

# **Environment and Health International (online)**

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# Environment and Health International



*Magazine of the International Federation of Environmental Health*



# INTERNATIONAL FEDERATION OF ENVIRONMENTAL HEALTH

*President – Diane Evans*



President, Diane Evans USA

President Elect, Jerry Chaka, South Africa

Hon. Secretary, Mike Halls, Scotland

Hon. Editor, John Stirling, Scotland

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Cover Photographs:

*Upper left: Inuksuk\*; Upper right: Caribou herd\*\*;*

*Centre: Inuit mother and child\**

*Lower left: Char\*\*; Lower right: Nunavut flag\**

\* Courtesy of Frederick P. O'Brien,

Honorary Vice President, IFEH

\*\*Courtesy of Nanavut Tourism

The views expressed in this magazine are not necessarily the views of the International Federation of Environmental Health

## IFEH REGISTERED OFFICE

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*The next meeting of the  
IFEH Council will be held in  
Denver, Colorado, USA, on  
11th & 12th September 2004*

## PRESIDENT'S COMMENTS

**Diane Evans**

How time flies! As I prepare my last "President's Comments" prior to the 8th World Congress on Environmental Health in Durban, that axiom keeps coming to mind. I have had the pleasure of representing the National Environmental Health Association (USA) to the Federation for nearly 13 years, and have had the honor of being the Federation's President since May 2002. I soon will be passing both those responsibilities on to others. I have advised NEHA that I think a fresher perspective is needed and that a new liaison appointment would be appropriate. I expect this to take place in 2004. And Jerry Chaka of the South African Institute of Environmental Health will follow me into the presidency of the Federation during the World Congress in Durban.

While preparing this column, I returned to the first "President's Comments" I wrote prior to the 2002 World Congress in San Diego in order to gauge the progress of the Federation in the intervening two years. I wrote back then about both the Federation's triumphs as well as its challenges. How has the Federation fared since then?

Triumphs for the Federation in the two years includes growth from 31 members in 2002 to 35 members as 2003 ends. The organizations which have joined IFEH during this time are: Jamaican Association of Public Health Inspectors, Liberian Association of Public Health Inspectors, Environmental Health Society of Nigeria, and Public Health Inspectors Association of Uganda.

The IFEH magazine, "Environment & Health International," compiled and edited to a high standard by John Stirling, is now available on the Federation's website, thanks to the efforts of the Federation's dedicated webmasters, Henning Hansen and Jan Jorgensen. It is truly a triumph when the Federation can make its publication so widely available to anyone who has an interest in environmental and public health, thereby helping to create a safer environment for all.

The Sustaining Subscribers scheme has been re-invigorated and re-named as Individual Associate Member. The Federation conducted its first open nomination and election process in 2003 for the position of President Elect. Observer status has been granted to the Federation by Codex Alimentarius. The Council will be considering a proposal to fund a research study or assistance with a project for developing countries using the

Federation's Development Fund during its meeting in Durban.

Triumphs of the Federation in these two years are balanced by its challenges, the most significant of which continues to be the inability to date to obtain funding that would allow the hiring of permanent staff, and thereby reducing the need to rely on volunteers to accomplish the Federation's work. As long as the Federation remains a totally volunteer organization, its ability to change and grow and create new triumphs will be limited. A prime example of this limitation is that the effort to draft at least one new policy statement by each Regional Group for adoption by the Council in Durban appears to have largely failed, primarily, it is presumed, due to the heavy workload and limited time availability of the regional group membership. The Federation must continue to seek a means of stable, long term funding that will allow the IFEH to become the organization that Eric Foskett envisioned 20 years ago.

I cannot close these final comments without recognizing and thanking the officers of the Board, the members of the Council, and the honorary officers for their dedication and hard work on behalf of the Federation. One officer in particular stands out. Hon. Secretary Mike Halls has become the most steadfast and hardworking individual over the long-term (next to the Federation's founder, Eric Foskett) that the Federation has been fortunate to have working on its behalf. I have greatly valued and admired Mike's efforts since our first meeting in 1985 when Mike visited me in California and made the first outreach from IFEH to NEHA, asking it to consider becoming a member of the Federation. While serving as member of the Council and then a Board member, I have observed first hand how hard Mike works for the Federation in the many roles he has held: President, Chairman of Council, Public Relations Officer, and, since 1998, Honorary Secretary. I am not the only one to acknowledge the many and significant contributions that he has made to IFEH: the Federation will recognize Hon. Secretary Michael Halls with the 2004 Eric W. Foskett Award during the Durban World Congress. Well done, Mike, and so richly deserved!

I have greatly enjoyed being a part of the challenges and triumphs of the Federation during my time as its president and as NEHA's liaison to the IFEH. The time of my involvement in the Federation certainly has flown by. In closing, I paraphrase the words of one of my favorite TV characters: May the Federation "live long and prosper!"

## REVIEW OF MEMBERSHIP OVER THE LAST SIX YEARS

Hon. Secretary IFEH – Michael Halls



As each New Year arrives, one is tempted, not only to look forward with hope and confidence but to look back on past achievements. The start of 2004 is no exception and at the turn of the year, I decided to look back on the period during which I have

had the honour to be the Federation's Honorary Secretary.

I took over in 1998 and at that time the Federation had 28 full members. As I compose this short contribution, I am pleased to report that membership has increased in the last 6 years by over 33%. The Annual Report for the year 1998 listed the 28 full members (one of which, that from Indonesia, has since left) and as things stand at the start of 2004, IFEH has 36 organisations in full membership.

A full list of current members is appended below and those which appear today but were not around in 1998 are indicated by an asterisk (\*).

### AFRICA REGION

**Botswana** - Botswana Environmental Health Officers' Association

**Kenya** - Association of Public Health Officers

\***Liberia** - Liberia Association of Public Health Inspectors

**Malawi** - Environmental Health Officers Association of Malawi

**Mauritius** - Health Inspectors Cadre

\***Nigeria** - Environmental Health Society of Nigeria

**South Africa** - South African Institute for Environmental Health Officers (SAIEH)

**Tanzania** - Tanzanian Association of Health Inspectors (CHAMATA)

\***Uganda** - Public Health Inspectors Association of Uganda

\***Zambia** - Environmental Health Institute of Zambia

**Zimbabwe** - Zimbabwe Environmental Health Practitioners Association (ZEHPA)

### AMERICAS REGION

**Canada** - Canadian Institute of Public Health Inspectors (CIPHI)

\***Jamaica** - Association of Public Health Inspectors

**USA** - National Environmental Health Association (NEHA)

### EUROPE REGION

**Austria** - Verband der Oesterreichischen Lebensmittelkontrolle

**Cyprus** - Association of Public Health Inspectors

**Denmark** - Foreningen af Miljomedarbejdere I Kommunerne (FMK)

**England, Wales & N. Ireland** - Chartered Institute of Environmental Health (CIEH)

**Finland** - Finnish Communal Association of Environmental Health & Protection

**France** - Association Nationale des Ingenieurs du Genie Sanitaire (ANIGS)

**Germany** - Bundesverband der Lebensmittel Kontrolleure (BVLK)

**Greece** - Association of Public Health Inspectors

**Ireland** - Environmental Health Officers' Association (EHOA)

\***Kazakhstan** - Kazakhstan Association of the Sanitary-epidemiological Service

**Latvia** - Latvian Association of Preventive Medicine Functioners

\***Lithuania** - Union of Hygienists & Epidemiologists

\***Malta** - Malta Association for Health Inspectors

\***Netherlands** - College van Keurmeesters

**Norway** - Forum for Miljo og Helse (FMH)

**Scotland** - Royal Environmental Health Institute of Scotland (REHIS)

**Sweden** - Miljo- och halsoskyddstjanstemannaforbundet (MHTF)

### PACIFIC RIM REGION

**Australia** - Australian Institute of Environmental Health (AIEH)

**Hong Kong** - Hong Kong Public Health Inspectors Association (HKPHIA)

**Malaysia** - Malaysian Association of Environmental Health (MAEH)

**New Zealand** - New Zealand Institute of Environmental Health Inc. (NZIEH)

**Singapore** - Society of Environmental Health

In so far as the number of Associate Members is concerned, the picture is less rosy. In 1998 there were 38 such organisations in membership while today the number stands at an identical level. A full list follows.

## ASSOCIATE MEMBERS

### AMERICAS REGION

#### USA

California Environmental Health Association  
Minnesota Environmental Health Association  
Underwriters Laboratories Inc

#### Peru

Peruvian Association of Sanitary and Environmental Engineers

### EUROPE REGION

#### England, Wales & Northern Ireland

EHOverseas, England  
Greater London Centre – CIEH, England  
Encams (formerly The Tidy Britain Group  
Water for Kids)

#### Scotland

Scottish Centre for Infection and Environmental Health

## ACADEMIC ASSOCIATE MEMBERS

### AFRICA REGION

#### Malawi

University of Malawi – The Polytechnic

#### South Africa

Cape Technikon  
M.L.Sultan Technikon, Durban  
Peninsula Technikon, Belleville  
Technikon Natal  
Technikon North Gauteng  
Technikon Pretoria

### AMERICAS REGION

#### Canada

British Columbia Institute of Technology, Vancouver  
Ryerson Polytechnic University, Toronto

#### USA

Loma Linda University, California

### EUROPE REGION

#### England Wales & Northern Ireland

King's College, University of London, England  
Leeds Metropolitan University, England  
Manchester Metropolitan University, England  
City College of Higher & Further Education, Norwich, England  
Salford University, England  
University of the West of England, Bristol, England  
University of Ulster, Northern Ireland  
University of Wales Cardiff Institute, Wales

#### Ireland

Dublin College of Technology

#### Netherlands

Groningen University

#### Scotland

University of Edinburgh  
University of Strathclyde, Glasgow

#### Sweden

Umea University

### PACIFIC RIM REGION

#### Australia

Curtin University of Technology, Perth  
Flinders University, Adelaide  
Griffith University, Brisbane  
Queensland University of Technology, Brisbane

#### Hong Kong

Hong Kong Technical College

#### Singapore

Ngee Ann Polytechnic

*Has your organisation produced  
any policy papers or position  
statements?*

*If so, please send a copy to the  
Honorary Secretary  
so that IFEH can consider  
producing something similar*

## ENVIRONMENTAL HEALTH IN THE CANADIAN ARCTIC OF NUNAVUT

By Fred O'Brien, Hon. Vice President and former Chairman of IFEH. Former Chairman of EHOA (Ireland). Qualified in both Ireland and Canada as an EHO. B.A. (Philosophy), University of Waterloo, Canada; M.B.A., University College Galway, Ireland. Currently Regional EHO, Nunavut, Canada.

### Our People – Our Land\*

\*In Inuktitut, *Inuit* means “Our People” & *Nunavut* “Our Land”



*Fred O'Brien kneeling in front of the carcass of a Beluga Whale*

The Canadian Arctic territory of Nunavut, established on April 1, 1999, is immense. It is as large as Europe and stretches above the tree line across more than two million square kilometers of land, water and ice. Its people, the Inuit, were previously identified by the Algonquin Indian term “Eskimo”, meaning “eaters of raw flesh”. The Inuit were proud to accept this designation and to identify themselves as practicing the principles arising out of Inuit *Qaujimagatuqangit* (IQ). IQ encompasses all aspects of traditional Inuit culture, including values, world-view, language, social organization, knowledge, life skills, perceptions and expectations.

Most Inuit communities would not have encountered white people until the European explorers of the 19th century went looking for a navigable channel - the Northwest Passage – from the Atlantic to the Pacific Ocean through the Canadian Arctic Islands and the Bering Strait. American and Scottish whalers regularly visited later in that century, eventually wintering on the east coast of Baffin Island and at Marble Island

on the west side of Hudson Bay. The whalers were followed by the fur traders, who exchanged guns, flour and other supplies for animal furs. The move from traditional hunting practices in favour of trapping, by many Inuit, resulted in creating a dependency on the global fur market. With the collapse of fur prices in the 1940s a source of income for trade goods was lost. In the 1950s some inland Inuit starved to death when caribou herds changed their migration route.

