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Zoonoses and Food Hygiene News, published four times a year, provides a medium for disseminating technical information on matters related to zoonoses and food hygiene generated in the world, particularly in Nepal. The editors welcome submissions on these topics with appropriate illustrations and references. The views and opinions expressed in the News are those of the authors.

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Bacteriological and Helminthological Contamination in Drinking Water Sources of Lalitpur Sub-Metropolitan City

Jyotsna Acharya, D. D. Joshi, A. Aryal, K. Shahi

Introduction

Safe drinking water is defined as water with microbial, chemical and physical characteristics that meet WHO guidelines or national standards on drinking water quality (WHO, 2007). Water being so important to all life, including man, the pollution of water is a threat to the survival and existence of life itself.

Hence only 34% of the population is thought to have access to safe drinking water (Nepal Net, 2001). Use of ground water for drinking purpose is extensive in the Kathmandu Valley. About 46 percent of water supply in Kathmandu and Lalitpur is from underground source. Shallow ground waters are also at risk from contamination. Pathogenic bacteria, pesticides, nitrate and industrial effluents (urban and peri-urban areas) are likely to be the greatest problems encountered. Jacobson, (1996) reported shallow ground waters in the Kathmandu Valley in particular have been highly contaminated with industrial and domestic pollutants in recent years.

The traditional water supply system from stone spouts and dug wells are the significant alternatives for people of Lalitpur Sub-Metropolitan city. The dug wells are a key water resource largely over looked until now (Joshi, 1993).

Lalitpur sub-metropolitan city has a long history of planned and well-designed water supply system as part of massive urban infrastructure of those times fulfilling the water need of its people dating back to Lichhavi period. And more remarkable is the fact that many of these systems are still functioning and contribute significantly to the day to day water demand of city.

Objective

General Objective

- To examine the microbiological quality of drinking water supplied in Lalitpur sub-metropolitan city.

Methods

The study was conducted in ward number 5, 12, 21 and 22 of Lalitpur Sub-Metropolitan City with the objective of determining microbiological contamination of water sources. The study was conducted in winter and rainy season during 2008. Samples were collected from various water sources (wells, stone spouts, NWSC tap, and stored water). Water samples were tested for bacteriological contamination by using H₂S method, Coliplate and Coli-strip techniques were used to determine the density of coliform and E.coli. Microscopic examination was also done using centrifugation and floatation method to observe the presence of protozoan and helminthes parasites. In the study total 160 samples of drinking water was collected from the different sources in the two seasons.

The study was conducted in Lalitpur Sub-Metropolitan City. Four different wards No 5, 13, 21, and 22 of Lalitpur sub-metropolitan city, where various sources like spouts, dug wells, hand pumps, and tube wells are used for water, were selected randomly for the study. Water samples were collected from both storage tanks of restaurants, hotels, and slaughter houses and directly from community wells, stone spouts and taps, personal tube wells. Samples were collected in two season's winter and rainy. Total 160 samples in each season were collected and analyzed as described below.

Out of total samples collected, well water contributed 54 (34%) and NWSC tap water contributed 42 (26%), stored water contributed 48 (30%) and stone spout contributed 16 (10%). Source wise distribution of samples showed that well water contributed the highest number of samples.

◇ **Data Recording and Interpretation**

H₂S test: The collected samples kept in the incubator were daily inspected for up to 5 days. The blackening of the indicator paper inside the test tube gave a positive result. A positive mark was then placed on the record sheet on the day the black color first appears. If no black color appears a negative mark was then placed on the record sheet.

Coliplate and colistrip: For interpretation of the results of the coliplate and colistrip tests, the number of wells showing blue color was first recorded in the recording sheets as the positive samples for coliform. Then the same samples present in the wells were observed under fluorescence under UV light. Number of wells showing peculiar shinning was recorded in the sheet for *E. coli*. Then with the help of MPN table, most probable number of the coliform and *E. coli* densities in the tested samples were calculated.

Microscopic examination: Microscopic examination of water samples were tested for helminths parasites. The results were interpreted by observing water samples under electrical microscope. First at 10X and at 40X to view clearly and finally observed under 100X to identify any helminthic parasites if present. The observed parasites were identified with the help of books having illustration and my supervisors.

Result

The results revealed that higher water samples were found contaminated in rainy season. Out of total samples 57.5% water samples were found contaminated. Among the four sources stored water showed comparatively higher contamination (73%) and is followed by well water (59.3%), NWSC tap (47.6%) and stone tap (31.3%) respectively. Coliform and *E. coli* densities ranges from <3->938 and <3-469. Location wise test results underlined the difference among the locations. Out of 28 locations Mikhabahal, Gabahal of ward number 21, Sankhamul of ward number 22 and Mathillo Kusunti of ward number 13 had 100% contamination in the tested water samples. On the other hand, water samples collected from Phimbahal of ward number 21 and Chobunani of ward number 22 were found less contaminated (20%). Microscopic test results showed the presence of eggs of *Ascaris* spp, *Ancylostoma* spp, *Trichuris* spp, *Taenia solium* and some unidentified nematodes. All the parasites were observed in rainy seasons.

