



Environment

Water Community



Solution Exchange for the Water Community Consolidated Reply

Query: Studies and Indicators on Health Impact of Improved Sanitation - Experiences

Compiled by Pankaj Kumar S., Resource Person and Ramya Gopalan, Research Associate

Issue Date: 31 August 2007

From [Benny George](#), Department of Drinking Water Supply, Ministry of Rural Development, Government of India, New Delhi

Posted 19 July 2007

I work as a Consultant (Monitoring and Evaluation) with the Department of Drinking Water Supply, Ministry of Rural Development, Government of India. As you are aware, the Department is implementing a number of programmes for ensuring the supply of safe drinking water and proper sanitation facilities in rural areas of India. According to the latest estimates, sanitation coverage in India has reached 44 per cent. Total Sanitation Campaign (TSC), implemented by the Department, aims to achieve full sanitation coverage by 2012, well ahead of the targets set under MDG 7. The Nirmal Gram Puraskar has given a fillip to achieving open defecation free status and some states like Mizoram, Sikkim and Tripura are on the verge of achieving full sanitation coverage.

We are interested in understanding the health outcomes of eradicating open defecation, on which a couple of micro studies (covering a few Gram Panchayats or maximum one Block) are available in the public domain. In this context, I request the Solution Exchange Water Community to share the following:

- References / similar studies carried out in any part of India (or other countries) which clearly outline the health impacts of eradication of open defecation.
- Suggested indicators (along with sources of data) for measuring such impacts.
- Experiences and observations of members from the field on health impacts of improved sanitation.

Members' inputs will help us in monitoring and designing the impact of the programme better and will be greatly appreciated.

Responses were received, with thanks, from

1. [B. S. Choudri](#), The Energy and Resources Institute (TERI), Goa

2. [Xavier Raj](#), Social and Environmental Research Centre (SERC), Synovate Ltd., Chennai
3. [Anju Dadhwal Singh](#), WHO, New Delhi
4. Archana Patkar, JunctionSocial, Mumbai ([Response 1](#); [Response 2](#))
5. [P. Durgaprasad](#), National Institute of Rural Development (NIRD), Hyderabad
6. [Ajit Seshadri](#), The Vigyan Vijay Foundation, New Delhi
7. [Latha Bhaskar](#), Consultant (Social Development Sector), Kerala
8. [Ranjan Das](#), Department of Community Medicine, Lady Hardinge Medical College & Kalawati Saran Children Hospital, MOHFW GOI, New Delhi
9. [Prakash Nayak](#), Tata-Dhan Academy, Madurai

Further contributions are welcome!

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Summary of Responses

In response to the query seeking studies and indicators on health outcomes of improved sanitation, respondents outlined the approach to be followed and suggested indicators for the same. They also cited diverse studies illuminating the issue.

Discussing the various **diseases** arising out of poor water and sanitation conditions, members agreed that conclusive evidence existed to trace origin of diarrheal diseases, ascariasis, guinea worm, schistosomiasis and trachoma to faecal-oral contamination. In addition, wet soils in poorly drained areas become faecally contaminated due to poor sanitation, and provide favourable conditions for eggs of parasitic worms like roundworm and hookworm, causing debilitating intestinal infections. Moreover, respondents noted that uncollected waste breeds vectors which, when mixed with wastewater and storm water, and spread excreta and pathogens throughout the area. Unclean living conditions and stagnant water also cause diseases such as cholera, typhoid, malaria, filaria, pneumonia, and respiratory infections among infants. Frequent occurrence of these diseases leads to an overall decrease in the immune system of children, and lack of proper nutrition further aggravates their susceptibility to diseases, pointed members.

The group asserted that improved sanitation and safer water led to numerous tangible **health impacts**. Firstly, it resulted in an overall feeling of dignity and well-being, especially among women and girls. Improved and more convenient sanitation facilities free women from tight schedules, which forced them to relieve themselves before daylight or to wait until night, which itself, caused various health problems. Participants stressed that diarrhoea, pneumonia and respiratory infections - the major killers in South Asia - in infants and children, could be averted simply with better hand washing and sanitation practices.

