

# **Detection, Management And Surveillance of Arsenicosis in Nepal**

Proceeding Report of Consultative Workshop  
Lalitpur, Nepal, 26-27 July, 2009



World Health Organization



Nepal Health Research Council



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*The views expressed in documents by named authors are solely the responsibility of those authors.*

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# INTRODUCTION

Globally, Arsenicosis, also referred to as Arsenism, is an important non-communicable diseases resulting from the ingestion of groundwater containing unsafe level of arsenic. As it became clear that contamination of groundwater with arsenic is the cause of mass poisoning in Bangladesh and West Bengal, the Department of Water Supply and Sewerage (DWSS) in cooperation from World Health Organization (WHO) conducted systematic study on possible arsenic contamination in groundwater of Jhapa, Morang and Sunsari districts of Eastern Terai region of Nepal bordering West Bengal in 1999. Out of 268 tube well water samples tested, 9.0% of the samples exceeded 10 ppb, the WHO limit, and 0.7% exceeded 50 ppb (the National Standard of neighboring countries India and Bangladesh) indicating the possibility of arsenic contamination in groundwater in the Terai region of Nepal. Since 1999, various studies were undertaken in the Terai districts of Nepal. These studies provided sufficient evidence of arsenic contamination where nearly half (48.4%) of the total population of the country live with 90% of the inhabitants using groundwater as the major source of drinking water.

These initial findings sensitized nongovernment agencies working in water and sanitation as well as the government to the possibility of an arsenic related problem. In early 2000, the National Arsenic Steering Committee (NASC), which includes major stakeholders from government and non-government sectors, was created as a first step by the government to address the arsenic issue in the country. The “National Interim Policy on Arsenic” was the first document drafted by NASC to guide stakeholders to work on this issue. All agencies involved in the water and sanitation sector then prioritized arsenic testing in their programme areas. A blanket testing initiative to test all the wells in the Terai was initiated under the auspices of the NASC starting in 2004 with the aim to provide a reliable insight of the arsenic contamination in drinking water and its effects on public health. The blanket testing also aimed to provide reliable and complete information needed for the formulation of a mitigation strategy as well as the implementation of such a strategy at various levels. As of June 2008, the blanket testing of 11,39,891 tube well have completed which shows that about 1.77% (20,243) have exceeded the National Standards of Nepal for drinking (50 ppb) and 5.62% (64,168) have exceeded the WHO Guideline value. Since, 2008 NASC has been unified into National Drinking Water Quality Standard (NDWQS) committee.

WHO Country Office Nepal is supporting NHRC for capacity building to respond the arsenic issue with the aim of human resource development and conducting research

to provide evidence. NHRC conducted the first study on Detection, Management and Surveillance of Arsenicosis in the Selected Local Communities of two Terai districts Bara and Rautahat of Nepal in 2005. The study revealed that Health Worker's Knowledge and Skills about Arsenic and Arsenicosis was almost nil, and they were not familiar with Preventive Measures, Primary Treatment and Referral Mechanism. The study concluded that Detection, Management and Surveillance of Arsenicosis cases was not possible without massive trainings to health staffs.

WHO SEARO published Field Guide, Facilitator Guide and Participant Handbook on Detection, Management, and Surveillance of Arsenicosis Cases in South East Asia Region in 2005 for maintaining the uniformity in case detection, management and reporting as well as for training purpose. NHRC translated these WHO Publications in Nepali for the training purposes on detection, management and surveillance of Arsenicosis Cases in Nepal and pre-tested the developed modules in Nepali organizing Training of Trainers on Arsenicosis case Detection, Management and Surveillance in Lalitpur in 2006. During the year 2007 -2008, NHRC conducted four district level trainings in Bharatpur, Birtanagar, Dhangadhi and Hetauda covering eleven districts of terai regions Morang, Sunsari, Saptahari, Siraha, Rautahat, Bara, Parsa, Nawalparasi, Rupendehi, Kailali and Kanchanpur. Total 72 person were trained which consists of Paramedics (Health Assistant, Senior Auxiliary Health Worker, Nurses), Public Health Officers, Medical Officers, Dermatologists, Senior Divisional Engineers of respective district and social worker of Nepal Red Cross Society. The recommendation from the training workshop was that there should be referral system and even Dermatologists are not enough aware about the cases of Arsenicosis. The prevalence survey conducted by Nepal Health Research Council in Nawalparasi, Kailali and Bardiya district demonstrated that the prevalence is 2-3 percent. Based on these lessons, NHRC with support of WHO Country Office Nepal organized the Consultative Workshop on Detection, Management and surveillance of Arsenicosis Cases in Nepal at the Hotel Himalaya, Lalitpur from 26-27 July, 2009. There were 42 participants representing various stakeholders segments including representatives from Department of Water Supply and Sewerage, Ministry of Health and Population, Department of Health Services, National Public Health Laboratory, Research Institutes, Academic Institutes including Hospitals and Medical Colleges. A list of Participant is enclosed in the Annex.