Table 1. Bacteriological pollution level detected in different water sources of Lalitpur Sub-Metropolitan City ward no 5, 13, 21, and 22.

Sources	Total samples	Positive H ₂ S result (%)	Coliplate /Colistrip results	
			Coliform MPN range	<i>E.coli</i> MPN range
well	54	59.3	<3 – 307	<3 – 469
NWSC tap	42	47.6	<3 – 94	<3 – 72
stored	48	72.9	<3 - >938	<3 – 255
Stone tap	16	31.3	30 – 106	16 – 94
	160	57.5		

Table 2. Coliform and *E. coli* MPN range in different water sources of ward number 5, 13, 21, and 22.

Ward No.	Total Samples	Positive samples	%	Coliplate /Colistrip results	
				Coliform MPN range	<i>E. coli</i> MPN range
5	40	24	60	<3 – 307	<3 – 255
13	40	21	52.5	<3 – 307	<3 – 119
21	40	26	65	<3 - >938	<3 – 469
22	40	21	52.5	<3 – 280	<3 – 119
	160	92	57.5		

Table 3. Different parasitic eggs/worms detected in water samples of different sources.

S. N.	Sources	Total tested samples	Positive samples	Parasites
1	Well	54	7	Eggs of <i>Ascaris</i> spp, <i>Trichuris</i> spp, <i>Taenia solium</i> and Unidentified nematodes
2	NWSC tap	42	2	Unidentified nematodes
3	Stored water	48	3	Unidentified nematodes
4	Stone Spouts	16	2	Eggs of <i>Ancylostoma</i> spp

Recommendations

The study revealed a picture of the drinking water quality situation of Lalitpur Sub-Metropolitan City. Bacteriological pollution in all kinds of drinking water sources could be one of the major factors of the outbreak of water borne epidemics. So, preventive measures are urgently needed to control the occurrence of such un-pleasurable incidence. There could be several long term programs like rehabilitation of treatment plants, restoring the pipe network, find out alternative water sources and provide piped water in all the communities.

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Workshop on Wards 19 and 20 of KMC Stakeholders Work Progress Surveillance

4 August, 2008

Workshop on Wards 19 and 20 of KMC Stakeholders Work Progress Surveillance was organized by NZFHRC and supported by IDRC Ottawa, Canada. The full report of this activity is written in full form and published separately. The summary of the report is as follows:

A questionnaire survey was done to assess the perceptions and knowledge of stakeholder groups' leadership on the contribution of their groups to improving the health and environment of their communities, and community development. Semi-structured interviews were carried out with three members (randomly selected) from each executive committee (56 in total out of 126) during the month of June and July 2008. The interview guide was developed to assess:

- the level of understanding of executive committee members of local groups on health and environment interactions (including the effects on health and environment of their work activities and peoples' behaviour before and after the project)
- their perceptions on the roles and responsibilities of their own group and that of local government authorities and other community actors on improving the health and environment of their communities
- their perceptions on the contributions of their local organizations to community health and in improving their urban environments
- their perceptions on the personal benefits they received by becoming members of the stakeholder group (i.e. how being a member improved or not their work, their health and/ or livelihood and why)
- the level of satisfaction with their collaborations with NZFHRC
- their perception as to the fruitfulness of the project

The guide was pre-tested prior to implementation and interviews were administered by the project team. The sociologist organized training to train and supervise interviewers and interviews were carried out in the local language with the assistance of a translator (Newari-Nepali) when necessary.

The data analysis was carried out with the help of Epi Info System and report was prepared. One day workshop was organized on 4th

August 2008. There were altogether 52 participants including NZFHRC secretariat. The workshop was inaugurated by the Chief Administered Mr. Dinesh Kumar Thapaliya, Kathmandu Metropolitan City (KMC). In his inaugural address he emphasized the enforcement of laws and bylaws by the concerned people in the community. He has appreciated the work carried out by NZFHRC with regard to implementation of these 6 acts not only in Kathmandu Valley but also in other part of Nepal. Followed to him Dr. D. D. Joshi explained the objective of this workshop and presented some part of survey output to the participants. Ms. Minu Sharma, Dr. Arjun Aryal, Ms. Kabita Shahi and Ms. Meena Dahal presented several sectors of the report to the participants. There was a lovely discussion by each participant with regards to NZFHRC activities and perception from the different stakeholders.

