, it was assumed that, on average, a household gaining improved water supply saves 20 minutes per day (5 min per trip, assuming 4 trips per day), and piped water saves 80 min per household per day (20 min per trip assuming 4 trips per day). For improved sanitation, the assumption was 15 minutes saved per person per day. Time savings for all age categories are valued at the minimum wage.

Reduced time lost from illness

Another saving for society arising from water and sanitation interventions is the productive days gained due to lower illness and less deaths due to diarrhoeal disease. Productive days are not restricted to the population of working age, nor to only those with formal employment. When children are ill less, they will gain school time; also, when babies are not ill, the time of the (additional) carer is released thus enabling them to engage in other activities. For those of working age, on average 2 days off work are assumed per case (1 to 4 days range), while those of school age 3 days are assumed (1 to 5 days range), and babies are assumed to be ill for 5 days (3 to 7 days range). While it is clear that the impact of a case of diarrhoea will vary from individual to individual (depending on the severity, resistance of the individual to inconvenience, nature of their work, etc.) in the absence of data it is not feasible to do a sub-group analysis, hence the use of a global average to reflect the average case. The time off work or school is valued at the minimum wage, while for babies the time of the carer is valued at 50% of the minimum wage. Table 4 below summarizes the data and the sources used for assessing the quantification of economic benefits.

Table 5. Data sources and values for economic benefits

Benefit by sector	Variable	Data source	Data values (+ range)
1. Health sector			
Direct expenditures avoided, due to less illness from diarrhoeal disease	Unit cost per treatment	WHO regional unit cost data	US$4.3-US$9.7 (cost per visit) US$16.1-US$39.7 (cost per day) *Varying by WHO region*
	Number of cases	WHO data	Variable by region
	Visits or days per case	Expert opinion	0.3 outpatient visit per case (0-1) 3.5 days for hospitalised cases (2.5-4.5)
	Hospitalisation rate	WHO data	91.8% of cases ambulatory 8.2% of cases hospitalised
2. Patients			
Direct expenditures avoided, due to less illness from diarrhoeal disease	Transport cost per visit	Assumptions	US$0.50 per visit
	% patients use transport	Assumptions	50% of patients use transport (0-100%)
	Non-health care patient costs	Assumptions	US$0.50 ambulatory (US$0.25-1.00) US$2.00 hospitalisation (US$1.0-3.0)
	Number of cases	WHO data	Variable by region
	Visits or days per case	Expert opinion	0.3 outpatient visit per case (0-1) 3.5 days for hospitalised cases (2.5-4.5)
	Hospitalisation rate	WHO data	91.8% of cases ambulatory 8.2% of cases hospitalised
Income gained, due to days lost from work avoided	Days off work/ episode	Expert opinion	2 days (1-4)
	Number of people of working age	UN population data 2015	Variable by country
	Opportunity cost of time	World Bank data	Minimum wage rate

Benefit by sector	Variable	Data source	Data values (+ range)
Days of school absenteeism avoided	Absent days / episode	Expert opinion	3 (1-5)
	Number of school age children (5-14)	UN population data 2015	Variable by country
	Opportunity cost of time	World Bank data	Minimum wage rate
Productive parent days lost avoided, due to less child illness	Days sick	Expert opinion	5 (3-7)
	Number of babies (0-4)	UN population data 2015	Variable by country
	Opportunity cost of time	World Bank data	50% minimum wage rate
3. Consumers			
'Convenience' – time savings	Water collection time saved per household per day for better external access	DHS data	5 min
	Water collection time saved per household per day for piped water	DHS data	20 min
	Sanitation access time saved per person	Expert opinion	15 min
	Average household size	WHO population data 2002	4 people
	Opportunity cost of time	World Bank data	Minimum wage rate

RESULTS

PREDICTED HEALTH IMPACT

Decrease in the burden of disease

Table below presents the number of diarrhoea cases (in thousands) averted under each of the five interventions. Intervention 1 potentially prevents 3.6 million cases, increasing to 7.2 million cases prevented by intervention 2. Clean drinking-water and improved sanitation for the entire region (intervention 3) would potentially avoid 37.4 million cases annually. Intervention 4 would add a further 20 million cases, due mainly to improved sewerage.

Table 6. Number of diarrhoeal cases averted per year

Intervention >	1	2	3	4	5
Caucasus	592	1,191	4,465	6,535	948
Central Asia	2,400	4,799	17,163	24,991	2,827
Eastern Europe	611	1,229	15,846	25,128	7,752
TOTAL	**3,602**	**7,219**	**37,474**	**56,654**	**11,526**

Time gained due to disease averted

The number of days gained due to lower incidence of diarrhoea in adults, children and babies varies by sub-region and by age group. The calculations assumed that:

- - babies gain 5 days per case of diarrhoea averted;
- - school children gain an average of 3 school days per case of diarrhoea averted;
- - adults gain two work days per case of adult diarrhoea averted; and
- - adults gain time from improved access to water and sanitation even when no particular disease is averted.