When southern Canadians became aware of the plight of the Inuit in the 1950s, the Canadian government, after some delay, moved to send relief supplies to the starving and supported the establishment of settlements around existing trading posts. Within a single decade many Inuit gave up their nomadic way of life, moving from igloos and skin tents to settle into wooden houses. Additionally, government, having shown little interest in the needs of the Inuit previously, introduced education and health care services, while promoting the establishment of community councils and local government. A benevolent, yet paternalistic and bureaucratic government system, was now introduced to the Inuit way.

In the space of a single decade, nearly all of Canada's Inuit gave up a nomadic lifestyle that had endured through millennia, to become village dwellers. Camps of two or three families were combined into settlements of 50 families or more. Previously, family groups would have moved from place to place as the seasons and food animal migration patterns dictated. Much time was spent by the sea, hunting whale, walrus and seal; and inland journeys were made to hunt caribou, which provided food and skins for warm winter clothing. Inland lakes and rivers were fished and migrating ducks and geese were stalked in the spring.

Nunavut's population now live in some 28 fly-in communities:

Total population of Nunavut: 29,000 (est)

Inuit population of Nunavut: 24,650 (est)

Inuit population as ratio of overall population: 85%

Population per square kilometer in Nunavut area: 0.01

Languages spoken: Inuktitut, Inuinnaqtun, English, French

Largest community: Iqaluit, population: 6,000 (est)

### Climate

The mean 10°C isotherm in July is a frequently used mappable Arctic climatic boundary limit. Other boundaries often referred to are the southern limit of continuous permafrost and the

tree line, both of which extend further south in the eastern Canadian Arctic than in the west. The tree line in Canada varies from 69° north latitude near Inuvik to 55° in Northern Ontario, and runs diagonally from the Beaufort Sea to a point just north of Churchill, Manitoba, and continues through the Ungava Peninsula in Quebec and Labrador. Those areas north of the tree line, which includes the Territory of Nunavut, experience mean temperatures of less than 10°C in the warmest month, less than minus 30°C in the coldest month, and below minus 10°C average for six or more months of the year.

Mean temperatures, however, do not tell the full story. On January 12, 2004 the dry bulb temperature at Rankin Inlet, Nunavut, where I live, was minus 43°C. With an extreme chill factor, because of the wind, the effective temperature was minus 71°C. And this is not as cold as it gets! During other days of that week, the effective temperature was in the minus 50s - 60s range!

Having arrived in the territory, for the first time, in May 2003, I had hoped the sea temperature would warm significantly so that I might try out my new wetsuit. The sea ice did not go out until well into July, and the sea, I am told, never warms above 3°C. Regardless, I swam in the sea from mid July until 12 September, 2003!

### ***Sermons in Stones and Good in Everything***

#### **Duke Senior**

*Now, my co-mates and brothers in exile,  
Hath not old custom made this life more sweet  
Than that of painted pomp? Are not these woods  
More free from peril than the envious court?  
Here feel we but the penalty of Adam,  
The seasons' difference, as the icy fang  
And churlish chiding of the winter's wind,  
Which, when it bites and blows upon my body,  
Even till I shrink with cold, I smile and say  
'This is no flattery: these are counsellors  
That feelingly persuade me what I am.'  
Sweet are the uses of adversity,  
Which, like the toad, ugly and venomous,  
Wears yet a precious jewel in his head;  
And this our life exempt from public haunt  
Finds tongues in trees, books in the running  
brooks,  
Sermons in stones and good in every thing.  
I would not change it.*  
Shakespeare "As You Like It", Act 2, Scene 1

Duke Senior's address in the Forest of Arden in *As You Like It* has, for over 45 years now, much impressed me, and continues to resonate in my understanding of how we can apprehend the environment, such that its elements and totality 'feelingly persuade' us of who we are. The reference to '*sermons in stones*' has taken on an additional meaning with my recent introduction to the *inuksuit* (singular: *inuksuk*), the standing stones of the Canadian Arctic. Throughout the world, where ancient peoples have settled, standing stones, such as dolmens, apashektas, chortens, stupas, seites; and ancient megalithic structures, speak to cosmologies that tap into the wisdom of the ages. In Inuktitut, *inuksuk* means *acting in the capacity of a human being*, and this is what these structures have done and continue to do on the Nunavut landscape to this very day. An excellent account of their meaning is provided in Norman Hallendy's book: *Inuksuit: Silent Messengers of the Arctic*, published in paperback in 2001 ISBN 0-295-98172-5.

The Inuit, in this vast land, have truly depended on inuksuit for physical survival since time immemorial; equally, they have revered them as sacred objects that mark out places where spirits and shamans exercise their powers for good or ill. They act as direction markers used for sighting and aligning, or for indicating a valuable caribou hunting or fish gathering area, to identify food caches, or the safety of an ice route. They are also used as a means to direct, herd and capture animals. The construction and shapes of inuksuit, and their arrangements are many and varied and follow patterns that convey varieties of meaning and utility in physical and spiritual realms. As Hallendy, who spent some forty years consulting with the Inuit elders and their oral tradition, notes:

*"I came to appreciate these seemingly simple stone constructions as a nuanced and once vital form of communication, a language as rich yet more elementary than the one in which I am communicating now. An inuksuk is a proxy for a human in every sense of the word; it provides comfort to the travel weary, life-saving advice to the disoriented, a focus of veneration to the spiritual seeker. It is a timeless language of the land for a people who existed on the land. As one Inuit elder told me, "This attaches me to my ancestors and to this place." (p.44)*



## Knowledge Through Connaturality

*The great sea has set me adrift.  
It moves me as a small plant in the running river.  
Earth and the mighty weather move me,  
Storm through me,  
Have carried me away.  
And I tremble with joy.* Uvavnuk, Inuit Shaman

As historical beings our human inclinations, behaviours and beliefs have developed and been expressed in the course of time. They have taken shape in local environments and social contexts possessing features and characteristics that we can apprehend, because, being connatured with all of creation, they are accessible to us. In our relationships of person to person; person to animate and inanimate beings; and in our explorations of spiritual realms we can be moved and carried such that reality resonates in us. Uvavnuk has expressed it very well indeed.

### Inuit Qaujimajatuqangit (IQ)

Unique features of the Canadian Arctic required that the Inuit, over millennia, adapt to the realities and patterns of an ecosystem little appreciated or understood in its full implications by the European explorers of the 18th and 19th centuries. The scourge of scurvy and the disastrous consequences of relying on technologies developed in the south might have been avoided had a science, informed by traditional local wisdom, been accessible to the travelers. The Government of Nunavut is committed to ensuring that Inuit culture, values and knowledge are incorporated in its decision making and have established structures and mechanisms to bring this about. IQ principles have been reflected in the new Wildlife Act; Inuktitut language courses are available to non-native speakers; an IQ activities day is available to government employees; and an external council, the Inuit Qaujimajatuqangit Katimajit, has been established to advise government on IQ.

#### *The objects of the IQ Committee are to:*

- Provide advice in developing public policy to reflect IQ;
- Provide advice, as requested by government departments, on their efforts to develop and deliver programs and services within the context of IQ;
- Provide advice to departments on their efforts to demonstrate traditional Inuit values through their day-to-day operations;
- Provide advice to departments on the viability of suggested approaches to IQ issues.

## IQ Activities Day Trip To Marble Island

In August of 2003 I traveled on an IQ trip with a group of government staff to Marble Island, Nunavut. [Check out the history at: [www.marbleisland.ca/history03.html](http://www.marbleisland.ca/history03.html)] I was thrilled, honoured and privileged to swim, dive and snorkel there and to see, circle and touch (I took off one glove of my wetsuit in freezing water) one of the two vessels from 1719 at some seven metres depth! I viewed the carpentry detail through my facemask. The rectangular hatch opening was intact with bevelling nicely surrounding it. The wood is relatively well preserved, considering it sank nearly 300 years ago! In fact it is pretty solid, except at the ends where it was, perhaps, broken before sinking! Awesome! If I had had an air tank and lead belt I would have spent more time down there. It would be wonderful to get some underwater pictures/video. Additionally, on the trip, I visited the remains of Captain Knight's house and visited Dead Man's Island and the cairn graves of the 19th century whalers. Maybe I will get another chance to dive and also to view the second vessel! We travelled on the yacht Avinnaajuk, captained by Yvo Airut. Our guide on the island was Nick Tattuinee.



*Fred O'Brien*

I would like to talk to the ship's architect/builder. Perhaps James Knight, leader of the expedition and a carpenter, had a hand in building it! Should you shake my hand from now on, or look in my eyes you will be in touch with amazing history, the carpenter & former employee of the Hudson Bay Company, James Knight, and part of the story of Nunavut and the North West Passage! We also visited Deadman's Island and took in much of the historic landmarks. Captain James Knight was 79 years old when he sailed from England in 1719! With some help from the travellers, Yvo Airut, the

captain, cooked up some caribou and beluga whale (muktuk) for us, we had a very satisfying meal and received an important introduction to IQ. Since the trip I have eaten raw, frozen and fresh caribou meat, frozen raw arctic char, raw walrus igunaq (aged/fermented meat) and other traditional foods. I am looking forward to trying out the stomach contents of caribou (with some trepidation!) which I have not yet found available at any of the four community feasts I have attended.

### **Traditional Knowledge and Some Lessons for Environmental Health**

Nunavummiut (people of Nunavut) have thrived on eating a varied diet of animals, fish and marine mammals, which are rich in the essential nutrients necessary for healthy living. Raw seal blubber, fish eggs, and seaweed provide the people of the arctic with an ample source of vitamin C. Native mammals and fish provide omega-3 fatty acids that give significant protection from coronary artery disease. The scurvy and possible serious lead poisoning experienced by Sir John Franklin and his 128 men appears to have contributed significantly to their premature deaths in the ill-fated Arctic expedition of 1845-48. Failures in environmental health quality assurance in relation to filling the polar victualling contract of 1845 are well outlined in Chapter 22 of Scott Cookman's book, *Iceblink: the tragic fate of Sir John Franklin's Lost Polar Expedition* (Pub: John Wiley, 2000 ISBN 0-471-37790-2). Additionally, with the exhumation of the astonishingly well-preserved bodies of Franklin's crew members Petty Officer John Torrington, Able Seaman John Hartnell and Private William Braine of the Royal Marine some 20 years ago, the arctic cold allowed the secrets of the mens' deaths to be stored and then disclosed at autopsy. The story is recorded in Owen Beattie and John Geiger's book: *Frozen in Time: Unlocking the Secrets of the Franklin Expedition* (ISBN 0-88833-253-X). Solder on the inside of food cans from the 1840s (the technology of the time) had leached into the foods causing serious lead poisoning to the sailors. It is interesting to note, also, that a viable *Clostridia* serotype was isolated and cultured from the bowel of William Blaine some 140 years after his death. (p159). Beattie and Geiger provide some very interesting observations:

*The health risks imposed by the use of lead-tin solder were simply not appreciated at that time. It was not until 1890 that government legislation in Britain finally banned soldering on the insides of food tins.*

*There is often a terrible price to pay in human exploration reliant upon new technology. The fact was vividly demonstrated again... by the failure of the space shuttle Challenger.*  
(ibid. p 162-163)

It is not long since Nunavummiut were introduced to meats produced from the intensive agricultural technology based industry of the south. Such technology requires the use of antibiotics and relies on the use of other 'growth promoters'. Housing and transportation of animals in large numbers and the bringing together of animals from many locations, in addition to the large throughput of meat in large slaughterhouses, result in an increase in the prevalence of disease causing bacterial strains and in elevated background microbial levels in the raw and frozen meats produced. Additionally, it causes an increase in the prevalence of antibiotic resistant strains and the occurrence of sensitivities to antibiotics among the general public. In Nunavut, where it is traditional for many people to eat meat raw, imported raw meat can pose particular health risks.