# 2

## OBJECTIVES OF THE WORKSHOP

The objectives of the workshop were to:

- Engage the dermatological professionals of Nepal in Detection and Management of Arsenicosis and
- Recommend a referral system and sentinel sites for reporting of Arsenicosis Cases in Nepal

## INAUGURAL SESSION

The workshop started with the welcome address by Dr. Kedar Prasad Baral, Board Member of NHRC who acknowledged that Arsenicosis in Nepal has come up as a public health issue since the major source of drinking water is groundwater extracted from tubewell. He highlighted that a lot needs to be done to tackle the problem of Arsenicosis including regular screening and monitoring of tube wells, to strengthen the existing laboratories for analysis of biological samples( hair, nail and urine) for laboratory confirmation of Arsenicosis cases. He stressed on the fact that Arsenicosis needed multisectoral approach for its management. He also stated that there is a need for conducting a systematic and comprehensive health survey on Arsenicosis. *(See annex2 for full text of the speech)*

Mr. Han Heijen, Environmental Health Advisor, WHO, informed that DWSS and NHRC have been working in human resource development in the field of Arsenicosis in Nepal. He agreed on the fact that the grass root level health workers are not able to detect arsenicosis in the first place and therefore its management and treatment at these levels were difficult. He therefore stressed that more and more dermatologists should be engaged and that this workshop by its name consultative would bring forth ideas and develop mechanisms through consultations and interactions.

Mr. Suman Sharma, Chairman of National Drinking Water Quality Steering Committee (NDWQSC) from Ministry of Physical Planning and Works (MPPW) stated that though it is the MPPW's responsibility to provide safe drinking water to the people at large this has remained a major challenge due to various limitations of Human Resources, lack of proper system and other factors. Nevertheless, arsenic has been detected in the groundwater of the terai region. He also stated that around 1.16 million tube wells have been already tested for arsenic in the terai. He stressed on the need for inter sectoral collaboration and coordination to tackle the problem of arsenicosis.

Addressing the gathering, Chief Guest of the program, Dr. Praveen Mishra, Secretary, Ministry of Health and Population (MOHP) said that the problem of arsenicosis is mainly found in the terai areas since groundwater extracted from tube well is the main source of drinking water. A National Arsenic Steering Committee (NASC) had been formed after studies indicated the presence of arsenicosis and its impacts on human health by various research studies. He also stated the fact that the blanket arsenic testing in tube wells of terai region of Nepal has revealed that about 20,243 (1.8%) of total

tested tube wells have arsenic concentration above national standard (50ppb) for drinking. He stressed on the need for studies to understand the magnitude of the arsenic problem in Nepal. He expected the constructive suggestion form consultative workshop to Ministry of Health and Population for necessary intervention. *(See annex2 for full text of the speech)*

Special Guest of the program, Prof Dr. D.N. Guha Mazumder, Institute of Post Graduate Medical Education and Research, Kolkata, India said that in India arsenic was detected in 1983 and in Pakistan in 1985. He also said that in West Bengal which is the most affected area of arsenic in India, all the tube wells have been blanket tested for arsenic. He said that since arsenic is not only manifested in skin lesions rather it is a systemic disease, patients come to the health facility only after the disease is out of hand. He also highlighted on the responsibility and potential role of Dermatologists on arsenicosis case detection and proper management, and emphasized that arsenicosis must be prevented before the condition becomes unmanageable.

Prof Dr. Dwarika Shrestha, Department of Dermatology, Institute of Medicine, in his inaugural remarks said that arsenic is a real problem with real prospect of real burden of Disease. He accepted that very little is known about health aspect of arsenic in Nepal and very little manpower is available in that line. Therefore this workshop would be very important to sensitize dermatologists about arsenicosis and discuss the role that dermatologists can play in detection, management and surveillance of arsenicosis in Nepal. He highlighted on the need for a prevalence study of dermatological manifestations of arsenicosis in Nepal.