Hygienic Meat Production, Meat Marketing Management and Meat Borne Diseases Orientation

July 25, 2008

Hygienic Meat Production, Meat Marketing Management and Meat Borne Diseases Orientation was organized by NZFHRC and supported by IDRC Ottawa, Canada. The full report of this activity is written in full form and published separately. The summary of the report is as follows:

Based on our projects' objective to build the organizational capacity and sustainability of local stakeholders' organizations that were established in earlier project phase, one day training was given to the meat-shops and slaughterhouse workers to aware various types of meat borne diseases and hygienic method of meat production. They were also given some knowledge about the prevailing act related to the meat production in Nepal.

Workshop was held on 25 July 2008. Totals of 25 participants were present. Among them 15 were from the mini slaughterhouse and 10 were from the meat shops situated in different places of ward number 19 and 20 of Kathmandu valley. Participants are supposed to know about the hygienic maintenance of their shops, hygienic method of meat production, precautions to be taken while transporting the meat and meat products.

Objectives

1. To acquaint them about hygienic methods of meat production.
2. To aware the meat sellers and slaughterhouse workers about various meat borne zoonotic diseases.
3. To give basic knowledge for increasing the keeping quality of meat and meat product and to decrease the microbial load.
4. To give knowledge on the prevailing legislation related to meat production in Nepal.

After having familiar with the objectives of the workshop, Ms. Minu Sharma, Program Officer, NZFHRC requested all the presentee to give their short introduction pertaining to name, type of shop and their address.

After the introductory program, all the presentee was concentrated on the subject matter. Ms. Minu Sharma, Program Officer, NZFHRC and Dr. Arjun Aryal, Veterinary Officer, NZFHRC presented papers during that workshop.

Meat Quality Food Safety, Safe Drinking Water Supply, Housing and Sewerage Plan Training Workshop

Dated October 13-17, 2007

Meat Quality Food Safety, Safe Drinking Water Supply, Housing and Sewerage Plan Training Workshop was organized by NZFHRC and supported by IDRC Ottawa, Canada

The full report of this activity is written in full form and published separately. The summary of the report is as follows:

The main theme of this workshop was to have good quality of hygienic meat, food safety, safe drinking water supply and sewerage plan in the country in general and Kathmandu metropolitan city in particular. There were several presentations of the papers in each topic mentioned above.

Certainly, there were a lot of Acts and Regulations related to these topics but how many of them are being implemented? How many of them are not implemented? and what is the cause behind it? What are the main lacunae to be considered? Should we able to change the Act? Or made as it is? Or need necessary amendment for its successful implementation? Are there any other issues raised during the workshop upon different Acts? There were thorough discussion in each presentation on the following different acts and made further suggestions and amendment to the send concerned authority for action:

- ❖ Nepal Animal Slaughtering and Meat Inspection Act
- ❖ Nepal Food Act
- ❖ Nepal Drinking Water and Sewerage Act
- ❖ Nepal Housing and Planning Act
- ❖ Nepal Garbage and Waste Disposal Act
- ❖ Nepal Environment Act

Altogether 16 technical papers were presented by the resource person/consultants/and experts related to the above mention acts. At the end there were five working discussion groups who discussed very thoroughly on the different issue of the acts and finally made recommendation and amendments. Then these were sent to the all concerned stakeholders for their further comments on these. After receiving the comments then they were sent to the concerned ministries of Nepal Government for urgent action.

On the fifth day of the workshop the recommendation made by all five groups have been discussed thoroughly and decided to send to all the concerned stakeholders for their comments and recommendation. After receiving the comments from all the stakeholders, it was decided to send to the concerned ministries of Government of Nepal through Kathmandu Metropolitan City (KMC) for the amendment and correction of six different acts, which have been discussed during workshop.

NEWS:

World Animal Day (WAD) October 4, 2008 Celebrated in Nepal

In Nepal, WAD was organized jointly by National Zoonoses and Food Hygiene Research Centre (NZFHRC), Animal Production Division, Veterinary Public Health unit of Department of Livestock Services (VPH/DLS), Kathmandu Animal Treatment Centre (KAT), Kathmandu Metropolitan City (KMC), Mount Glory English Boarding High School and Divya Gyan English Boarding High School Chagal, Kathmandu, Nepal. An animal picture drawing competition was the main theme of the WAD and main aim was to love animal and protect their rights. It was one month time competition. The output of these two schools are given below separately with picture events. There are three schools from Lalitpur district who participated in talk competition programme in DLS Office. First, second and third prize and four other small gift award were given by Director General Dr. Pursottam Mainali, DLS. There