*The structure of animals is the work of a master who is wise and who loves the living.* Niels Stensen (Nicolaus Steno) 1638-1686

The body building and defense mechanisms of animals serve to provide wholesome food; and traditional hunting and harvesting practices are geared to ensure that the food is safe and healthy. The 1997 Canadian Arctic Contaminants Assessment Report (CACAR) indicated that, from a sample of 27 arctic beluga whales, the mercury level on the outer skin layer was some five times that of the levels in the dermis; and that approximately 20% of the total mercury in the whale skin was lost annually through molting. Traditional Inuit practice in preparing muktuk (whale skin) is to remove and discard this outer layer.

Levels of cadmium found in the livers and kidneys of the Porcupine, Finlayson and Tay caribou herds of the Yukon Territory in the 90s were considered high. The 'elevated' levels were attributed, initially, to trans-boundary aerial pollution and caused a great deal of concern to First Nations communities relying on these food supplies. Further research, however, indicated that the levels were entirely natural, affirmed the proper functioning of livers and kidneys, and were as a result of high mineralization and uptake through lichens and other forage.

An elder hunter from the community of Sanikiluak confirmed to me that, to protect against trichinosis Inuit avoid hunting old male walrus. This is entirely consistent with the facts that the incidence of trichinosis is higher among scavengers; the predominant diet of young walrus is shellfish; and the highest rate of scavenging is practiced by the old males.

The arctic variant of the 10 known genotypes of *Trichinella*, *T. nativa*, can survive several years deep frozen, and its local ecology and human pathology have unique features. A double separatory funnel digestion procedure for the efficient and reliable testing of walrus meat for *Trichinella* was introduced to our local laboratory in Rankin Inlet last summer. It was developed by the Centre for Animal Parasitology (CAP), Canadian Food Inspection Agency Laboratory, Saskatoon, and CAP provided the training and back-up support to incorporate the procedure, which rapidly screens wild meat prior to consumption, into our environmental health program.

## OUR PEOPLE – OUR WORLD

I see his face in every flower;  
The thunder and the singing of the birds  
Are but his voice – and carven by his power  
Rocks are his written words.

Joseph Mary Plunkett

The 8th World Congress on Environmental Health in Durban, South Africa in February 2004 will witness the gathering of peoples of many races, cultures, faiths and traditions from around the globe. The wisdom of the ages is found in peoples of diverse origins, and the local environment from which they come will have shaped and informed their understanding. Commitment to caring for the environment in the interest of world health will unite those gathered at the world congress, and, whatever their origins - the paradigm, cosmology, faith or tradition that mark their path – they are precious keepers of each other, and keepers of a whole fragile world that keeps us all.

*The next meeting of the  
IFEH Council will be held in  
Denver, Colorado, USA,  
on 11th & 12th September 2004*

## WHY MAKE HACCP DIFFICULT?

**By Dr. David J Cameron, Managing Director,  
Cameron Food Safety Ltd, Aberdeen,  
Scotland, and President of The Royal  
Environmental Health Institute of Scotland.**

### Introduction

Since HACCP burst onto the food safety scene in the late 1980's there have evolved almost as many opinions on what is HACCP as there are "experts" on HACCP. In the beginning this was not an issue as the whole ethos of introducing HACCP into food production was being driven by technical staff and scientific research establishments and was only being considered for food manufacturing. After a fashion this was successful. Codex Alimentarius produced the Hygiene Text in 1992 embodying HACCP and subsequently updated this publication in 1997.

The Codex system has been adopted by the World Health Organisation and is based on seven principles, which are universally accepted by most proponents of the "Art of HACCP". These seven principles are:

- Conduct a hazard analysis.
- Determine the critical control points (CCPs).
- Establish critical limits.
- Establish a system to monitor control of the CCPs.
- Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
- Establish procedures for verification to confirm that the HACCP system is working effectively.
- Establish documentation concerning all procedures and records appropriate to these principles and their application.

However, there is a major problem to the introduction of HACCP into all food businesses. The purists do not think that HACCP is achievable for all food companies. This view is primarily based on their interpretation of HACCP, a position from which they are reluctant to deviate. I would argue quite strongly that HACCP is achievable by all food businesses but to achieve this we need to move away from the diktats which to date have surrounded all attempts to introduce HACCP.

## The Problem!

I became very aware of this problem several years ago. There are two major experiences I had which highlighted the academic approach to HACCP as being rather facile. I was involved with the Central Scotland *E. coli* O157: H7 Outbreak Fatal Accident Inquiry. As part of my role in this I had the opportunity to review the HACCP system of the butcher involved. Within this document there was an identified potential hazard of *Clostridium perfringens* toxin. As a microbiologist I am aware that this organism is a spore forming obligate anaerobe. I am also aware that the toxin can form at the point of sporulation. So to control this potential hazard I could attempt to introduce very obtuse procedures which might just prevent *Clostridium perfringens* toxin production thus eliminating the perceived potential hazard. So what! I now need to start working on the other bacteriological species, which might be present. Can a retail butcher, chef or cook be expected to take this approach? I think not.

My second experience was being invited to Japan in 1999 to deliver seminars to Japanese food manufacturing companies on HACCP and HACCP implementation. Whilst delighted and honoured to be invited I have to admit to some puzzlement. Japan is a world leader in 'systems'. HACCP is a systematic approach to food safety control, so why were they not ahead of the field in this area? I discovered that the approach to HACCP had been similar to the approach referred to above. The government departments involved with the food industry and the food research establishments had been quite clear in their philosophy on HACCP. If you were not a large company with extensive technical resources, including laboratory facilities, then HACCP was not for you!

Many businesses are allegedly having difficulty complying with "HACCP" legislative requirements. I would simply pose the question, "Why are they having difficulties?" As a simple answer I would contend that we are making a potentially very simple and commonsense approach to food safety difficult because the practitioners are desperately clinging on to traditional HACCP as practiced in food manufacturing and dependent on the input of Food Scientists, Chemical Engineers, Food Microbiologists and Environmental Health Officers to operate.

As an academic I have no problems with the content and interpretation of Codex Alimentarius, Food Hygiene Basic Texts, 2002 in respect of HACCP. I equally have no issue to take with this strict interpretation for manufacturing where there are very specific issues which require to be addressed, e.g. the controls of *Salmonella species* and *Campylobacter species* in poultry rearing and manufacture or the issue of control of *Clostridium botulinum* in the canning of foods. I do, however, take offence at the purists approach which says that all food business operators must implement a HACCP which conforms to this regime – HACCP team, flowchart for every product, detailed hazards (in particular microbiological). I also find it offensive and arrogant to suggest that small businesses cannot operate HACCP, as they do not have the expertise required.

Let us develop this along the lines of the seven principles of HACCP as defined in Codex Alimentarius.

### *Principle 1 - Conduct a hazard analysis*

To carry out this we need a flow chart of the operation. A flow chart for each product or recipe is far too onerous and, therefore, let us look at constructing the flow chart with the common factors to the operation and branches for the individual products or dishes emerge from the common core.

Having established that the flow chart is a true reflection of the operation we now need to carry out the hazard analysis. This would be my second deviation from the very strict interpretation of HACCP. I feel we need to categorise the hazards as simply as possible to enable control to be meaningful. To this end, the hazards should be looked at as microbial growth and survival (this takes account of both growth and toxin production), microbial contamination, chemical contamination and physical contamination. The issue of allergens can also be incorporated in this simple way by being aware of potential problems such as the presence of nut or nut derivatives in foods and dishes.

Thereafter it is a question of introducing controls to prevent, or minimise the risk of, contamination from the sources identified. Now we are ready to move onto the next step.

***Principle 2 - Determine the critical control points (CCPs).***

If we were considering microbial growth control then I would argue that we need to control each step where there is the possibility of microbial growth up to the point where a product might be sterilised. Thereafter the most important issue would be to prevent microbial contamination. If we are not achieving commercial sterility in the product then temperature control is critical all the way through to consumption – in products or dishes where microbial growth is seen as a potential hazard. Therefore this issue is one where temperature/time controls for minimising microbial growth are all critical control points.

The three contamination hazards need to be dealt with on the basis of simple logic.

***Principle 3 - Establish critical limits***

My approach here is simple. Firstly, look at your legislative requirements and do not infringe them. Secondly, determine the temperatures, which your storage areas are capable of achieving, work to these limits and use this for determining your limits. The control you have and the shelf life of your products is dictated by what you are doing, not what you might have theoretically written into your HACCP!

Other controls, such as personal hygiene, are not at first glance so obvious for the determination and identification of critical limits. However if we look at this particular control the critical limits should be the personal hygiene “rules”, which are in place. Similarly with cleaning and disinfection the critical limits are defined within the documented cleaning schedule. Assuming there are no problems related to the ineffectiveness of cleaning and disinfection then the standards applied must be adequate. The use of microbial monitoring is at best expensive and at least ineffectual for small and medium sized businesses.

***Principle 4 - Establish a system to monitor control the CCPs.***

A very important issue which sometimes, in the most elaborate of HACCP systems, creates problems. A theoretical control is of no value if you do not have a means of monitoring if the control is in place. Therefore when determining controls for potential hazards consideration must

be given to the method of monitoring. Sometimes indirect monitoring methods are required. As an example think of control of temperature of food and time out of temperature control during preparation of food. This is important in control of microbial growth during the step but direct measurement of these two parameters could prove difficult to monitor effectively.

***Principle 5 – Establish the corrective action to be taken when monitoring indicates that a particulate CCP is not under control.***

The most important part of this principle is to appreciate that we are not attempting to determine the specific actions to be taken in the event of every conceivable theoretic loss of control which may occur. Instead we should be concentrating on the process by which we can ensure that corrective actions will occur in the event of a non-compliance with the system parameters. The specific corrective action events cannot be pre-determined.

***Principle 6 – Establish procedures for verification to confirm that the HACCP is working effectively.***

There are two elements to this and partly it can incorporate the results of visits from enforcement officers. Firstly, there is the element of whether or not the documented system is being followed. This can be determined by looking at the documented system and comparing it with the records, which exist. As an example the control of the temperature of food in chilled storage may be being controlled by recording the temperature of the chill store three times per day with the critical limits of 0°C to 5°C.

On this basis, review of the temperature records should show three temperatures each day, all the temperatures should be within the critical limits and, if they are outside the critical limits a note of the corrective action should exist. Assuming all these points are in place then this provides evidence that the system is being followed. The second element is related to the effectiveness of the system. Here looking at problems, which have arisen in the form of repeated corrective actions, customer complaints and enforcement officer criticism can be used to determine the effectiveness of the system. Assuming both these elements are adequately covered then verification can be assumed to have been achieved.

***Principle 7 – Establish documentation concerning all procedures and records appropriate to these principles and their application.***

This principle is an important feature in order to determine the continuing food safety controls in a food business. The results of a spot check by an enforcement officer only gives a moment in time impression of the safety of the business and on its own is rather meaningless. However, documentation should be straightforward and, where it exists for other purposes, duplication achieves very little. Virtually every company will have some form of delivery records as part of their business requirements. This is used for accountancy purposes and to control stock. The addition of a delivery temperature, if appropriate, integrates this into the HACCP system. I see this as performing two roles. Firstly, there is the minimising of paperwork – how often have you heard the comment “HACCP, that’s just a paper chase”? Secondly, you are now “integrating” HACCP into the functions of the business (large and small) which every businessperson sees as important to the success of their venture. We are now firmly on the trail of convincing these businesses that HACCP is also an important part of their operation and integral to the success of their company.