In his concluding Remarks, Dr. Mahesh Kumar Maskey, Executive Chairman, NHRC and chairperson of session said that since arsenicosis problem in Nepal has come up as an important public health issue there is a great challenge in front of the health professionals to detect and manage arsenicosis with preventive focus. He highlighted the need for collaboration with neighbouring countries like India and Bangladesh. We can benefit greatly from their experiences in this field. He also said that NHRC is willing to give a push for a study which demonstrates the actual problem magnitude of arsenicosis in Nepal. *(See annex2 for full text of the speech)*

## Day I

The technical session began with the presentation of Mr. Han Heijnen, Environmental Health Advisor of WHO Country Office Nepal on the topic *'Epidemiology of Arsenicosis in Nepal and overview of relevant water quality concerns'*. He started with the WHO definition of arsenicosis given, followed by sources of arsenic, forms and chemical structure of arsenic. His presentation also highlighted on the health impacts of arsenicosis and the epidemiological distribution of arsenic in Nepal. He also shared the experience of Bangladesh which shares similar characteristics with the Nepalese people and geolog. He also discussed on how much arsenic one can intakes through water and through food items because plants like rice has the maximum absorption capacity of arsenic. He also briefed about the different types of filters that have been used for arsenic free water, and particularly, kanchan filter which has been used in Nepal recently. He highlighted on the mechanism of this filter, how it works and its advantages. In conclusion he said that there is a need of coordination between the local administration, the health professionals, the water sector, other relevant stakeholders and the local people for effective arsenic control and mitigation in Nepal.

Mr. Meghnath Dhimal, Environmental Health Research Officer from NHRC presented his paper entitled *'Capacity building by NHRC/WHO on Detection, Management and Surveillance of Arsenicosis cases in Nepal'*. He highlighted the role WHO has played in arsenic mitigation through various of its activities like determining the international standard of drinking water, providing policy and technical support to the national governments of affected countries. He also said that WHO has published Field Guide, Facilitator Guide and Participant handbool on Detection, Manangement and Surveillance of Arsenicosis in South East Asia Region. He said that WHO has set three broad strategic goals to mitigate problem of Arsenicosis which are: Goal 1- Responding to arsenic hazard, Goal 2- Strengthening infrastructure, Goal 3- Capacity building. He said that NHRC is working with WHO under strategic goal 3. He also added that NHRC translated the above mentioned WHO Publications in Nepali for the training purposes on detection, management and surveillance of Arsenicosis Cases in Nepal . Thus developed modules in Nepali were pretested by organizing a Training of Trainers on Arsenicosis case Detection, Management and Surveillance in 2006 which was targeted for central level experts who could be the potential trainers on upcoming trainings. After that four district level trainings were conducted for 11 districts (Nawalparasi, Rupandehi, Rautahat, Bara, Parsa, Morang, Sunsari, Saptari, Siraha, Kanchanpur and Kailali) health staffs. He presented that NHRC also developed

Arsenicosis case reporting format for disease surveillance and pre-tested in Rupendehi district. He also informed that already there have few research studies conducted by NHRC on Evaluation Study of Health Impacts due to Arsenic Contamination in the Selected Communities of Terai Regions in Nepal (2006) and Prevalence Study of Arsenicosis in Nawalparasi, Kailali and Bardiya Districts (2007 and 2008). In conclusion he said that there is a need of proper mechanism for detection, management and referral system of arsenicosis in Nepal.

Another paper was presented by Prof. Dr. D. N. Guha Mazumder on the entitled '*Clinical aspects of Arsenicosis and case definition*'. His presentation was mainly focused on the clinical manifestations of arsenicosis patients which include keratosis, melanosis, chronic liver problems, hepatomegaly, portal hypertension, splenomegaly, weakness, dyspepsia, conjunctivitis, non-pitting edema, polyneuropathy, skin cancer and internal cancer. He also highlighted about the differential diagnosis of arsenicosis. The presentation was well equipped with pictures of arsenic related skin lesions and non-arsenic skin lesions. He also discussed on the criteria of case definition of arsenicosis.

Prof. Dr. Dwarika Shrestha presented on '*Arsenicosis and Dermatologists; what role we can play in Arsenicosis Surveillance*'. He said that arsenic was used in medicine for various disease treatments if we go through history, and even today it has been used to treat various disease conditions. He said that arsenic is considered a slow poison and poison of kings. He argued that in arsenicosis skin manifestations are always present and are sensitive markers of arsenicosis. He further added that skin manifestations are the earliest manifestations and it is likely that arsenicosis presents as skin problem to the dermatologists first. Therefore he stressed on the crucial role that dermatologists have in detection, management, reporting and treatment of arsenicosis.