In addition to alleviation of diseases listed above, improved sanitation also had various **indirect impacts** such as reduced drudgery; improved environment free from odour, faeces, etc.; and increased privacy and rest. However, members cautioned that need for higher water availability to maintain toilets posed an additional burden on women, which could be addressed by increasing the availability of water. Respondents underlined that the common belief about major health benefits coming from improved water quality was not completely true. Recent reviews

suggest that health impact of better water quality were in fact smaller than those from increased water quantity, as this allows for better personal and domestic hygiene practices. Further, respondents emphasized that if safe excreta disposal is combined with hand washing with soap, diseases can be reduced by as much as 70 to 80 percent, while clean water alone cuts disease by just 14 to 17 percent.

Coming to **principles** for selection of indicators for measuring the health impacts, discussants stressed that since sanitation practices were related to behavior, they could not be measured purely through quantitative indicators such as coverage. They felt the need to use a combination of indicators for measuring such impacts. Additionally, they emphasized that since contamination could occur by any household, these indicators need to be measured across the entire community and to be disaggregated by gender, age group, etc. Moreover, the indicators must capture sanitation practices both at home and at work, that is in market places, fields, etc.

Respondents listed a number of **suggested indicators** for measuring health impact of improved sanitation. To capture the behavior change aspects of sanitation, they suggested using proxy indicators such as lack of faeces near households and in fields; instances of easier access, cleaner paths reported by village people, especially women; indirect proxies such as crops free of faeces at harvest time, etc. Other indicators members suggested were:

Impact Indicators

- Reduction in incidence of diseases, e.g. - percentage children less than 36 months age with diarrhea in last two weeks
- Quantity of water used per capita per day
- % of child caregivers, food preparers with appropriate hand-washing behavior
- Use of safe methods for disposal of infant excreta
- Knowledge of danger of unsafe excreta disposal and hand washing practice
- Demand for new toilets within village and from neighbouring communities
- % of toilets upgraded with own funds by households after monsoon/filling up of pit

Monitoring indicators

- % households with year-round access to safe drinking water
- % population using sanitary toilets regularly
- % constructed water supply facilities maintained by the communities served
- % households using safe drinking water regularly (public and personal separately)
- Use of toilets by household members (esp. men, aged, disabled, children under 5)
- Range of available affordable options for toilets

Participants suggested that **verification** of above indicators could be done by using structured observation samples and focus group discussions. For primary schools, they felt that school feeding programmes provide a key checkpoint for practice of hand washing with soap, while open-defecation – a more sensitive issue - required a combination of indicators including proxies.

Additionally, the group listed various [studies and references](#) covering water/ sanitation related morbidity such as studies done in Tamil Nadu by UNICEF, which focused on coverage, use, maintenance of toilets and hygienic behavior and their health outcomes. Another experience in [Tamil Nadu](#) indicates how community involvement helped prevent diarrhoeal diseases. Respondents cited the [EH Project of USAID](#), which provides evidence of positive health impact of improved hygiene practices including provision of hardware solutions. [DFID's New Sanitation Policy Paper](#), mentioned by participants, stresses on need for greater focus on sanitation, while a recent [study](#) in Kanyakumari, Tamil Nadu confirms an affirmative impact of the Total Sanitation Campaign on improved health. Members also noted how in [New Delhi](#) remediation of water helped keep the environment clean thus impacting health outcomes. Additionally, respondents

mentioned some epidemiological studies tracing links between improved water and sanitation and various diseases.

The discussion helped members in developing a nuanced understanding of the oft-repeated truth that poor water and sanitation lead to widespread morbidity and mortality. It also showed how impact studies could delve deeper into assessing real benefits of safe water and sanitation. Members agreed that deeper comprehension of the issue would lead to better design of water-sanitation programmes, thereby benefiting the vast majority in India.