### **Conclusion**

HACCP is achievable for all food companies, large and small.

Food business operators have a prime responsibility over food safety. The HACCP (Hazard Analysis Critical Control Point) system is proposed as a tool to be

implemented by food business operators in order to control microbiological, physical and chemical hazards in food and thus to promote food safety.

The establishment of guides of good practice by the food sectors gives guidance to food business operators on food safety and the implementation of HACCP and flexibility for food businesses in remote areas, for traditional food production and for the implementation of HACCP in small businesses.

As can be seen above all businesses will need to implement HACCP. If, as is suggested by some reputed experts, this were impossible surely we would be doomed to failure. With the correct approach by food businesses and a professional attitude by the enforcers the universal implementation of HACCP across all food businesses will materialise with an increased level of confidence in food safety by the consumer.

If however, the enforcing agencies do not look at each business’ HACCP on its own merits but rather expect a rigid format common to all businesses as perceived by the enforcer we will fail to implement HACCP. In this way food businesses will understand why they are needed and will take account of them during reviews.

HACCP is the way forward, we should have been doing it years ago. I get frustrated when I think about all the effort I misguidedly channeled into controlling quality in food manufacture 30 years ago when I should have been adopting the principles of HACCP. Moreover, HACCP is possible for every food operation, let us stop being professionally “precious” and come back into the real world.



*A group of happy participants at one of the many Health Education events referred to in the following article.*

## **“Sanitary Capitaos”: Problems and challenges facing Environmental Health Officers and Environmental Health Assistants in Chikwawa, Malawi**

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*“For millions of children today, particularly in Africa, the biggest health challenge is to survive until their fifth birthday, and their chances of doing so are less than they were a decade ago.”*  
(Lee Jong-wook, Director-General, World Health Organization, World Health Report 2003).

*“It is an appalling fact that, of all who are born of the labouring classes in Manchester (UK), more than 57% die before they attain 5 years of age, that is, before they can be engaged in factory labour.”*  
(Edwin Chadwick, Sanitary Commissioner, Report on the Sanitary Condition of the Labouring Population 1842).

### **Introduction**

Malawi is a country that is located in Southern Africa, east of Zambia and shares borders with Mozambique and Tanzania. The country is one of the poorest nations in the world. It has an annual gross national product of US\$ 166 per capita (UK = >24,000 US\$ per capita) resulting in two thirds of the population having to live below the absolute poverty line (Table 1). Two out of five of the population has to live on less than US\$1 per day and three quarters of the population on less than US\$2 per day. Within the Southern African Development Community (SADC), only Angola and Mozambique have a human development index (HDI) value less than that of Malawi. It is categorized within the lowest human development category, ranked the 162nd out of the 175 countries listed. HDI is a composite index

measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living. The country has an estimated total population of 11.8 million people with an annual population growth rate of 1.5%, and a population density of 105 people per square kilometre. Approx. 86% of the population reside in rural areas predominately engaged in subsistence farming, with the remaining 14% in urban and peri-urban centres. The literacy rate within the country is low with approx. half (48%) of all women and one in three (30%) men functionally illiterate. This is mainly because of not having attended school.

### **Health Indicators**

The country’s health indicators are among the worst in the world including a life expectancy that has been declining over the years and an infant mortality rate that has improved only marginally in the last ten years. The World Health Organisation (WHO) has recently grouped Malawi in the highest of the five mortality strata (Afr-E) on the basis of its level of mortality in children under five years of age (u/5) and males 15-59 years old (Anon, 2003). Infant mortality (u/1) and u/5 mortality rates for Malawi are the 2nd and 3rd highest in the SADC (Tables 2 & 3).

The range of human development in the world is vast and uneven especially between developed and developing countries. A child born today in Malawi has a life expectancy (< 40 years) half of that of a similar child born in the UK. The Malawian child would have an 80% chance of living to the age of 5 years and less than a 40% chance of reaching it’s sixtieth birthday. There is a 40% chance that the child would still be illiterate by the time it becomes a teenager (i.e. 15th birthday) and a one-in-three chance that it will remain malnourished throughout its life. There is a one-in-four chance that the mother of a child may be HIV positive when giving birth and therefore may not live long enough to see her child develop to adulthood (Table 6). There is also a significantly greater risk that the mother of a child may die from a pregnancy related cause (1,100 / 1000,000 people) compared with other SADC countries (Table 2 & 3). At present, some 65,000 children under the age of 14 years are HIV positive in Malawi, a statistic that is projected to get worse over the next decade (MDHS, 2000). These statistics are in sharp contrast to the opportunities in life afforded to a child born in the UK and other developed countries. Unlike in the UK, where housing, water, sanitation, nutrition,

education, maternity and medical care are readily available and affordable, this is not the case in Malawi for the majority of the population.

### **Health Care System in Malawi**

A key objective of the Government of Malawi is to raise the health status of all Malawians, especially severely affected groups, through improving access to health facilities and related services through primary health care (PHC). The formal health care services in Malawi are structured into six levels namely, health posts, health centres, rural hospitals, district hospitals, central hospitals and special hospitals. These services are provided throughout the country by a mixture of Government, Christian Health Association of Malawi (CHAM), non-government organisations (NGO's), individuals, and a few private companies e.g. Illovo sugar company in Chikwawa that provides health care for its workers. The Ministry of Health and Population (MOHP) is by far the largest provider of health services (40%) whilst approx. one in five (19%) are managed by the CHAM. Local authorities run 8% and the rest are operated by the private sector or NGOs. Informal health services providers include traditional birth attendants (TBAs), traditional healers and local vendors/shops.

The services at community level include outreach activities conducted through mobile clinics held either in public or at manned or unmanned health posts. Outreach activities are mainly primary health care type of activities. Most health centres on the other hand offer curative and maternal services. District hospitals are referral centres for health centres and also serve the local populations, offering both in-patient and outpatient services. Central hospitals act as district hospitals for their own districts as well. They are different from district hospitals in that they provide specialist referral care for their respective regions. Lastly, special hospitals offer very specific services such as mental health services and in-patient care for leprosy. Services are generally free at government facilities. All the central hospitals (Lilongwe, Queen Elizabeth, Zomba and Mzuzu Central Hospitals) charge user fees in special wards.

The poor health indicators in Malawi are due to many and interrelated reasons, but primarily a result of low socio-economic levels due to poverty and high prevalence of HIV/AIDS. Most of the health facilities are under staffed due to limited financial resources and inadequately trained individuals. The doctor to patient ratio is 1

to 350,000, nurse to patient ratio is 1 to 50,000 and environmental health officer to community is at 1 to 100,000 people. Factors that restrict people's ability to access the available health facilities include the location of the facility, lack of transportation, culture, religion and the cost and quality of service. In some rural parts of Malawi, health facilities are allocated far apart (e.g. 20 kilometres) and for the clients / patients to access these health services they need money for transport. Natural barriers such as rivers and escarpments also hinder people to access health services. Some people culturally prefer to consult local traditional healers and take traditional medicine rather than consult a doctor or take western hospital medicine. Religious denominations such as Zion and Apostolic Faith churches prohibit their members and faithful from seeking any sort of health service from any health provider and believe that they will be healed through the power of prayer. Shortage of staff and drugs in some health facilities results in despondency and as a result people lose interest in seeking health services from their nearest health facilities. In addition, some communities are only served by health facilities that charge for their services e.g. St Montfort at Nchalo in Chikwawa. Due to low-income levels of many Malawians, they fail to visit such health facilities for health care assistance. As a result, less than half (46%) of people in Malawi are able to access to the available health services (Anon, 1999a).

### **National Health Goal**

The National Health goal outlined in the Malawi Fourth National Health Plan 1999-2004 is to raise the level of health status of all Malawians (Anon 1999a & b). This can only be undertaken by developing a sound and achievable health care delivery system, that is capable of promoting health, preventing diseases, protecting life and fostering well being and increased productivity; and reducing the occurrence of premature death.

In support of this goal, four supporting health sector policies have been developed and adopted to guide the health services delivery and operation of the health sector. These health sector policies are:

Introduction of the Essential Health Package (EHP), which focuses on promoting the provision of basic cost-effective package of promotive, preventive and curative health services. Such essential health services include promotion of safe water and improved sanitation, expanded programme on immunisation (EPI), family planning and safe motherhood, nutrition,



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prevention and control of malaria, HIV/AIDS, diarrhoeal diseases, acute respiratory infection (ARI) and tuberculosis.

Introduction of Sector Wide Approach (SWA), which deals with sector collaboration between government, NGO's and donor agencies in delivery of health services.

Decentralisation of health care management system that aims at strengthening the management of health care delivery at district and central hospitals; and at community level.

Introduction and strengthening of cost-recovery scheme by government, CHAM and other health care providers.

### Malawi Health Targets

In order to achieve the National Health goal the Government of Malawi in its 1999-2004 National Health Plan set the following targets:

Reducing maternal mortality rate from 620 to 310 per 100,000 women,  
Infant mortality rate from 134 to 100 per 1000 live births,  
Under five-mortality rate from 234 to 150 per 1000,  
HIV seroprevalence from 16% to 7%,  
Average diarrhoeal episodes in under five children from 6 to 3 per child,  
Childhood malnutrition in under five children from 50% to 25% and  
Malaria morbidity from 33% to 8%.

### Environmental Health in Malawi.

Environmental health as a profession in Malawi dates back to the early 1950s when the Government of Malawi established the Zomba School of Hygiene. The school trained a cadre of health assistants who were popularly known as 'sanitary capitaos' because of the nature of their work i.e. mostly engaged in inspecting pit latrines and refuse disposal sites. The profession gained momentum when the University of Malawi at its inception in 1965, offered a programme in Public Health at diploma level, the graduates of which were known as Public Health Inspectors. In 1994, they were became known as Environmental Health Officers falling into line with the rest of the developed world. The University phased out the diploma programme in 1998 and with the help of the University of Strathclyde the course became a four-year Bachelor of Science degree in Environmental Health. Lilongwe School of Health Sciences complements the efforts of the University

in promoting the profession by offering a basic technical course that produce "Assistant Environmental Health Officers" at diploma level.

The professional body responsible for practising environmental health officers and assistants in Malawi is the Environmental Health Officers Association of Malawi (EHOAM). EHO's & EHA's are employed in both the public and private sectors with an estimated total of 300 in the country. The exact number is unknown. The Government of Malawi registered the EHOAM in 1980 and since that time, it has been a member of the Environmental Health professional body in the SADC region. The objective of the EHOAM is to safeguard the national status of the environmental health profession and to improve the working conditions of its members.

However, the professional body is currently inactive and has encountered many problems preventing it from meeting its goals and its mission. Some of these problems are:

Death and retirement of key members at all levels at national, regional and district levels which has paralysed the operation of EHOAM as a professional body.

Weak management by the current office bearers has resulted in the discontinuation of the Association's annual and regional meetings at all levels.

Inadequate funds to run the association, and little effort in exploring alternative means of generating income to the profession e.g. offering continuous professional training courses, running conferences or consultancy work.

To help address some of these issues, the Royal Environmental Health Institute of Scotland (REHIS) and International Federation of Environmental Health are actively liaising with representatives of the EHOAM to help re-vitalise the professional body in Malawi. More recently, the Commonwealth Scholarship Commission in the UK awarded a professional scholarship in 2003 to a practicing EHO in Malawi to travel to the UK and meet key members of the professional bodies there. This resulted in the development of a number of ideas whereby income could be generated to make the EHOAM both viable and sustainable. An active and viable profession would also enhance public awareness of the importance of environmental health in promoting sustainable development to alleviate poverty and improving the health status and quality of life of the population. A viable

professional body capable of offering continuous development courses would enable practising EHO's to develop their professional competency, keep abreast of new developments in public health and improve in knowledge and skills in order to maximise their performance. Unfortunately, EHO's in Malawi lack such opportunities effectively upon graduation.