Another paper entitled '*Laboratory support for diagnosis of arsenicosis cases*' was presented by Dr. Narayan Prasad Upadhyay from ENPHO. He outlined the importance of lab support where probable cases can not be clinically confirmed or in instances in countries where a laboratory diagnosis is required for final confirmation. In case of arsenicosis, he said that the type of specimen to be collected, collection techniques, storage and shipment of specimens, and the analytical procedures were the different aspects of arsenicosis testing in Laboratory. Not only that, quality control, right interpretation of the obtained lab results and use of laboratory networks also made a difference in arsenicosis detection and confirmation. In his conclusion he pointed out that Comparisons between studies, Consistent diagnosis and surveillance, Consistency in training of health laboratory scientist are some of the public health needs for uniform arsenic testing.

Ms. Junu Shrestha Presented findings of a '*Case-control Study of Arsenic Toxicity to Pregnant women through biological monitoring*' conducted in Ramgram municipality of Nawalparasi district as case and Dhulikhel municipality of Kavre district as control of the study. 40 and 20 pregnant women were selected as cases and controls of the study respectively. The positive co-relation was observed between the exposure period arsenic intake and hair arsenic concentration and was significant. She recommended

that a mass screening for arsenic testing must be done, as well as further research studies must be conducted in arsenic.

## Day II

Second day session started with the recap of first day by Meghnath Dhimal.

Prof. Dr. D.N. Guha Mazumder presented a paper entitled '*Arsenicosis: Treatment, Surveillance and mitigation*'. He said that hospital based and epidemiological studies show that chronic lung disease, chronic neuropathy, severe weakness and chronic liver disease over and above skin manifestations are the major causes of morbidity while chronic lung disease and cancer are major causes of mortality among the Arsenic exposed population. Though chelation therapy with DMPS showed some improvement in placebo control trial. Recent study showed that Folic acid can improve symptoms of Arsenicosis. However, the main emphasis in management of Arsenicosis is in taking Arsenic free water and high protein diet. He further added that the main goal of Arsenicosis surveillance is follow-up and management of cases, especially, 'probable cases' that cannot be easily classified and it is very important that a surveillance of Arsenicosis need to be done in Nepal. He shared that in West Bengal they have been doing the following activities in response to mitigating Arsenicosis at the grass root level: Publicity, health camp, training program, awareness raising campaigns about arsenic. He further recommended major potential research areas on Arsenicosis.

Dr. Baburam Marasini, Member-Secretary of Non-communicable Diseases Steering Committee and Coordinator of Health Sector Reform Unit from Ministry of Health and Population presented a paper on '*Possible Arsenicosis Surveillance System in Nepal*'. He said that steps in response to arsenic surveillance have been taken on the part of the Nepal government. He also informed that various activities like, testing of tubewells for arsenic, arsenic reduction filters, awareness campaigns, among others have been conducted. He recommended for a creation of a surveillance system, and the establishment of a referral centre for patients referred by primary health care workers. He recommended for integration of arsenicosis with national Health Information Management System (HMIS). Similarly he stressed on the need for developing Case definition and treatment protocols.

Mr. Madhav Pahari from DWSS/UNICEF presented a paper entitled '*Arsenic Mitigation Program in Nepal*'. He informed that total 1.1 million tube wells have been tested for arsenic until today by several agencies using various test kits/methods. According to National Arsenic Steering Committee (NASC), in 2008, 92.59% of tested tubewells have arsenic <10 ppb, 5.62% between 10-50 ppb and 1.77% have >50 ppb arsenic concentration in tube well water. Wrapping up his statement he said that challenges lay ahead in arsenic mitigation. Regular monitoring of performance of mitigation options, identification of permanent options and promotion available mitigation options, regular monitoring of tubewells and dynamism of arsenic movement sealing contaminated aquifers, hydro-geological/geo-chemical study are some of the areas of challenge in arsenic which must be addressed in an integrated manner.

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## INTERACTION ROUND

The moderators of the group interaction nominated were Prof Dr. D.N Guha Mazumder and Prof Dr. Dwarika Shrestha. The issues raised by the participants were tackled by the moderators. The issues raised were like whether or not the groundwater of Kathmandu has been tested for arsenic, does boring reduce arsenic contamination, and does boiling reduce arsenic in water. In response to these issues Mr. Han Heijen said that the groundwater of Kathmandu has been tested for arsenic and the mostly affected was Lalitpur district. Dr. Guha informed that neither boring nor boiling reduced arsenic from water. There are two parameters or standards set, one by WHO and one by the Nepal government on the permissible arsenic concentration in drinking water, which according to Dr Dwarika was confusing. Mr. Han himself being from the WHO said that WHO provides a guidance and practitioners seek for that so on the basis of that guidance, do governments set their own permissible values and standards. One of the participants questioned why arsenic is not much seen in children. In response to that query Dr. Guha said that it requires longer period of exposure for arsenic to manifest and also intake of water by children is less. Environmental exposure is also necessary. He further added that not only water but other sources are also quite important for exposing one to arsenicosis.