Comparative Experiences

Tamil Nadu

Control of Diarrhoeal Diseases (CDD) WATSAN Project (from [Ranjan Das](#), Department of Community Medicine, Lady Hardinge Medical College & Kalawati Saran Children Hospital, MOHFW GOI, New Delhi)

A Community Development project designed by Tamil Nadu Slum Clearance Board and UNICEF and funded by British Airways envisaged management and prevention of diarrhoeal diseases involving women, the community and the Government in Pulianthope slums integrating water, sanitation and health. A baseline survey identified community needs and activities included capacity building, social mobilization etc which elicited unique achievements. Read [more](#).

New Delhi

Use of Recycled Waste Water in Horticulture (from [Ajit Seshadri](#), The Vigyan Vijay Foundation, New Delhi)

The Vigyan Vijay Foundation is working on the implementation of wastewater remediation using bio-remediation and natural methods. This water after due processing is re-used at nearby areas for lower end uses, horticulture etc. The approach provides double benefits; the water usage is optimized getting more value of once used water and the local environment is clean and safe with greens and plants well sustained due to water availability all year around. Read [more](#)

International

Tanzania

NGO's Working with Government, Dodoma Region (from [Ramya Gopalan](#), Research Associate)

The [WAMMA Project](#) replicated in other regions indicates how collaboration can achieve positive health outcomes through improved watsan facilities. Each team consists of a staff member from three departments: Water, Health and Community Development, trained in participatory evaluation, communication and extension techniques. Designed to fit into a decentralized Government framework, the project enabled communication and reduced conflicts in the sector.

Related Resources

Recommended Documentation

Water and Sanitation Indicators Measurement Guide (from [B.S. Choudri](#), The Energy and Resources Institute (TERI), Goa)

Technical Paper; by Patricia Billig, Diane Bendahmane and Anne Swindale; Title II Generic Indicator Guides, Food and Nutrition Technical Assistance (FANTA) Projects; June 1999
Available at <http://www.fantaproject.org/downloads/pdfs/watsan.pdf> (PDF Size: 126 KB)

Provides and inputs to identify indicators on health outcome of improved sanitation process, analysing current trends in watsan improvement and hygiene behavior change

From [Archana Patkar](#), JunctionSocial, Mumbai

The Preventive and Environmental Determinants of Neonatal, Infant and Maternal Mortality

Study; by Archana Patkar; JunctionSocial; Mumbai; December 2003

Available at <http://www.solutionexchange-un.net.in/environment/cr/res19070701.pdf> (PDF Size: 187 KB)

Study looking at sanitation, hygiene and water as preventive determinants of child and infant health

Effects of Improved Water Supply and Sanitation on Ascariasis, Diarrhoea, Dracunculiasis, Hookworm Infection, Schistosomiasis, and Trachoma

Article; by S. A. Esrey, J. B. Potash, L. Roberts, and C. Shiff; Bulletin World Health Organization; PubMed; 1991

Available at [Link](#) (subscription required- paid publication)

Examines impact of improved watsan facilities on selected diseases, illustrating a variety of mechanisms through which improved water and sanitation can protect people

Water, Waste, and Well-Being: A Multicountry Study

Study; by Steven A. Esrey; American Journal of Epidemiology Vol. 143, No. 6; The Johns Hopkins University School of Hygiene and Public Health; 1996

Available at <http://aje.oxfordjournals.org/cgi/content/abstract/143/6/608> (subscription required- paid publication)

Abstract of an analysis from 8 countries to test if incremental health effects on diarrhea and nutritional status result from incremental improvements in watsan conditions

Epidemiologic Evidence for Health Benefits from Improved Water and Sanitation

Study; by Esrey and Habicht; Epidemiologic Review; 1986

Available at <http://epirev.oxfordjournals.org/cgi/reprint/8/1/117.pdf> (subscription required- paid publication)

Examines access to potable water supply issues and adequate methods to dispose of human fecal waste, as steps towards improving health and water and sanitation services