In Malawi, environmental health is a multi-disciplinary field and an integrated service that is concerned with developing criteria and prescribing environmental health quality standards. It is responsible for enforcing and monitoring compliance with national legislation and regulations in the following areas: safe drinking water, sanitary disposal of human excreta; safety in the use, handling and disposal of harmful chemical substances; radiation protection; notifiable diseases; vector borne diseases, control of environmental pollution; appropriate and safe waste management practices; occupational health and hygiene services; port health; pest control; food hygiene and safety practices; housing and infrastructure development; personal hygiene and general household cleanliness.

The overall policy objective of environmental health in Malawi is to give high priority and support for environmental health measures aimed at preventing and controlling environmental factors and occupational health hazards that may adversely affect the health and well-being of all people in Malawi. It operates within the framework of PHC, which is the main health care delivery strategy in achieving an increase in health status of the people through their involvement as beneficiaries. PHC in environmental health services delivery aims at establishing accessible and affordable environmental health services at national, district and community level with effective sectoral coordination and cooperation with relevant government agencies, local authorities, NGOs and the private sector. Despite this aim, environmental health practice in Malawi still faces tremendous challenges primarily due to poverty, lack of resources and general mismanagement of the health sector. Some of those challenges are outlined below.

## **Environmental Health Challenges**

### **High Disease Prevalence**

Several diseases of public health importance significantly affect the Malawian community. It is estimated that 70% of mortality among in-patients is due to communicable and preventable diseases

such as malaria, upper respiratory infections, diarrhoeal diseases, eye and worm infection, HIV/AIDS, malnutrition and anaemia (Anon 1999a) (Table 4). These diseases are also considered to be major cause of outpatient attendance in all health facilities in Malawi. The data presented in the various tables that accompany this article refer to the number of cases reported to the WHO and may represent only a fraction of the true number in a country because of incomplete reporting systems, incomplete coverage by health services and / or misclassification. Because of the diversity of case detection and reporting systems with the SADC, it is difficult to accurately compare data between countries.

### **Malaria.**

Malaria is the most frequent cause of morbidity and mortality reported in all age groups in Malawi (Table 4), and is the cause of over 40% of deaths in children under two years of age. It is estimated that one in three outpatient attendees and nearly half (45%) of hospital in-patients are due to malaria or malaria complications such as anaemia. Currently, more than one-in-four people suffer from malaria with a reported malaria-mortality rate in the general population of 275 / 100,000 people. Malawi also has a significantly greater malaria-related mortality rate in children younger than the age of 4 years (1,288/ 1000,000 children) compared with other SADC countries (Table 5). Children under the age of five years suffer on average 9.7 malaria episodes per year, while adults suffer 6.1 such episodes (Ettling *et al.*, 1994a). The human and economic costs are enormous. In addition to the expenses of consultation, treatment, hospitalization, and travel, malaria often leads to low productivity and lost income from days of work missed. The cost of malaria to the average Malawian household has been estimated at US\$35 annually-or 7.2% of the average household income (Ettling *et al.*, 1994b). In reality, this cost is very high for most Malawians; especially those that reside in rural areas and exist on subsistence farming.

The seasonal prevalence of malaria is greatest during the rainy season. This is primarily due to the accumulation of wastewater in disused containers and presence of overgrown bushes close to dwelling houses providing ideal breeding sites for the mosquito. To reduce the prevalence of malaria, the MoHP instigates regular malaria control programmes through out the country such as the Roll Back malaria programme. The Minister of Health initially launched this in Mkanjila district in October 2003. In addition,

the NGO 'Population Services International (PSI)' have recently produced low-cost (US\$ 2.00-6.00) insecticide treated (with biodegradable pyrethroid insecticide) mosquito nets (ITN's). Sleeping under treated nets is a proven method of preventing malaria. Based upon research trials undertaken in Africa in 1996, the WHO reported that the lives of a half a million African children might be saved each year if the nets were widely and properly used. However, less than 3% of children under the age of 5 years in Malawi use insecticide treated nets (Table 5).

As part of the WHO 'Roll Back Malaria' (RBM) initiative, the Community Health Sciences Unit (CHSU) in Malawi undertakes periodic malaria vector surveys and instigates control activities in various communities. This enables communities to become sensitised to the problem and empowered to take a leading role in reducing the potential for the transmission of the disease at a local level. At present, a survey of the incidence of severe malaria and anaemia is underway at Chikwawa hospital and Ngabu rural hospital. The findings of this study will enable specific targeting of the limited resources available to combat the problem in these areas. The WHO Roll Back Malaria initiative was established in 1998 to galvanize global, regional and country-level partnerships in order to reduce the morbidity and mortality due to the disease. Its strategies are (i) to intensify application of existing tools for the prevention of malaria, (ii) to improve early access to effective malaria treatment, (iii) to increase access to and availability of preventive measures to populations and individuals at risk of malaria, (iv) to strengthen health systems in countries and situations where malaria is a major health burden, and (v) to support the development of new, cost-effective approaches and products for decreasing the malaria burden. The RBM initiative has called for a 30-fold increase in ITN use.

A number of factors limit the degree of success achieved by the above efforts in Malawi e.g. (i) high poverty levels, (ii) limited funds to run all the necessary activities at district level, (iii) subsistence farming practices (whereby approx. 30% of communities temporarily settle along the Shire river for winter cropping, thereby exposing themselves to mosquitoes) and, (iv) poor sanitation standards around dwelling houses that provide a conducive environment for the breeding of mosquitoes.

## **HIV/AIDS**

Malawi reported its first AIDS case in 1985 and by the end of 1997, nearly one million people had tested HIV positive, a figure which is expected to double by 2010 (Malawi National AIDS Control Programme (NACP)). It is estimated that at least 16 percent of the population are infected and one-in-four (25%) of the urban workforce likely to die from HIV/AIDS in the next ten years. Over the next decade this will significantly affect the nation's development efforts and activities including the health care delivery system. By the end of this decade, the NACP estimate that 70,000 children will be orphaned annually by the pandemic, while the number of people with fully blown AIDS will reach 100,000. Currently, it is estimated that 65,000 children under the age of 14 years of age are infected with the HIV virus (Table 6). In 1994, 70% of sex workers tested in the capital Lilongwe were HIV positive. In 1998, the HIV incidence in antenatal women was estimated to be 26% in urban areas. In 1997, nearly one-in-five (17%) of urban women less than 20 years of age were found to be HIV positive, with a peak incidence of 32% in women between the ages of 25-29 years of age. Outside major urban areas, the prevalence of infection amongst antenatal women increased three-fold between 1992 (6%) to 1998 (18%). In 1997, 14% of women less than 20 years of age from rural areas were found to be HIV positive with a peak prevalence of 28% in women aged between 25-29 years.

Despite the progress that has been made on the biology and mode of transmission of the organism, a cure for those infected is still some way off. Until such time as a cure is available, emphasis must be placed on HIV/AIDS awareness and prevention strategies and to encourage behavioural change. To this end, a number of control measures have been instigated to tackle the HIV/AIDS problem in Malawi e.g. the provision of voluntary confidential counselling and testing (VCCT) centres in all districts. Such centres allow those infected with HIV/AIDS to be effectively counselled about the significance of the disease and the opportunity is taken to emphasise the importance of practising safe sex and the need for behavioural change. Behavioural change is also encouraged through a variety of health education initiatives on HIV/AIDS transmission and prevention in local communities, schools, workplaces and those involved in the sex trade. To reach a greater range of people and communities, different communication channels are used e.g. drama, songs, audio visual etc. Screening of all pregnant mothers is encouraged

at all antenatal clinics and the use of condoms is promoted for safe sex practices. Factors limiting the success of these efforts include cultural and traditional beliefs, shortage of staff, relevant teaching materials, inadequate HIV testing kits, poor transport and financial support. Few people can afford the cost of the anti-retroviral drugs used to prolong the life of those infected with the virus. As a result, many people purchase fake, illegal and often expired drugs from drug peddlers offering dubious cures, ignoring warnings from the MoHP.

## Tuberculosis

The incidence of tuberculosis (TB) in the country is increasing amongst all age groups whilst the cure rate appears to be decreasing i.e. from 75% to 70% primarily due to the HIV/AIDS pandemic. In 1997, studies indicated that an estimated 20,000 Malawians contracted TB each year, of which nearly half died from the infection or related complications such as HIV/AIDS. A countrywide survey by the Malawi Tuberculosis Control Programme in 2000 found that 77% of all TB cases were HIV positive. The incidence of TB in Malawi is currently estimated at 242 / 100,000 people, with approx. one-in-five people dying from the infection (TB-related mortality rate: 49 / 1000,000) (Table 7). In Chikwawa, the average number of reported TB cases is 800 per year with a cure rate of 76%. To deal with the problem in Chikwawa, EHO's & EHA's have focused on (i) enhanced health education programmes on respiratory disease, personal hygiene and housing construction, (ii) promoting the need for speedy case reporting by health workers and traditional healers at community level, and (iii) the introduction of the directly observed treatment, short course (DOTS) case detection and treatment strategy.

DOTS is the acronym for the TB control strategy recommended by the WHO. Success of the strategy depends on implementing a five-point policy package: (i) government commitment to a national TB programme, (ii) case finding based upon sputum smear microscopy, (iii) a standardised short course of chemotherapy for at least all smear-positive TB cases, (iv) a regular, uninterrupted supply of essential anti-TB drugs, and (v) a monitoring system for programme supervision and evaluation. TB programmes which have adopted the DOTS strategy have good data on case finding, high rates of smear-positive pulmonary TB, and better cure rates than programmes which do not use DOTS (Harries *et al.*, 2001). About 40% of TB cases in Malawi are

detected under the DOTS strategy, of which 73% are cured (Table 7).

Factors limiting the control of TB are (i) poor housing standards in most rural communities of Malawi with little or no ventilation, (ii) a shortage of diagnostic equipment such as light microscopes at health centres to facilitate speedier diagnosis of positive sputa and (iii) inadequate funding as highlighted above. All these factors restrict the Districts ability to successfully implement the DOTS strategy.

## Diarrhoeal Diseases

Food-borne, water-borne and sanitation related diseases are very common in Malawi. The prevalence of diarrhoeal diseases is estimated to be about 7%, which is likely to be an underestimate of the true prevalence of the disease as only the most severe cases are brought to the attention of the nearest clinic. Diarrhoeal disease are known to be the most common cause of out-patient attendance amongst children under the age of 5, the fourth cause of admission to hospitals and the fifth cause of hospital reported deaths. Low accessibility to safe drinking water and inadequate sanitation, poor food, water, personal and environmental hygiene practices are the main factors that contribute to the transmission of enteric pathogens. In 2002, 33,000 cases of cholera were recorded. Of these, 1,220 were reported from Chikwawa with an attack rate of 0.4%, which is slightly above the WHO attack rate of 0.2%.

The main bodies responsible for the provision of water supplies in Malawi are the Ministry of Water Development (MoWD), the Water Boards and, to a lesser extent, the MoHP with respect to sanitation. The main stakeholders in the Malawi water sector are the MoWD and departments, the private sector, NGO's and civil society organisations. International donors also set up and fund their own water and sanitation projects. The roles and inter-relationships of the various players are not well established or defined. This is especially true of governance responsibilities i.e. planning, budgeting and the preparation of investment plans. The fragmentation of the sector also affects the responsibilities for operation and delivery, such as project planning, the system of design, contracting, supervision and the co-ordination of water and sanitation projects. This lack of co-ordination is a major contributory factor to the overall poor performance of the sector, which is failing to deliver safe water supplies to poor people.