Another participant had a query whether there was any correlation between biological samples (hair, nail, urine) and skin manifestations. Dr. Guha in response to this query said that there wasn't any correlation as such but high arsenic level in biological samples did mean the person is/has been exposed to Arsenic. One of the participants asked whether Arsenic contamination transferred from breast milk and if it can cross the placenta. Dr. Guha answered that there was no substantial relationship between arsenic and breast milk but there were suggestions from researches that arsenic can cross the placenta. One of the participants questioned about the mechanism of arsenic manifestation in human body (like more in the chest and back). And Dr. Mazumder said that this was not yet known.

One of the participants enquired if there were any changes in the nail and hair (like texture, color, etc) in arsenicosis. Dr. Guha said that there were no such changes in color or texture, but in testing these samples, presence of arsenic is suggested in case of arsenic exposure. Another participant asked if one stopped drinking arsenic contaminated water how long does it take to reduce the symptoms. Dr. Guha in response said that after one year pigmentation reduces gradually, and does improve mild symptoms, but does not disappear completely. Arsenic excretion does occur through urine, hair and nail and that is why these samples are used for testing, because they are the potential

samples where arsenic could be present. Regarding about the simplest test for arsenic, Mr. Han Heijen said that it was the field test kit. Regarding the query about whether weakness in arsenicosis is due to anemia, Dr Dwarika said that it was not yet established fact but it maybe due to changes in the metabolic enzymes.



## GROUP DISCUSSION

Mr. Han Heijen and Dr. Dwarika Shrestha facilitated the group discussion on the theme *'How to develop Referral system and Sentinel sites'*. Mainly the dermatologists working in and outside the Kathmandu valley were engaged in the discussion and were allowed to share their experiences and suggestions. They suggested that Primary health care workers working in the grass root level must be sensitized and then well trained who can identify arsenicosis cases and refer to the district level hospital to zonal and then to the referral sites at the central level. They strongly emphasized on the need for coordination between the referring and referral systems.

Other important suggestions of the discussion are summarized below:

- Manifestations of any kind in the skin must be suspected for arsenicosis and sent for testing and confirmation to the higher level facilities
- Diagnosing systems must be improved, for example lab facilities must be available not only in the central levels but also in the zonal and the district level.
- Human resources must be trained in this prospect and also the paramedics must be made aware about this problem
- Need for further research into arsenicosis and its potential burden of disease
- Media must be engaged in a widely for sensitization and awareness about arsenicosis
- Arsenic must be included in the government program (like Malaria, Kalazar) and a reporting system must be established
- Definite criteria for Arsenic detection must be developed, as there is for leprosy.
- Intersectoral coordination of arsenic detection must be established, for example, suspected cases of arsenic can be referred from one hospital to another where there is dermatologist
- National Public Health Laboratory (NPHL) must be developed as tertiary center for sample testing for arsenicosis
- Dermatologists first must be trained, and they should train other grass root level staffs thus a relation can be maintained between them also in the formal mechanism.

- There is awareness about arsenic, but while advocating about arsenic, it must be linked with its relationship with human health.
- Need for an integrated approach to water related problems
- Need for active surveillance of cases and follow up in most affected areas.



## CLOSING SESSION

On behalf of the participants, Prof. Dr. Bhaskar Mohan Kayastha thanked the organizers for providing the opportunity to participate in the workshop which he said proved to be very helpful to all. He said that signs and symptoms of other disease also must be interlinked like those of cutaneous manifestations of HIV/AIDS and dermatologists must be involved in all such matters.

Prof. Dr. Dwarika Sherstha in his wrapping up comments said that the workshop had been very helpful and it really was very informative in terms of what has been done in Nepal for arsenic mitigation; water testing and use of sonofilters. He was very happy that young dermatologists were willing to give training at grass root level. He stressed on the need for a follow up of this workshop and said that the workshop for future had been very sensitizing.

Delivering his closing remarks, Dr Mahesh Kumar Maskey congratulated the organizers and the participants for the successful completion of the workshop. He assured that a follow up will be done to ensure that we achieved what was intended to achieve. He also identified the need to train dermatologists in many issues including Aresnicosis. Our health services must be intertwined and integrated. Concluding his remarks he said that bringing together all resources only can we face the problems before they become public health problems.