Health Impacts of Improved Household Sanitation

Factsheet; by Beth Scott; Water, Engineering and Development Centre (WEDC); United Kingdom; November 2006

Available at [Link](#)

Outlines benefits of improved household sanitation, highlighting that consistent use of sanitation isolates faeces from surroundings, stopping faecal-oral disease transmission

Shifting Millions from Open Defecation to Hygienic Practices

Case Study; by Rokeya Ahmed; WaterAid Bangladesh and Village Education Resource Centre (VERC); Asian Development Bank; August 2005

Available at [Link](#) (PDF Size: 128.72 KB)

Case study describing the achievement of 100% sanitation in Bangladesh through empowering communities, resulting improving health outcomes

Dialogue on Diarrhoea Online

Newsletter; Issue 54; September – November, 1993

<http://rehydrate.org/dd/dd54.htm>

Details the importance of handwashing and other household hygiene practices as essential in preventing diarrhea and other diseases

DFID Sanitation Policy Background Paper - Water is Life, Sanitation is Dignity (from [Archana Patkar](#), JunctionSocial, Mumbai)

Final Draft; by Peregrine Swann *et al*; DFID Sanitation Reference Group; DFID; Location; 31 August 2007

Available at <http://www.solutionexchange-un.net.in/environment/cr/res19070702.doc> (Doc Size: 350 KB)

A succinct case for giving sanitation and hygiene (with a focus on safe excreta disposal and handwashing) their rightful place, also includes useful sources and examples

Recycled Water Applying Natural Treatment for Horticulture from Waste Water (from [Ajit Seshadri](#), The Vigyan Vijay Foundation, New Delhi)

Paper; by Ajit Seshadri; The Vigyan Vijay Foundation

Available at <http://www.solutionexchange-un.net.in/environment/cr/res19070703.pdf> (PDF Size: 39 KB)

Details the experience of clearing effluents in surroundings and recycling waste water using natural methods and applying this water for horticulture and other low end uses

A Guide to Water and Sanitation Sector Impact Evaluation (from [Latha Bhaskar](#), Consultant (Social Development Sector), Kerala)

Study; Doing Impact Evaluation Series No. 4, Thematic Group on Poverty Analysis, Monitoring and Impact Evaluation; The World Bank; December 2006

Available at [Link](#) (PDF Size: 620 KB)

Defines impact evaluation studies in the water and sanitation sector, emphasising the importance of evaluating WSS policies against their effectiveness in delivering health

Communications Needs Assessment of TSC & Swajaldhara (from [Prakash Nayak](#), Tata-Dhan Academy, Madurai)

Study; by Biren Das *et al*; Orissa State Water & Sanitation Mission; Orissa; 2006

Available at <http://orissagov.nic.in/website/study-&-research.htm>

Details study, which verifies if sanitation/hygiene interventions of Orissa government's sanitation programs causes variations in health outcomes for young children

The CDD WATSAN Project (from [Ranjan Das](#), Department of Community Medicine, Lady Hardinge Medical College & Kalawati Saran Children Hospital, MOHFW GOI, New Delhi)

Project Document; Tamil Nadu Slum Clearance Board

Available at <http://gotn-tnscb.org.in/cdevslum.htm>

Discusses experiences of the project in Tamil Nadu, activities undertaken within and the achievements of improving health and hygiene behaviour through varied watsan services

From [Ramya Gopalan](#), Research Associate

Advancing Environmental Health for Disease Prevention: Past Experiences and Future Priorities

Report; Lessons Learned from EHP 1999–2004; Environmental Health Project; October 2004

Available at http://www.ehproject.org/PDF/Lessons_Learned/LLBookletComplete.pdf (PDF Size: 1.7 MB)

Captures lessons learned focusing on advancing state of the art in urban environmental health to address problems of sanitation in small towns and in overall urban health

Groundwater, Latrines and Health

Study; Ben Cave and Pete Kolsky; Task No: 163; July 1999; London School of Hygiene & Tropical Medicine, UK and WEDC, Loughborough University, UK