The percentage of the population in Malawi with access to an improved water source for drinking (e.g. household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collection) ranges from 44% in rural areas to 95% in urban areas (Table 8). Reasonable access is defined as the availability of at least 20 litres a person per day from a source within 1 Km of the user's dwelling (Anon, 2003b). The percentage of the urban and rural population with access to safe and unsafe water supplies is outlined in Table 9. Safe water sources are piped water systems, boreholes, protected shallow wells and springs, whilst unsafe sources are lakes, rivers, dams and open unprotected shallow wells and springs. Surface water sources are often highly polluted with human and animal wastes, industrial wastewater and agricultural chemical run-offs. Boreholes and protected wells are the most favoured sources of drinking water supply in rural areas, however it is estimated that approx. one-in-three (30%) of these supplies are in a major state of disrepair and non-functional due to lack of spare parts and poor maintenance.

The percentage of urban population with access to adequate excreta disposal facilities (e.g. connection to a sewer or septic tank system, a pour-flush latrine, a simple pit latrine or a ventilated improved pit latrine) is 96% (Table 8). An excreta disposal system is considered adequate if it is private or shared (but not public) and if it can effectively prevent human, animal and insect contact with excreta (Anon, 2003b). Most people in rural and high-density townships in urban areas use the conventional pit latrine, which are often in a state of disrepair and unhygienic. Efforts have been made to improve the structure of pit latrines by including a concrete sanitation platform and ventilation pipe to remove foul smells and trap flies. However, due to the costs involved, these have met with limited success and as a result most are unhygienic. Children's faeces can often be seen around the drop hole or latrine, as they are frightened to use it due to the darkness and / or smell. During the rainy season, many pit latrines collapse under their own weight due to poor soil structure and poor standard of workmanship and this further reduces the pit latrine coverage in Malawi. Communities in urban areas use a combination of waterborne and on-site sanitation in form of conventional sewerage systems, septic tanks and pit latrines. For those who do not have access to a latrine or cannot afford the cost of labour involved in constructing one, open defecation in the bush and water bodies is still a popular means of human excreta disposal (Table 10).

With the support from the government and NGOs like the Catholic Development Commission of Malawi, EHO's and EHA's in Chikwawa are actively engaged in (i) promoting improved sanitation through encouraging the construction and use of pit latrines, (ii) environmental and personal hygiene through proper domestic waste disposal and hand washing at community and school level, (iii) the provision of chlorine and water guard to disinfect rural water supplies, and (iv) the provision of safe water points in the form of boreholes by the Malawi Social Action Fund (MASAF) to reduce the potential for future waterborne outbreaks.

### Schistosomiasis

Schistosomiasis (i.e. snail fever or bilharzias) has been endemic in Malawi for several decades (Teesdale & Chitsulo, 1985). Surveys have identified infected people in a number of villages around Lake Malawi and in recreational users of the waterbody (Cetron *et. al*, 1996). The disease is very common in children aged between 5 to 15 years, contracted as a result of them playing in still or slow moving water bodies. However, others become infected through bathing, washing dishes, laundry and collecting surface water for drinking purposes. The MoHP estimates that up to four out of five children in lakeshore districts are infected. On an annual basis between 15,000 and 19,000 cases are reported (Anon 2002). It is estimated that more than 50% of all primary school children are infected with the parasite. In Chikwawa, the prevalence of infection in school children is 56% and is most common in communities around irrigation schemes (e.g. Kasinthula, Nkhate and Illovo sugar estates).

To reduce the prevalence of infection in Chikwawa as well as other districts in Malawi, the MoHP in collaboration with other NGO's (i.e. GTZ, a German NGO & Press Trust) are (i) instigating health education in local communities and primary schools and (ii) introducing mass screening and treatment of positive cases. In Chikwawa, sugar estate owners are actively encouraged to provide protective wear to their employees. Factors limiting the success of the above interventions are poor sanitation standards as a result of non-use of pit latrines. This results in higher re-infection rates because faecal matter containing the transmissive stage of the parasite is continuously washed into water bodies. Other problems include the inability to screen patient's urine and faeces due to the lack of available light microscopes in local health centres. The use of insecticides is prohibitively expensive and hence

unaffordable. In addition, they are ecologically unsustainable as they destroy aquatic life other than the vector.

## Plague

Plague in Malawi is rarely experienced with the exception of periodic outbreaks that tend to occur along the borders with Mozambique, Tanzania and Zambia. Outbreaks of bubonic plague have been reported in Nsanje district, south of Chikwawa at the southern tip of the country since 1994. The number of cases peaked at 582 in 1997 associated with an outbreak affecting Nsanje, Chikwawa and Ntchisi Districts. Additional outbreaks have been recorded in 2002 and 2003. In 2003, Malawi recorded 200 cases of plague from two districts of Nsanje and Nkhatabay.

Outbreaks are usually associated with poor environmental sanitation, which encourage vermin such as mice and rats to proliferate. When outbreaks occur, cross-border solutions are instigated to (i) control the vermin population in the affected areas, (ii) improve the surveillance and diagnosis of cases at community and health centre levels, (iii) introduce health education to communities on proper storage of food stuffs, disposal of left over foods and good sanitation and hygiene practices. As mice are part of the diet for people in rural areas, this increases the chances of people/mice contact and increases the risk of contracting plague should the insect vector and bacillus be present.

Disease causing vectors and vermin are a public health concern in Malawi as they transmit several infections to human beings. The commonly found vectors are bedbugs, cockroaches, fleas, mosquitoes, rodents, ticks, lice and tsetse flies. The MoHP, Ministry of Agriculture and a range of private organisations provide vector control services. However, government services are not successfully implemented due to (i) the high costs associated with the purchase of chemicals and equipment, (ii) lack of trained manpower to undertake the service, and (iii) poor sectoral institutional co-ordination. In Chikwawa district the services have been decentralised to the communities themselves through the revolving fund concept. EHO's and EHA's are responsible for providing surveillance, identifying the type of infestation and to offer advice on the most appropriate chemical/pesticide to be applied. In addition, they offer advice on community based control measures such as personal and environmental hygiene and sanitation, trapping and proper food storage and disposal within the compounds.

## Discussion and Conclusion

Health care delivery in Malawi is undertaken at central, district and community levels. The national health plan (1999 – 2004) acts as a guideline to all governmental and non-governmental sectors in implementing their health activities to achieve the targets set to raise the health status of all Malawians. This plan identifies a number of targets aimed at improving the health indicators for Malawi, which are at present the worst in sub-Saharan Africa. However, the health delivery system in Malawi is not well developed at all levels and it is debatable whether or not the targets set will be achieved within the timeframe set. Poor prioritisation of health activities has resulted in poor targeting of health services and inadequate co-ordination among governmental and non-governmental sectors in health care delivery. In order to meet the national goal and targets policy makers need to be persuaded to give priority to the health sector and target preventive services at community level through the primary health care concept.

Those in Government need to be proactive and focus upon preventative measures to reduce the disease burden upon society, rather than be reactive and attempt to cover the spiraling costs associated with curative measures. Therefore, priority has to be given to environmental health services when allocating financial and material resources to enable the effective and efficient implementation of the environmental health programmes at all levels. There is a clear need to promote the principles of integrated environmental health intervention measures based on intersectoral and community participation and improved co-ordination within the MoHP, MoW, and with relevant government agencies and NGOs. This should lead to clearer guidelines being developed on the roles and shared responsibilities for relevant government and NGO agencies and local authorities in carrying out the national health policy if the set targets are to be met by 2004. Proper co-ordination among all sectors implementing health related activities to spread the activities evenly in the communities is of paramount importance. An annual evaluation of health activities in accordance with the national health plan would assist planners and implementers to direct the limited financial and human resources available to the areas that need more effort and concentration.

There is a clear need to review existing national legislation, regulations and practice with respect to environmental health. At present, the country is

suffering from a poor legal framework to help EHO's protect public health. Several pieces of legislation and regulations exist, however some of them are outdated and the administration is fragmented between different government agencies. For example, the Public Health Act of 1945 is the main statutory instrument enforced by EHO's in the country. This Act needs to be repealed and replaced with a more up-to-date legislation that addresses the problems that EHO's deal with today e.g., environmental protection, occupational health and safety etc. The outdated legislation makes it difficult to protect public health. Local Authorities have their own bylaws on food, wastewater disposal, sanitation, pollution control and hygiene only applicable in cities. However little is done by the EHO's to enforce these laws because of under staffing, lack of prosecution and political interference. As such, this leads to poor sanitation, high pollution levels and poor food hygiene standards.

Indicators and standards need to be derived to determine, measure and assess whether the environmental health services are effective and adequately address the goals and objectives of the national health policy. Emphasis should be placed upon improving water, sanitation and promoting behaviour change. To address this, a centre for water, sanitation and health is currently under development at the University of Malawi – The Polytechnic in Blantyre. In most peri-urban and rural local communities, small to medium enterprises and informal settlements, the environmental health services are limited and not well developed. The inadequate technical, material and financial support are major constraints to implementing the environmental health programmes. Other areas of environmental health routinely practiced in developed countries need to be developed in Malawi e.g. environmental impact assessment, health impact assessment and auditing, occupational health and safety, environmental health action plans etc. Finally, there is a need to train, motivate and retain health sector staff, especially EHO's & EHA's so as to promote and enforce preventive environmental health interventions. This should be done through the health professional bodies concerned e.g. the development of continuous development courses. Whilst this may occur within other health sector professions in Malawi, this is not the case in environmental health. With respect to environmental health, this should be developed through the EHOAM which first of all needs to be a revitalised and re-activated.

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**Table 1. Human Development Indicators 2003 in the SADC compared with UK.**

Country	HDI index	GDP index	GDP per capita (US\$)	Public expenditure on health (as % of GDP)	Public expenditure on education (as % of GDP)	Population living below \$1 a day (%)	Population living below \$2 a day (%)	Population living below the national poverty line
Angola	0.377	0.50	701	2.0	2.7	-	-	-
Botswana	0.614	0.73	3,066	3.8	8.6	23.5	50.1	-
Congo	0.502	0.38	886	1.5	4.2	-	-	-
Lesotho	0.510	0.53	386	5.2	10.1	43.1	65.7	-
Malawi	0.387	0.29	166	3.6	4.1	41.7	76.1	65.1
Mauritius	0.779	0.77	3,750	1.9	3.5	-	-	-
Mozambique	0.356	0.41	200	2.7	2.4	37.9	78.4	-
Namibia	0.627	0.71	1,730	4.2	8.1	34.9	55.8	-
Tanzania	0.4	0.28	271	2.8	2.1	19.9	59.7	41.6
Seychelles	0.84	0.86	6,912	4.1	7.6	-	-	-
South Africa	0.684	0.79	2,620	3.7	5.5	< 2	14.5	-
Swaziland	0.547	0.63	1,175	3.0	1.5	-	-	-
Zambia	0.386	0.34	354	3.5	2.3	63.7	87.4	72.9
Zimbabwe	0.496	0.52	706	3.1	10.4	36.0	64.2	34.9
UK	0.93	0.92	24,219	5.9	4.5	-	-	-