At last, Dr Mahesh Kumar Maskey presented a token of love and remembrance to the special guest who came all the way from India, Prof. Dr. D.N. Guha Mazumder and with that ended the proceedings of the workshop.

# ANNEX I

## Welcome Speech

Dr. Kedar Prasad Baral, Board Member, NHRC

Mr. chairman, chief guest Dr. Praveen Mishra, Special guest, Prof. Dr.D.N. Guha Mazumder, Mr. Han Heijen WHO environmental Health Advisor, experts, participants, Ladies and Gentlemen.

It gives me great honor to welcome you all in this very important Consultative workshop on Detection, Management, and Surveillance of Arsenicosis cases in Nepal. On behalf of Nepal Health Research Council, the organizer, I extend my hearty welcome to all of you.

Ladies and gentleman, we all know chronic arsenic poisoning associated with groundwater contamination has been reported from many developing countries. In the Terai region of our country Nepal too, arsenic contamination in water has been a public health issue, since the major source of drinking water is ground water extracted from tube well. The first study on Arsenic contamination was conducted by Department of Water Supply and Sanitation in 1999 in eastern Terai of Nepal, which indicated the possibility of arsenic contamination in groundwater of Terai. Findings of several other studies also suggested the same. Not only that, an initial health survey in 2001-2002 found evidence of arsenic related dermatosis and elevated amounts of arsenic in human hair and nails samples in four districts where tube well drinking water contained arsenic above 50 ppb. This initial evidence of arsenic contamination and associated health effects led to the formation of the National Arsenic Steering Committee (NASC).

*WHO has put forth three broad strategic goals for arsenic mitigation:*

- Responding to arsenic hazard
- Strengthening infrastructure
- Capacity building

In response to the third strategic goal, the WHO country office Nepal has been supporting the NHRC in capacity building through human resource development and evidence based research. In order to sensitize and enhance capacity of district health staffs about Arsenicosis, NHRC has already conducted the district level trainings in most affected districts of Nepal: Nawalparasi, Rupandehi, Rautahat, Bara, Parsa, Siraha,

Saptari, Kailali, Kanchanpur, Sunsari, and Morang. Community based prevalence studies conducted in Nawalparasi, Bardiya and Kailali conducted by NHRC shows that prevalence of Arsenicosis is between 2 to 3 %.

This is though just the beginning. A lot needs to be done to tackle the problem of Arsenicosis. Regular screening and monitoring of tube wells and other sources of water for arsenic contamination is the most vital. Awareness building and motivational programs should be conducted. Similarly, health professionals in local sub health posts, health posts and hospitals should be trained in diagnosing, Arsenicosis and its management with special emphasis on preventive measures. Necessary steps should be taken to develop and equip the existing research laboratories for analysis of biological samples (hair, nail, urine) for arsenic.

Further efforts should be made for conducting a systematic and comprehensive health survey on Arsenicosis. And I hope this workshop will identify mechanisms on detection, management and surveillance of Arsenicosis cases in Nepal.

Once again, welcome to you all and have a great day ahead!!

## Remarks of Chief Guest

### Dr. Praveen Mishra, Secretary, Ministry of Health and Population

Chairman of the session Dr. Mahesh Maskey, Special Guest Dr. Guha Mazumder, Dignitaries on the stage distinguished participants and ladies & gentleman.

Drinking water contaminated with an unsafe level of arsenic is known to result in adverse health outcomes. In many parts of the world, the source of drinking water is groundwater. While groundwater is relatively safe as regards bacterial contamination and other impurities, it is prone to chemical contamination such as arsenic. In terai region of Nepal, the major source of drinking water is ground water extracted from tube well. The Department of Water Supply and Sewerage and World Health Organization (WHO) carried out the first Nepalese studies on arsenic in groundwater in 1999 in three districts of eastern Nepal bordering with India followed by Nepal Red Cross Society (NRCS) & Japanese Red Cross Society (2000). Both studies provided evidence of arsenic contamination in terai region of southern Nepal. Furthermore, an initial health survey in 2001-2002 found evidence of arsenic-related Dermatitis and elevated amounts of arsenic in human hair and nail samples in four districts where tube well drinking water contained arsenic above 50 ppb (parts per billion). This initial evidence of arsenic contamination and associated health effects led to the creation of the National Arsenic Steering Committee (NASC) to help coordinate efforts by government and non-government agencies to address the potential problems of arsenic contamination in the rapidly growing region of southern Nepal. Different agencies are involved in blanket arsenic testing and mitigation programs in Nepal. The blanket arsenic testing in tube wells of terai region of Nepal has revealed that about 20,243(1.8%) of total tested tube wells have arsenic concentration above the national standard (50 ppb) for drinking. The continuous exposure to arsenic above the safe doses causes the Arsenicosis. According to WHO, arsenicosis is a chronic health condition arising from prolonged ingestion of arsenic above the safe dose for at least six months, usually manifested by the characteristics skin lesions of melanosis and/or keratosis with or without the involvement of internal organs.