Available at <http://www.lboro.ac.uk/well/resources/well-studies/full-reports-pdf/task0163.pdf>
(PDF Size: 150 KB)

Reviews the risks to health posed by groundwater contamination from on-site sanitation (particularly latrines)

Learning Lessons from Sector Studies – Uganda, Tanzania, Nigeria and Kenya

Study by P.A. Deverill; WELL; 2000

Available at <http://www.lboro.ac.uk/well/resources/well-studies/full-reports-pdf/task0325.pdf>
(PDF Size: 480 KB)

Synthesizes lessons learned during country sector studies in water supply, sanitation and environmental health in Uganda, Nigeria, Tanzania and Kenya.

Recommended Organizations and Programmes

Environmental Health, USAID, USA (from [Anju Dadhwal Singh](#), WHO, New Delhi)

1611 North Kent St., Suite 300, Arlington, VA 22209; Tel: +1-703-247-8722;
dcampbell@usaid.gov; <http://www.ehproject.org/>

Aims at developing innovative approaches, including hardware solutions, thus acting as a resource of experiences and evidence on improved hygiene practices impacting health

Social and Environmental Research Centre (SERC), Synovate Ltd., Chennai (from [Xavier Raj](#), Social and Environmental Research Centre (SERC), Synovate Ltd., Chennai)

No. 8, 5th Street, Z Block, Anna Nagar (W), Chennai - 600040; Tel: +91-44-26205531/26205532;
Fax: +91-44-26192393; <http://www.synovate.com/whatwedo/>

Undertaken studies in watsan/hygiene behaviour using log frame indicators (West Bengal), capturing lessons of CEP (Orissa), maintaining toilets/hygiene (Tamil Nadu)

Recommended Portals and Information Bases

From [Ramya Gopalan](#), Research Associate

Environmental Health Publications, USAID, USA

http://www.ehproject.org/ehkm/eh_pubs.html

Provides a number of studies on the health impacts of improved water and sanitation, including community involvement providing a search for EHP/WASH studies by country

WELL Studies, Loughborough University, UK

<http://www.lboro.ac.uk/well/resources/well-studies/well-studies.htm>

Details various guidelines, studies and experiences by which improved water and environmental sanitation services created a positive impact on community health

Related Consolidated Replies

Role of Improved Sanitation in Economic Growth, from Priyam Das, University of California at Los Angeles (UCLA)/WaterAid, California, USA (Examples; Experiences).

Issued 29 June 2007. Available at <http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-09060701.pdf> (PDF Size: 116 KB)

Shares experiences demonstrating economic benefits of investments in sanitation services by creating livelihood opportunities and positive health outcomes

Responses in Full

[B. S. Choudri](#), The Energy and Resources Institute (TERI), Goa

Thanks for your query. Please refer to the document link below.

<http://www.fantaproject.org/downloads/pdfs/watsan.pdf> (Size: 126 KB)

I am sure it would provide you valuable steps and inputs for the said purpose. I believe this is one of the most useful guides in order to identify indicators on health outcome of improved sanitation process.

I hope you will find this interesting and useful.

[Xavier Raj](#), Social and Environmental Research Centre (SERC), Synovate Ltd., Chennai

UNICEF has conducted a number of studies on water, sanitation and hygienic behaviors. Social and Environmental Research Centre (SERC) of Synovate Ltd. (earlier known as Blackstone Market Facts), carried out a number of studies in this area. First one covered 15 districts in six states of India. We use log frame indicators to establish the baseline for the programme and assess the impact in three districts (two in Orissa and one in West Bengal).

Second study we carried out in Orissa for UNICEF captured lessons learned from Child's Environment Project (CEP), Orissa. Third study, which is being concluded in Tamil Nadu is on Coverage, use and maintenance of toilets and hygienic behaviour in Tamil Nadu (UNICEF, Chennai). All these studies were carried in association with district and state administration involvement.