**Table 2. Human Development Indicators 2003 in the SADC compared with UK.**

Country	Life expectancy at birth (years)	Infant mortality rate (per 1,000 live births)	Under 5 mortality rate (per 1,000 live births)	Probability at birth of surviving to age 65 (% of cohort)	Maternal mortality ratio reported (per 100,000 live births)	Undernourished people (as % of total population)	Adult literacy rate (% age 15 and above)
Angola	40.1	154	260	31.1	-	50	-
Botswana	39.7	80	110	21.7	330	25	78.1
Congo	48.2	81	108	37.5	-	32	81.8
Lesotho	35.1	91	132	19.2	-	26	83.9
Malawi	37.5	114	183	21.3	1,100	33	61.0
Mauritius	72	17	19	82.4	21	5	84.8
Mozambique	38.1	125	197	26.3	1,100	55	45.2
Namibia	44.3	55	67	30.8	270	9	82.7
Tanzania	43.3	104	165	29.2	530	47	76.0
Seychelles	-	13	17	-	-	-	-
South Africa	47.7	56	71	37.4	-	-	85.6
Swaziland	34.4	106	149	15.2	230	12	80.3
Zambia	32.4	112	202	10.6	650	50	79.0
Zimbabwe	33.1	76	123	8.3	700	38	89.3
UK	78.2	6	7	89.4	7	-	-

**Table 3: World Health Organisation Life Expectancy & Mortality Rates in the SADC compared with UK**

Country	Life Expectancy at Birth (Years)		Probability of Dying (per 1000)			
			Under 5 years		15-59 years	
	Male	Female	Male	Female	Male	Female
Angola	37.9	42.0	279	247	594	481
Botswana	40.2	40.6	104	102	786	745
Congo	51.6	54.5	109	101	474	410
Lesotho	32.9	38.2	166	160	902	742
Malawi	39.8	40.6	197	190	657	610
Mauritius	68.4	75.5	20	14	222	116
Mozambique	41.2	43.9	212	201	613	519
Namibia	48.1	50.5	97	93	605	529
Tanzania	45.5	47.5	163	144	561	512
Seychelles	67	77.2	15	10	243	113
South Africa	48.8	52.6	86	81	598	482
Swaziland	36.9	40.4	150	142	818	707
Zambia	39.1	40.2	191	176	700	654
Zimbabwe	37.7	38.0	115	107	821	789
UK	75.8	80.5	7	6	107	67

**Table 4. Prevalence of Disease in Malawi**

DISEASE	PREVALENCE (%)
Malaria	33
HIV/AIDS	20
Upper respiratory infections	12.4
Diarrhoeal Diseases	7.0
Anaemia	7.0
Eye Infections	4.3
All other diseases	16.3

**Table 5. Human Development Indicators 2003 in the SADC compared with UK.**

Country	Malaria / 100,000	Malaria-related mortality rate (per 100,000)	Malaria-related mortality rate (per 100,000), children aged 0-4	Children under 5 with insecticide-treated nets (%)	Children under 5 with fever treated with anti-malarial drugs (%)
Angola	8,773	354	1,624	2.3	63
Botswana	48,704	15	72	-	-
Congo	5,880	78	395	-	-
Lesotho	-	84	549	-	-
Malawi	25,948	275	1,288	2.9	27
Mauritius	1	0	0	-	-
Mozambique	18,115	232	1,159	-	-
Namibia	1,502	52	300	-	-
Tanzania	1,207	130	676	2.1	53.4
Seychelles	-	4	40	-	-
South Africa	143	0	0	-	-
Swaziland	2,835	0	0	0.1	25.5
Zambia	34,204	141	721	1.1	58
Zimbabwe	5,410	1	0	-	-
UK	-	0	0	-	-



**Table 6. Human Development Indicators 2003 in the SADC compared with UK.**

Country	People living with HIV/AIDS (age 0-14)	People living with HIV/AIDS (age 15-49)	HIV prevalence among pregnant women aged 15-24 (%), in major urban areas	HIV prevalence among pregnant women aged 15-24 (%), outside major urban areas
Angola	37,000	5.50	-	-
Botswana	28,000	38.80	33.3	31.4
Congo	15,000	7.15	11.0	-
Lesotho	27,000	31.00	22.0	16.1
Malawi	65,000	15.00	-	-
Mauritius	-	0.10	-	-
Mozambique	80,000	13.00	16.1	7.9
Namibia	30,000	22.50	17.9	-
Tanzania	170,000	7.83	-	15.0
Seychelles	-	-	-	-
South Africa	250,000	20.10	24.1	-
Swaziland	14,000	33.44	39.4	-
Zambia	150,000	21.52	11.6	-
Zimbabwe	240,000	33.73	32.3	-
UK	550	0.10	-	-

**Table 7. Human Development Indicators 2003 in the SADC compared with UK.**

Country	TB / 100,000	TB-related mortality rate (per 100,000 people)	TB cases detected under DOTS (%)	TB cases cured under DOTS (%)
Angola	197	47	-	-
Botswana	224	31	75	77
Congo	122	19	104	69
Lesotho	277	55	-	-
Malawi	242	49	40	73
Mauritius	209	12	24	93
Mozambique	125	33	68	75
Namibia	221	35	98	53
Tanzania	212	47	47	78
Seychelles	26	6	77	82
South Africa	237	55	72	66
Swaziland	727	130	-	-
Zambia	445	94	-	-
Zimbabwe	191	54	47	69
UK	5	1	-	-

**Table 8. Human Development Indicators 2003 in the SADC compared with UK.**

Country	Population with sustainable access to an improved water source, rural (%)	Population with sustainable access to an improved water source, urban (%)	Urban population with access to improved sanitation (%)
Angola	40	34	70
Botswana	90	100	88
Congo	17	71	14
Lesotho	74	88	72
Malawi	44	95	96
Mauritius	100	100	100
Mozambique	41	81	68
Namibia	67	100	96
Tanzania	57	90	99
Seychelles	-	-	-
South Africa	73	99	93
Swaziland	-	-	-
Zambia	48	88	99
Zimbabwe	73	100	71
UK	100	100	100

**Table 9: Distribution of water sources in Malawi (%)**

Water source	Urban area	Rural area
Piped into dwellings	17.1	0.6
Piped into yard	24.6	1.1
Community stand pipes	41.8	12.1
Protected well/spring	3.0	6.6
Bore hole	8.3	40.1
Unprotected well/spring	3.9	27.0
Surface water	1.3	12.5

**Table 10: Distribution of sanitation facilities in Malawi (%)**

Type of facility	Urban area	Rural area
Own flush toilet	16.4	0.7
Pit latrine	81.8	78.0
No facility/bush	1.8	21.2

## INTERNATIONAL DEVELOPMENT PROGRAMME FOR LOCAL GOVERNMENT LAUNCHED

**Peter Minhinnett, EHO East Midlands, England, Individual Associate Member IFEH**

Local Government throughout the world delivers many of the basic services that are essential to reducing poverty. United Kingdom local authorities are already committed to building capacity at a local level in other parts of the world, but their efforts need a boost.

Four local government bodies and the Government's Department for International Development have launched an agreement to boost local government understanding of international development issues. The four make up the UK Local Government Alliance for International Development, and comprise the Local Government International Bureau, the Commonwealth Local Government Forum, the Improvement and Development Agency and the Society of Local Authority Chief Executives and Senior Managers.

Launching the three-year project, Gareth Thomas MP, Parliamentary Under Secretary of State for International Development, said, "This agreement will help build a stronger and more engaged constituency for development. This is essential if we are to achieve the Millennium Development Goals. The Strategic Grant Agreement will build the understanding and contribution of the causes of poverty and the challenges facing us all."

The Strategic Grant Agreement is one of a series agreed by the Department for International Development. The agreements aim to involve organisations and networks in the UK which would not traditionally participate in international development activities. Other agreements have been made with the Trade Union Congress and the British Medical Association, amongst others.

The Millennium Development Goals are central to the international development agenda. The goals aim to encourage the international community to work together in a 'global partnership' to tackle critical global problems of poverty and hunger, lack of education, gender inequality, child mortality, maternity health, HIV/AIDS and other diseases, as well as seeking environmental sustainability. In his statement Mr Thomas emphasised that the Strategic Grant

Agreements aim to inspire joint action by UK society to support achieving the goals in the agreed time frame, set for 2015.

Cllr Ken Bodfish, Chair of the Local Government International Bureau, said, "International development is about more than simply helping poor communities in developing countries. It's also about recognising the links to issues on our doorstep and meeting those challenges. We have much to gain from local communities around the world and from sharing our experiences with them."

The project will include production of educational and training materials to support greater local government and community involvement in international development issues. A database of practitioners will be developed of people with key skills available for future secondment opportunities. The project will build new and extend existing networks with key UK and European bodies and seek to ensure an effective link between local and central government.

Information on international development will be disseminated throughout local government.

For further information, please contact: Rosalie Callway, International Policy Officer, LGIB.  
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### **Daventry Friends of Iganga, Uganda and Water for Kids**

To further the links between East Midlands Health Professionals and their Ugandan colleagues and to further the good work being done in Uganda by Daventry Friends of Iganga a 'Study Tour' is being arranged for between 2 & 3 weeks travelling sometime in June/July or August 2004. This trip will include meetings with Ugandan Health Professionals and Students, visits and workshops at Makerere University, Kampala; also field trips and work to assist the provision of a new water source. In addition there will be the chance to see plenty of this beautiful country including Lake Victoria and the Source of the Nile. If interested in joining this party contact Peter Minhinnett at Daventry DC on 01327 302549 or email [pminhinnett@daventrydc.gov.uk](mailto:pminhinnett@daventrydc.gov.uk)

## **United Kingdom Commonwealth Scholarship Commission Institutional Capacity Grant awarded to the University of Malawi**

**Dr. Tony Grimason, Head of Environmental Health & Protection, Department of Civil Engineering, John Anderson Building, University of Strathclyde, United Kingdom & Visiting Professor in Environmental Health, University of Malawi, and Mr. George Jabu, Senior Lecturer in Environmental Health, University of Malawi – The Polytechnic, PB 303, Chichiri, Blantyre, Malawi**

The Commonwealth Scholarship Commission in the UK has recently awarded (December 2003) one of only two Institutional Capacity Grants to the University of Malawi to build research and enhance staff development in the areas of environmental health, civil and mechanical engineering with the support of the University of Strathclyde over the next five years. The Commission supports a variety of programmes aimed at increasing qualifications amongst staff of universities in developing Commonwealth countries. The majority of candidates are successful, and return to make considerable impact in their home institutions. Increasingly, the Commission is seeking to aim such awards at those countries and universities where the potential to contribute to the UK's Department for International Development (DfID) targets is greatest.

As part of this policy, universities in selected developing countries were invited to apply for the first round of Institutional Capacity Grants (ICGs) by October of last year. The aim of these awards is to provide support for a number of awards for a specific department or subject group, over a period of up to six years. The aim of the awards is to allow selected departments to plan their staff development policy over a period of time, and lead to concerted improvements of provision in key areas. As the recipient of one of the first ICG's, the University of Malawi aims to establish a Centre for Water, Sanitation and Health based at The Polytechnic ([www.poly.ac.mw/](http://www.poly.ac.mw/)), Blantyre, one of five constituent colleges that make up the University. The aim is to train personnel, conduct research and consultancy in water, sanitation, public health, environmental management and health promotion in collaboration with the University of Strathclyde. This will be undertaken through the award of three Ph.D. scholarships, 1

M.Sc. scholarship and 2 academic fellowships tenable at the University of Strathclyde with funding in excess of £200,000.

It is well known that waterborne and water-associated disease is a significant cause of morbidity and mortality in developing countries. The World Health Organisation estimate that about 4 billion cases of diarrhoea per year cause around 2.2 million deaths, mostly among the under five population, and that four out of five cases of sickness in developing countries can be attributed to unsafe water and inadequate sanitation (WHO Global Water Supply and Sanitation Assessment Report, 2000). Thus, providing access to safe water and sanitation would bring valuable benefits to public health not only to the under-five population, but both social and economic development with a reduction in the morbidity and mortality associated with the general labouring population. Studies conducted over the last decade have revealed that (i) improved water quality reduces childhood diarrhoea by 15-20%, (ii) better hygiene through hand-washing and safe food handling by 35% and (iii) safe disposal of children's faeces leads to a reduction of nearly 40% (UNDP Human Development Report, 2003). Therefore, hygiene interventions and behavioural change through health promotion and education are equally important measures in this context.