WHO has three broad strategic goals for arsenic mitigation i) responding to arsenic hazard ii) strengthening infrastructure and iii) capacity building. Under the strategic goals third, the WHO Country office Nepal has been supporting to Nepal Health Research Council (NHRC) on behalf of Ministry of Health and Population which aimed to capacity building through human resource development and research to provide evidence. In order to sensitize and enhance capacity of district health staffs, NHRC has already conducted the district level trainings in most affected districts of Nepal which are Nawalparashi, Rupendehi, Rautahat, Bara, Parsa, Sirha, Saphahri, Kaillai, Kanchanpur, Sunsari and Morang. NHRC has conducted some community based prevalence studies in Nawalparashi, Bardiya and Kailali districts which shows that prevalence of Arsenicosis is between 2 to 3 Percent. These are not enough to respond to the problem of arsenicosis. A lot of studies still need to be done to understand the magnitude of problem and more and more health staffs need to be trained. The health staffs of

peripheral level (sub-health post, health post and primary health care), district level, and tertiary care level should be trained on detection and management aspect of arsenicosis. Timely detection of mild stage of arsenicosis can be recovered while as moderate and severe cases will be difficult to recover. There is need of research on case management including natural history and therapeutic regimens and interventions. As there is no known specific treatment for arsenicosis, the prudent intervention is to stop consumption of arsenic-contaminated water. Appropriate counseling for safe water options and health consequences of consuming arsenic-contaminated water should be supported through standard Information, Education and Communication Strategies.

I sincerely hope this consultation workshop of experts from different sectors will help to develop strategies and programmes to involve the dermatological professionals of Nepal developing network of experts on Detection and Management of cases of Arsenicosis and develop a referral system and sentinel sites for reporting cases of Arsenicosis in Nepal.

## Remarks of Chairman

### Dr. Mahesh Kumar Maskey, Executive Chairman, Nepal Health Research Council

Chief Guest, Dr Praveen Mishra, Secretary Ministry of Health and Population, Special Guest, Dr. Guha Mazumder, Dignitaries on stage, distinguished participants.

Welcome to you all! Globally, arsenicosis is an important non-communicable disease resulting from the ingestion of ground water containing an unsafe level of arsenic. It is estimated that some 30 million persons may be at risk for arsenic –related disease by virtue of consuming arsenic contaminated water in the South East Asia Region. WHO has estimated 5 million persons are exposed to arsenic and possible diseases burden 1 million and which need to further confirmed based on our latest arsenic testing data. Mapping of high level arsenic concentrated areas at local level and conducting health survey to screen the cases of arsenicosis is extremely important. Capacity building of health staffs on detection and management is needed and regular training should be conducted by appropriate government authorities within the health system of the country. Chronic arsenic toxicity produces various dermal and systemic manifestations including cancer.

We have to learn many more from our Neighboring Countries India and Bangladesh about the Detection, Management and Surveillance system. As we currently do not have clinical treatment to deal with moderate and severe cases of arsenicosis, timely detection of mild stage of arsenicosis will help to protect a lot of people from developing cancer. We have to give counseling to stop consumption of arsenic –contaminated water and provision of information on arsenic safe water supplies and advice on adequate nutrition.

Need to conduct prevalence survey in most affected districts and research on case management including natural history and therapeutic regimens and interventions. Dermatologists and Academic institutes should be actively involved conducting research on this field.

Thank you.