Some of the aspects reflecting health outcomes, such as incidence of diarrhoea among children, personal hygienic practices, understanding of link between hygienic behaviour and reduction in diseases were explored in these studies.

One aspect that we would like to highlight here is ensuring use of toilets by everyone in the household is critical for achieving success in TSC. Inculcating hygienic behaviours and civic sense are essential to sustain use of toilets and improving cleanliness of the surroundings.

[Anju Dadhwal Singh](#), WHO, New Delhi

This link below is an excellent resource for experiences and evidence on health impact as a result of improved hygiene practices including hardware solutions

<http://www.ehproject.org/>

[Archana Patkar](#), JunctionSocial, Mumbai (response 1)

This is a cross-sectoral area of immense professional interest to our company (JunctionSocial) as we work on the design and M&E of large donor programmes in water and sanitation, but also in health, education, gender, etc.

A small suggestion: *when looking at the impact of safe excreta disposal (eradication of open defecation) on health - it is critical to do this in tandem with improvements in handwashing with soap as the combination can cut disease transmission by 70 to 80 per cent! Water quality improvements on their own cut disease by 14 to 17% (on their own - without any sanitation improvements).*

As regards handwashing there is a wealth of material on the health benefits and some references follow at the end of this message.

As regards your specific queries please find below a few useful studies that we often use in our work.

1. References / similar studies carried out in any part of India (or other countries) which clearly outline the health impacts of eradication of open defecation.

There is no dearth of material on the health benefits of improved sanitation (safe excreta disposal, plus hand washing) and a web search with key words will yield a multitude of these. Some are included in my mail for quick reference ... See in the link below a specific study and paper done to influence the design of the GOI's reproductive and Child health programme (Phase II) in 2003 to include sanitation, hygiene and water with separate budgets, etc in recognition of their key role as preventive determinants of child and infant health.

<http://www.solutionexchange-un.net.in/environment/cr/res19070701.pdf> (Size: 187 KB)

- The Lancet - Infectious diseases - especially the issue on Child Survival
- WELL FACT Sheet: Health Impacts of Improved Household Sanitation, Author: Beth Scott, November 2006; Quality Assurance: Sandy Cairncross and Andrew Cotton
- Shifting Millions from Open defecation to Hygienic Practices, Rokeya Ahmed, WaterAid Bangladesh, August 2005
- Some key authors with useful material on this issue include: Feachem, Esrey, S. Cairncross, VERC, WaterAid.... alternatively - specific searches around cholera, dysentery, diarrhoeal disease, trachoma, worm infestations, ascariasis, schistosomiasus, hookworm infection also throw up good material.

2. Suggested indicators (along with sources of data) for measuring such impacts.

- Since eradication of open defecation is a behavior change it must be measured by a combination of indicators. We follow a few important principles in measuring this achievement i) it cannot be measured in terms of coverage (number of latrines in the community) alone ii) it must be measured across the community and households with disaggregation by gender, age group (include disposal of infant and child faeces - both are important sources of faecal-oral contamination) and also location - what do people do at work at play - away from their homes - in markets, schools, fields, etc. Once you have these basic principles, indicators may include
 - a. proxies such as - lack of faeces in yard, front of household, in fields - villagers, especially women report easier access, cleaner paths, also further indirect proxies such as crops free of faeces at harvest time (reported by VERC communities in Rajshahi Bangladesh following *declaration of Open defecation free* villages) - Means of verification: observation plus FGDs

- b. household members use of toilet facilities - especially men, the aged, special groups (disabled, etc.) children under 5, children in primary and secondary schools (*using structured observation samples, plus focus group discussions plus knowledge and awareness traditional methods*) For primary schools - school feeding programmes are key checkpoint for hand washing with soap practise. For open-defecation - more sensitivity is required hence a combination including proxies.
- c. range of affordable options suiting different budgets in community installed and in use;
- d. demand for new toilets, upgradation of existing toilets with own funds by households following monsoon/filling up of pit, etc. - demonstrating community commitment to sanitary disposal of excreta. Also demand from neighbouring communities for eradication of open defecation (not necessarily for physical coverage only)
- e. various methods for safe disposal of infant excreta in use - including plastic potties or small plastic utensil; knowledge of danger of such excreta and hand washing practise in tandem.