The following Tables 6–10 show the time gained due to disease averted per age category.

Table 7. Number of baby days gained due to reduced morbidity (in million)

Intervention >	1	2	3	4	5
Caucasus	2	4	14	21	4
Central Asia	7	15	53	77	9
Eastern Europe	2	3	42	67	21
TOTAL	**11**	**22**	**109**	**164**	**33**

Table 8. Number of school days gained due to reduced morbidity (in million)

Intervention >	1	2	3	4	5
Caucasus	0	1	2	3	1
Central Asia	1	2	9	13	1
Eastern Europe	0	0	3	5	2
TOTAL	**2**	**3**	**14**	**21**	**4**

Table 9. Number of productive days gained for adults due to reduced morbidity (in million)

Intervention >	1	2	3	4	5
Caucasus	0	0	2	2	0
Central Asia	1	2	6	9	1
Eastern Europe	0	1	10	16	5
TOTAL	**1**	**3**	**18**	**27**	**6**

Table 10. Time gained (millions of hours per year)

Intervention >	1	2	3	4	5
Caucasus	304	608	608	1,320	0
Central Asia	1,334	2,668	2,668	5,374	0
Eastern Europe	1,012	2,024	2,024	8,301	0
TOTAL	**2,650**	**5,300**	**5,300**	**14,995**	**0**

PREDICTED ECONOMIC IMPACT

Following the basic information summarised above, an initial assessment was made of the economic importance of these gains. These are estimated in tables 10–15 below.

Health sector costs averted

Table 11. Health sector costs averted (in million USD/year)

Interventions >	1	2	3	4	5
Caucasus	8	16	62	90	13
Central Asia	33	67	240	349	40
Eastern Europe	9	19	243	386	119
TOTAL	**51**	**102**	**545**	**825**	**172**

Patient costs averted

Table 12. Patient costs averted (in million USD/year)

Interventions >	1	2	3	4	5
Caucasus	0	0	1	2	0
Central Asia	1	1	5	8	1
Eastern Europe	0	0	5	8	2
TOTAL	**1**	**2**	**11**	**17**	**3**

Baby days gained

Table 13. Value of baby days gained (in million US$/year)

Intervention >	1	2	3	4	5
Caucasus	3	7	26	38	7
Central Asia	12	24	88	128	15
Eastern Europe	1	2	40	64	20
TOTAL	**17**	**34**	**154**	**230**	**41**

School days gained

Table 14. Value of school days gained (in million USD/year)

Intervention >	1	2	3	4	5
Caucasus	1	2	8	12	2
Central Asia	4	8	29	42	5
Eastern Europe	0	0	6	10	3
TOTAL	**5**	**11**	**44**	**64**	**10**

Adult days gained

Value of productive days gained due to illness avoided in the 15–60 year age group

Table 15. Value of productive days gained by reduced morbidity (in million USD/year)

Interventions >	1	2	3	4	5
Caucasus	1	2	6	9	2
Central Asia	3	6	21	31	4
Eastern Europe	1	1	19	30	9
TOTAL	**4**	**8**	**46**	**69**	**14**

Value of productive time gained at minimum wage base

Table 16. Value of time gain at minimum wage (in million of USD/year)

Intervention >	1	2	3	4	5
Caucasus	149	298	298	646	0
Central Asia	594	1188	1188	2379	0
Eastern Europe	200	401	401	2279	0
TOTAL	**943**	**1886**	**1886**	**5303**	**0**

SUMMARY

The following Table 16 summarizes the assessments of economic gains from the different interventions.

Table 17. Summary table on economic gains from reduced morbidity (in million USD/year)

Intervention >	1	2	3	4	5	Subregional total
Caucasus	163	325	401	797	22	1707
Central Asia	647	1294	1571	2937	63	6512
Eastern Europe	212	424	714	2776	153	4278
TOTAL	**1,022**	**2,043**	**2,685**	**6,509**	**239**	**12498**

The economic value ranges from US$ 1 billion for intervention 1, to US$ 2 billion for up to 6.5 billion for intervention 4 per year. Intervention 5 brings fewer benefits, because it does not include convenience time savings as it focuses only on the population already connected to the piped water system network.

CONCLUSION

The current paper relies, as disclosed, on a very restricted number of literature sources, and was forced to look at the data from other regions. Nevertheless, the calculation done clearly shows the importance of the health gains from improved water supply and sanitation in EECCA countries, and that the economic value of this health gain seems to have been underestimated in current assessments.

It is therefore hoped that the current document will form the basis for a closer cooperation between WHO and the EAP Task Force in the refining of the methodology, and the application of appropriate impact assessment studies in the EECCA region, in order to provide the correct evidence basis for the inclusion of realistic assessments of health in any financing assessments in the water supply and sanitation sector in the EECCA region.

ENDNOTES

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