## ANNEX II

### Schedule of the Program

- Date : 26-27 July 2009, Kathmandu, Nepal  
Venue : The Hotel Himalaya  
Objectives : To engage the dermatological professionals of Nepal in Detection and Management of Arsenicosis and develop a referral system and sentinel sites for reporting on Arsenicosis cases in Nepal

#### DAY 1 - 26 July 6, 2009 Sunday

08:30-09:00 Registration

#### 09:00-10:00 Inaugural Session

Welcome Address

**Dr. Kedar Prasad Baral**

*Board Member, Nepal Health Research Council*

Inaugural Address by

**Mr. Han Heijnen**

*Environmental Health Advisor World Health Organization*

Remarks by

**Mr. Suman Prasad Sharma**

*Chairman*

*National Drinking Water Quality Steering Committee*

*Ministry of Physical Planning and Works, Government of Nepal*

Remarks from

**Chief Guest Dr. Praveen Mishra**

*Secretary, Ministry of Health and Population, Government of Nepal*

Remarks by

**Special Guest Prof. Dr. D. N. Guha Mazumder**

*Professor, Institute of Post Graduate Medical Education and Research, Kolkata*

Closing Remarks by

**Dr. Mahesh K. Maskey**

*Executive Chairman, Nepal Health Research Council*

10:00-10:30 Tea/Coffee Break

#### 10:30-16:30 Technical Session

10.30-11.00 Epidemiology of Arsenicosis in Nepal and overview of relevant water quality concerns

**Mr. Han Heijnen**

*WHO-Nepal*

- 11:00-11:30 Capacity building by NHRC/WHO on Detection, Management and Surveillance of Arsenicosis Cases in Nepal  
**Mr. Meghnath Dhimal**  
*Environmental Health Research Officer, Nepal Health Research Council*
- 11:30-12:15 Clinical aspects of Arsenicosis and case definition  
**Prof. Dr. D. N. Guha Mazumder, India**
- 12:15-12:30 Arsenicosis and Dermatologists: What role we can play in Arsenicosis Surveillance  
**Prof. Dr. Dwarika Prasad Shrestha, Institute of Medicine, Tribhuvan Universtiy**
- 12:30-13:00 Discussion
- 13:00-14:00 Lunch
- 14:00-15:15 Case Studies on Differential Diagnosis of Arsenicosis Cases  
**Prof. Dr. D. N. Guha Mazumder, India**  
**Prof. Dr. Dwarika Prasad Shrestha, Institute of Medicine, Tribhuvan Universtiy**
- 15:15-15:30 Tea Break
- 15:30-15:50 Laboratory Support for Diagnosis of Arsenicosis Cases  
**Dr. Narayan Prasad Upadhyay, Environment & Public Health Organization**
- 16:50-16:00 Discussion
- 16:00-16:15 Case - Control Study of Arsenic Toxicity to pregnant women through biological monitoring  
**Ms. Junu Shrestha, Filters for Families**
- 16:15-16:30 Discussion

## **DAY 2 - 27 July, 2009 Monday**

- 09:00-09:30 Arsenicosis Case Management and Arsenicosis Case Surveillance System in West-Bengal, India  
**Prof. Dr. D. N. Guha Mazumder, India**
- 09:30- 10.00 Possible Arsenicosis Surveillance system in Nepal  
**Dr. Baburam Marashini, Member-secretary**  
*Non-communicable Diseases Steering Committee,  
 Ministry of Health and Population, Government of Nepal*
- 10:00-10:30 Arsenic Mitigation Program in Nepal  
**Mr. Madhav Pahari, UNICEF**
- 10:30-11:00 Tea Break
- 11:00-12:30 Discussion on referral system and development of Sentinel Sites  
*Group work*
- 12:30-01:15 Closing Session  
*MOHP, WHO, NHRC*
- 01:15-02:00 Lunch and end of formal programme
- 02:00-03:00 Meeting with Dermatologist outside the Kathmandu Valley
- 03:00-03:30 Tea Break and End

# ANNEX III

## List of Participants and Resource Persons

Consultative Workshop on Detection, Management and Surveillance of Arsenicosis Cases in Nepal

Date : 26 - 27 July 2009 (11 - 12 Shrawan 2066)

Time : 08:30 AM - 04:30 PM

Venue : The Hotel Himalaya, Kupandol, Lalitpur, Nepal

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42	Ms. Lila Bhattarīa	Nepal Health Research Council	4254220		Kathmandu

# ANNEX IV

## Photographs



*Guests in the Dash (from Left: Mr.Han Heijen, Dr Dwatika Shrestha, Dr.Mahesh Maskey, Dr. Praveen Mishra, Dr. D.N Guha Mahazumder and Mr.Suman Shatam)*



*Welcome Speech by Dr. Kedar Prasad Batal, Board Member of NHRC*



*Remarks by Dr. Mahesh Kumar Maskey, Executive Chairman, NHRC*



*Participants of the Workshop*



*Intetraction by Dr. Mahesh Kumar Maskey with Prof. Dr. D. N. Guha Mazumdar & Prof. Dr. Dwatika Prasad Shrestha*



*Group Photograph*







*Contact*

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