was talk programme and Dr. Joshi gave the speech on the importance and role of animal in human life. At **Mount Glory English Boarding High School, Chagal, Kathmandu, Nepal**, total 90 students participated in animal picture drawing competition. Out of 90 animal pictures drawn by students, top 13 were selected. Out of top 10 and first, second and third were selected. The award was given to the student jointly by principal Mr. Gopal Acharya and Dr. D. D. Joshi. At **Divya Gyan English Boarding High School, Chagal, Kathmandu, Nepal**, total 117 students participated in animal picture drawing competition. Out of 117 animal pictures drawn by students, we selected top 13. Out of them, top 10 and first, second and third were selected. The award was given to the student jointly by principal Mrs. Sujan Kunwar and Dr. D. D. Joshi. In this WAD, free dog rabies vaccination was carried out by NZFHRC. Altogether 26 dogs were vaccinated at NZFHRC office.

"Joint International Tropical Medicine Meeting (JITMM) 2008"

Dr. Durga Datt Joshi, Executive Chairman, NZFHRC participated in the Joint International Tropical Medicine Meeting (JITMM) 2008 **"Tropical Medicine in the-omics Era"** 13-14 October 2008 Imperial Queen's Park Hotel, Bangkok, Thailand. Two following technical papers were presented at JITMM an oral and poster presentation.

- a) "Epilepsy and Neurocysticercosis in Nepal: a hospital-based questionnaire study"
- b) "Japanese Encephalitis (JE) Outbreaks Recorded in Nepal during the Year 2005 and 2006"

"Training Workshop on Tools in Analysing EcoHealth Issues" Chengdu, China.

Dr. Durga Datt Joshi, Executive Chairman, NZFHRC, Ms. Minu Sharma, Programme Officer of NZFHRC and Ms. Meena Dahal, Computer Analyst of NZFHRC participated in the **"Training Workshop on Tools in Analysing EcoHealth Issues"** October 11-15, November 2008, Chengdu, China. Five following technical papers were presented at Chengdu an oral presentation.

- a) Concept of Urban Ecosystem Health Project (UESHP) Approach to Echinococcosis in Health Transition in Nepal with Reference to Ecosystem Health
- a) Entry Point of Urban Ecosystem Health Project (UEHP) Approach with Regard to the Adaptive Methodology for Ecosystem Sustainability and Health (AMESH)
- a) Participatory Action Research (PAR) in Urban Ecosystem Health Project (UEHP)
- a) Identification/Selection Classification and Analysis of Stakeholders Who are Stakeholder under Urban Ecosystem Health Project in Kathmandu Case Study? Stakeholders

Hierarchy in the Government, Biophysical System and Political Decision Making System

- a) Presentation of Ecosystem Health Issues/Influence Diagram on Water Quality and Management, Waste/Garbage Management, Food, Urban Ecosystem Health Concern Needs/Issues

International Eco-Health Forum on Healthy Environments, Healthy People Merida, Yucatan, Mexico

Dr. Durga Datt Joshi, Executive Chairman, NZFHRC and Ms. Minu Sharma, Programme Officer of NZFHRC participated in the International Eco-Health Forum on Healthy Environments, Healthy People, held in Merida, Yucatan, Mexico from December 1-5, 2008. Two following technical papers were presented at IEF an oral presentation.

- a) Impact of Urban Ecosystem Health Project (UESHP) in Kathmandu Nepal
- b) Multi-Stakeholder Participation in Urban Ecosystem Health Research in Kathmandu, Nepal

Establishment of Sentinel Pig Farm

Pig sentinel farm was established in Morang and Sunsari district of eastern Nepal on 3rd April, 2008. Total of 18 one-month piglets were purchased from local pig breeders and randomly distributed to the pig farmers. These pigs are allowed to roam freely at the rural farmer's house. Blood samples were collected on monthly basis. These samples were checked for cysticercosis by sandwich based Ag-ELISA. Till the ninth time checking, pig with tag numbers 0556, 0560, 0580, 0583, 0589 and 0591 were positive for Cysticercosis. The pattern of positive is discontinuous except for 0556 and 0580 pigs.

Trichinosis test

Till now, total of 305 serum samples from Haat-bazaar of Itahari and Mrigauliya were checked for Trichinella antibody by Ab-ELISA. Out of them 56 samples were positive by this method. But, non of the sample was found positive for Trichinella larva by pepsin meat digestion.

K.D.M.A. Research Award:

Please kindly submit your research work paper on allergy for trust award consideration by the end of May 2009 to KDMART office Chagal, G.P.O. Box 1885, Kathmandu, Nepal, Phone: 4270667 and Fax 4272694. This award was established by Dr. D.D. Joshi in 2049 B.S. on the memory of his wife, the late Mrs. Kaushilya Devi Joshi. The award includes a grant of NCRs. 10,001 with certificate.

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