3. Experiences and observations of members from the field on health impacts of improved sanitation.

- The most important impact may be first and foremost an overall feeling of dignity and well-being (particularly in dense or urban areas). I quote the WHO definition of health: Although this is not what most practitioners are necessarily looking to measure in terms of *health* impacts- it is certainly what women and girls report as extremely important. Thus the health impacts need to be considered holistically i.e. reduction in diarrhoea, dysentery, worm related diseases, cholera, respiratory infections etc.(as the case may be) together with the indirect benefits from reduced drudgery, improved environment (free of odour, faeces, etc.), increased privacy and rest, etc.
- Diarrhoea seems to be the most popular for advocacy purposes ... however the list of diseases prevented by improved sanitation is long. the most important is that we may be ignoring systematically to our own peril is pneumonia and respiratory infections in infants and children - up there with diarrhoea as major killers in S. Asia and averted simply with better hand washing and sanitation practices.
- A critical benefit which needs to be systematically measured is the health impact on women from improved and more convenient sanitation facilities, that frees them from tight schedules wherein they have to relieve themselves before daylight and after dark - the cause of many problems.
- My own observation though, is that health impacts are measured from a certain (limited) lens i.e. diarrhoeal disease for example which may have reduced overall in the community - but which may be negated somewhat by an additional burden on women who now have to fetch additional water in the dry season and clean toilets.
- The how-to is also critical - it is interesting that the implementation of TSC for example rarely focuses on *adequacy of water for hand washing and sanitation* (which need not be of potable quality) and that health promoters ignore the of-reputed dictum that *it is quantity of water rather than the quality that has greater proven and direct health benefits. If these practices are not followed across communities - drinking water quality will be affected - but most importantly health benefits will not be forthcoming.*

Some useful online sources:

- Dialogue on Diarrhoea Online Issue 54 - September-November 1993
- Epidemiological studies by Esrey et al

1. [Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm ...](#)

SA Esrey, JB Potash, L Roberts, C Shiff - Bull World Health Organ, 1991
<http://www.ncbi.nlm.nih.gov/>

A total of 144 studies were analysed to examine the impact of improved water supply and sanitation facilities on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. These diseases were...

2. [Water, waste, and well-being: a multicountry study –](#)

SA Esrey - American Journal of Epidemiology, 1996

<http://aje.oxfordjournals.org/>

Data collected in the late 1980s from eight countries in Sub-Saharan Africa (Burundi, Ghana, Togo, and Uganda), Asia/North Africa (Sri Lanka and Morocco), and the Americas (Bolivia and Guatemala) were combined and analyzed to test...

3. [Epidemiologic evidence for health benefits from improved water and sanitation in developing ...](#)

SA Esrey, JP Habicht - Epidemiologic Reviews, 1986 - Soc Epidemiolc Res

<http://epirev.oxfordjournals.org>

Much of the world's population remains without access to potable water supplies and adequate methods to dispose of human fecal waste (table 1). The cost of providing these services is considerable and depends on the type of...

Hope this is useful

[Archana Patkar](#), JunctionSocial, Mumbai (*response 2*)

In response to your query below, following is the link to DFID's new Sanitation policy paper - just in case you have not seen it already.

DFID Sanitation Policy Background Paper - Water is Life, Sanitation is Dignity

Final Draft, 1 August 2007

<http://www.solutionexchange-un.net.in/environment/cr/res19070702.doc> (Size: 350 KB)

This Sanitation Policy paper is a succinct and powerful case for giving sanitation and hygiene (with a focus on safe excreta disposal and handwashing) their rightful place in the sun. Since it also includes some excellent sources and examples, I have already found it to be a useful resource in my work.

[P. Durgaprasad](#), National Institute of Rural Development (NIRD), Hyderabad

The impact of Total Sanitation Campaign on improved health is positive and visible, as revealed by a recent study of National Institute for Rural Development in Mepluram Block of Kanyakumari district, Tamil Nadu. The rapid appraisal report on the same is available with Shri Ravi Sinha, Director, Total Sanitation Campaign, Department of Drinking Water and Sanitation, Ministry of Rural Development, Government of India. The Secretary, DDWS, too, has a copy. For further

details, you may interact with me and Dr Sivaram, my colleague at polankis@gmail.com and siva@nird.gov.in.

Ajit Seshadri, The Vigyan Vijay Foundation, New Delhi

We have been observing good exchanges on the experiences and reports on safe sanitation and its impacts on wellness in health and environment.

In the extension of safe sanitation and clearance of effluents, this aspect is to be looked into that the village surroundings and low-level ponds are not polluted with sewage effluents etc. To achieve this, we have been working in implementation of wastewater remediation using bio-remediation and natural methods and this water after process is taken up for re-use at nearby areas for lower end uses, horticulture etc. This approach has double benefits that the water usage is optimized, getting more value of once used water. The local environment is clean and safe with greens and plants well sustained due to water available all the year around.

In this connection, we are including an article detailing the above features at a peri- urban drain channel. See link below

<http://www.solutionexchange-un.net.in/environment/cr/res19070703.pdf> (Size: 39 KB)

The situation is very similar in most villages with copious piped water supply available, led downstream into cesspools

Latha Bhaskar, Consultant (Social Development Sector), Kerala

Kindly refer to the link of a World Bank document published on 2006 December, which may be of help to you, as it clearly defines the impact evaluation studies in the water and sanitation sector.

A Guide to Water and Sanitation Sector Impact Evaluation

Doing Impact Evaluation Series No. 4, Thematic Group on Poverty Analysis, Monitoring and Impact Evaluation, The World Bank, December 2006

http://siteresources.worldbank.org/INTISPMA/Resources/383704-1146752240884/Doing_ie_series_04.pdf (Size: 620 KB)

Ranjan Das, Department of Community Medicine, Lady Hardinge Medical College & Kalawati Saran Children Hospital, MOHFW GOI, New Delhi

1. I had been closely associated, about a decade ago, with a large project of similar type in UP. The Control of Diarrhoeal Diseases Project by Water & Sanitation (CDD-WATSAN) was implemented in whole of UP by Govt. of UP (Health, Rural Dev etc.) with support of UNICEF.

I was also involved in the impact assessment in 3 districts

2. Indicators for impact assessment:

- % of households with access to sanitary latrines: public and personal separately
- % of population using sanitary toilets regularly
- % of households with access to safe drinking water: public and personal separately
- % of population using safe drinking water regularly

- 2 week incidence of any type of diarrhoeal disease in the community: (mainly among children), measured as before and after project implementation taking care that both should be of same season

3. Impact though significant, is not impressive as, diarrhoeal diseases are closely related to 1. Level of education, 2. Personal hygienic practices, 3. Nutritional status etc.

Yet, the activity you are involved in is of utmost significance.

Please feel free to contact me any time you feel like.

Prakash Nayak, Tata-Dhan Academy, Madurai

There was a comprehensive study on "Communications Needs Assessment of TSC & Swajaldhara" conducted by Orissa State Water & Sanitation Mission in 2006. The study was carried out by Mr. Biren Das and his team for the select districts of Orissa. The findings were with the State Mission and UNICEF, Bhubaneswar. The same can be had from them directly.

Many thanks to all who contributed to this query!

If you have further information to share on this topic, please send it to Solution Exchange for the Water Community in India at se-wes@solutionexchange-un.net.in with the subject heading "Re: [se-watr] Query: Studies and Indicators on Health Impact of Improved Sanitation - Experiences. Additional Reply."

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