Indicative targets such as the 'millennium development goals' (MDG's) for water supply and sanitation coverage were developed by the Water Supply and Sanitation Collaborative Council (WSSCC) as part of the process leading up to the Second World Forum (The Hague, 17-22 March 2002). These targets, to be met by 2015, are to:

- reduce by one-half the proportion of people without access to hygienic sanitation facilities
- reduce by one-half the proportion of people without sustainable access to adequate quantities of affordable and safe water
- provide water, sanitation and hygiene for all.

These targets were endorsed at the World Summit for Sustainable Development in Johannesburg, South Africa in September 2002, and at the 3rd World Water Forum, Japan in March 2003.

In Malawi, approximately 85% (8.5 million) of the population resides within rural and peri-urban areas, the majority of which have inadequate access to safe water and sanitation facilities (Global Water Supply and Sanitation Assessment, WHO, 2000 Report). The Ministry of Water Development's national policy objective is "the provision of clean

potable water to all people so as to reduce the incidence of waterborne diseases (50% of all illnesses in Malawi) and reduce the time devoted by individuals to water collection.” Although the International Water and Sanitation Decade improved the percentage of people with access to safe water and sanitation in Malawi (*Mr. Joseph Gaussi, Ministry of Water, Malawi, personal communication*), the beneficiaries were predominantly peri-urban and urban communities. As in other developing countries, rural services in this area still lag far behind urban services with women and children still walking prolonged distances to collect water and transport it home. The considerable amount of time women and children spend in fetching water could be spent more effectively on other tasks e.g. improving their economic productivity, a key component in poverty alleviation efforts. Over the next five years, the University of Malawi plans to establish a Centre for Water, Sanitation & Health to pull together the expertise that exists within the University, Government and NGO sectors working in the areas of water, sanitation and hygiene education.

Malawi health indicators are among the worst in sub-Saharan Africa. Life expectancy at birth is 44 years, infant mortality is 134 per 1000 live births and the under five mortality is 234 per 1,000 live births (National Health Plan of Malawi, 1999-2004). These are expected to rise as a result of the HIV/AIDS pandemic, which has a national prevalence rate of 16%. Dehydration caused by severe diarrhoea is a major cause of morbidity and mortality amongst young children in Malawi. Diarrhoeal disease is mainly caused by water contamination, food poisoning and poor sanitation (Malawi Demographic Survey, 2000). The Malawi Water and Sanitation Sector Programme (Ministry of Water Development, (MoWD) 1998) identified that the overall goal of the country is to ensure that the health status of rural, peri-urban and urban communities is sustainable through enhanced provision of potable water and improved sanitation. In addition, the Government adopted the Primary Health Care (PHC) concept as the main health service delivery strategy. In order to achieve the MDG's, the PHC in Malawi is focused on three main areas: (i) maternal and child health, (ii) water and sanitation, and (iii) promotion of early treatment. Sectoral collaboration between water and sanitation stakeholders is uncoordinated at present and requires strengthening (MoWD, 1998), if the MDG's are to be met. More recently, a need has been identified that proper hygiene education and health promotion accompany the provision of

water and sanitation technology options (World Bank & International Monetary Fund, 2003).

The proposed ICG fits in with the aims of the Government of Malawi Poverty Strategy Reduction Paper (PSRP) (2002) and the National Health Goal for Malawi (1999) which both aim to provide a sound health care delivery system that is capable of promoting health, preventing disease, protecting life and fostering well-being and increased productivity. The Government of Malawi is committed to meeting the MDG's for water supply and sanitation coverage and disease burden that were developed by the Water Supply and Sanitation Collaborative Council (WSSCC). This objective also fits in with the Institutional Strategic Plan (ISP) for the University of Malawi (2001) which is to advance knowledge, understanding, skills and wisdom to undergraduates and post-graduates for the betterment of the nation. Furthermore, the ISP seeks to invest and develop scientific, technical and commercial solutions to environmental problems through the provision of high quality education, training, research, consultancy and information dissemination.

The Polytechnic, University of Malawi has been involved with various water, sanitation and public health research and consultancy projects since its inception in 1965. Large and small-scale development projects have been undertaken for Government, Non-Government Organisations, the private sector and at village level. However, in recent years the training capacity of the University of Malawi has declined due to reduced provision of Government and donor funded scholarship schemes to enable newly qualify and mid-career staff to undergo technical, scientific and professional development. It is envisaged that the ICG will help address this problem and expand and meet the following objectives:

- establish a sustainable Centre for Water, Sanitation and Health
- train personnel in water, sanitation and public health
- conduct research and consultancy in water, sanitation, and environmental management
- develop and adopt technology in the fields related to water and sanitation
- disseminate information in the fields of water and sanitation throughout the country
- develop short courses and curriculum development in the areas outlined above.

The University of Malawi has had a long-standing relationship with the University of Strathclyde in

the areas of civil engineering and more recently, environmental health. Collaborative research and teaching projects involving the exchange of engineering academics from both institutes have been undertaken over the last 20 years. Since 1997, the focus of this collaboration has been on environmental health primarily in the areas of water and sanitation through three DfID higher education links (HEL) administered through the British Council, Lilongwe, Malawi. The first link was established in 1998 (and renewed in 2001) to facilitate reciprocal exchange visits between scientists and staff from both countries to instigate (i) collaborative research projects and (ii) curricular development (academic and professional). The first HEL resulted in the formation of a B.Sc. in Environmental Health in Malawi. This degree course now has an intake of approx. 35 students per year with an ever-increasing number of female undergraduates. The professional aspect of the link was recently enhanced with the award of the first Commonwealth Professional Fellowship in Environmental Health to Mr. P. Chunga, District Environmental Health Officer for Chikwawa District Council, Malawi between August and December, 2003.

Based upon the success of the above HELs, the University of Malawi recently established (October 2003 – September 2006) a new three-year HEL, Sanitation & Health with the University of Strathclyde. The aim of the new link is again to facilitate reciprocal exchange visits, but this time between public health scientists and engineers from both countries to (a) establish the Centre for Water, Sanitation and Health and (b) instigate collaborative research projects in these areas.

To mark the Millennium the University of Strathclyde set up the Malawi Millennium Project (MMP). Launched in September 1999 by the HRH Princess Royal, it is based on long standing relationship between both Universities. Working with the three constituent colleges of the University of Malawi - the Polytechnic in Blantyre, Kamuzu College of Nursing (KCN) in Lilongwe and Chancellor College in Zomba - the programme of work officially began on the 1st January 2000 and will continue for a period of five years. Details of the MMP can be found at the following web site (<http://www.strath.ac.uk/press/prism/iss162.htm>). Amongst the key objectives of the MMP is the commitment to help establish the Water, Sanitation & Health Centre. It is estimated that the cost of this project will be around £30,000. The MMP is operated on an honorary basis within the University

of Strathclyde and has limited funds. Therefore, projects are prioritised and funds are then sought to implement and develop them. For example, the previous priority area for funding was the need for a clinic at Kumuzu College of Nursing in Lilongwe, Malawi to provide additional nursing care and facilities to the surrounding community. The cost of that project was estimated to be £30,000. The 'Livingstone Clinic' was opened last year by HRH Princess Anne. Through the University of Strathclyde MMP, we are currently exploring ways of establishing an interim 'electronic' Centre for Water, Sanitation and Health using Intranet technology and E-mail to improve the flow of information and communication among academics, technicians and students working in the field of environmental health within the country.

### **The Commonwealth Scholarship Commission in the UK**

The Commission was set up under the Commonwealth Scholarship Act 1959, as the body responsible for the United Kingdom's participation in the Commonwealth Scholarship and Fellowship Plan, itself established in 1959.

The Plan was designed as a system of awards to men and women from all Commonwealth countries chosen for their high intellectual promise and their capacity to return to make a significant contribution to life in their own countries. One of its guiding principles is that it be based upon mutual co-operation and the sharing of educational experience among all countries of the Commonwealth.

Funds for awards tenable in the United Kingdom come from two Government Sources: the Foreign and Commonwealth Office, which provides an annual budget of around £2 million to support scholars from Canada, Australia and New Zealand; and the Department for International Development which provides an annual budget of some £10 million to support award holders from the remainder of the Commonwealth.

As well as General Scholarships, the Commission also administers Academic Staff Scholarships, Commonwealth Academic Fellowships, Split-Site Doctoral Scholarships, Scholarships by Distance Learning, Professional Fellowships and the DFID Shared Scholarship Scheme. More information on all of these schemes, and also on the work of the Commission (including Annual Reports and Events information) can be found on the CSFP website

(<http://www.acu.ac.uk/cgi-bin/targettop.pl?ml=scholarships&sl=scholarships&select=scholarships&page=scholarships>)

The types of award currently available are:

*Academic Staff Scholarships* - fully funded awards for doctoral and Masters course at UK universities for younger members of staff

*Academic Fellowships* - visits to a UK host institution for up to six months, for mid-career staff

*Split-Site Doctorates* - up to one year's study at a UK university, for students undertaking doctoral study in their home country

*Professional Fellowships* - three months visits to a UK host organisation for mid career staff. In the case of universities, this category would be available to non-academic staff only

The full terms and conditions for each of the above

types of award are outlined in separate Prospectuses for each scheme, which should be consulted before individual applications are finalised. These are supplied separately, or can be accessed on the CSFP website.

#### Acknowledgements

We would like to acknowledge the Commonwealth Scholarship Commission for the provision of the Professional Scholarship in Environmental Health, administered through the Association of Commonwealth Universities, London, UK and the British Council, Lilongwe, Malawi.

#### CCDP FORGE LINK WITH THE



*Vice Principal David Rhubadiri, University of Malawi, talking to Ms Natalie Williams, Scottish Environmental Health Officer, during a visit to the University of Strathclyde.*

**Deadline for submission of articles for the next edition of  
Environmental and Health International is**

**31st August 2004**

**Contact John Stirling, 11 Muirwood Drive, Currie, Edinburgh EH14 5EZ  
e-mail: [j.stirling@btinternet.com](mailto:j.stirling@btinternet.com)**

## UNIVERSITY OF STRATHCLYDE ON FOOD LAW ENFORCEMENT

**Dr Raymond Wong, Environmental Health  
Division, University of Strathclyde**



Improving food safety and hygiene is one of the key areas targeted by the UK government, with a strategy to reduce the number of food poisoning cases by 20% by 2006 (Food Standards Agency 2003). Under the current legislative system concerning foodstuffs, the Food Safety (General Food Hygiene) Regulations 1995 lay down specific requirements upon food businesses. A specific Regulation requires that all proprietors of food businesses are required to identify any step in the activities of the food business that is critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained and reviewed. In order to comply with this requirement, food business proprietors have to carry out hazard analysis and identify critical control points. For food premises, including restaurants and take-aways, they should have a risk assessment system in place as the minimum

legal requirement at present. It is fully anticipated that in 2006 the current system of risk assessment will be replaced by the Hazard Analysis Critical Control Point (HACCP) system. This will require detailed attention to be paid to documentation. However, many food proprietors within the Chinese food sector appear to find this concept confusing mainly due to communication barrier. Hence compliance with this specific Regulation becomes a difficult task.

To address this issue, the Chinese Community Development Partnership (CCDP) is working in close association with the University of Strathclyde (UoS) to seek funding from the Community Fund – Lottery Money - on a project addressing the HACCP system in the Chinese catering sector. Mrs Joyce Tai of CCDP and Dr Raymond Wong of Environmental Health Division, UoS will lead this project subject to funding. The project will be enhanced by professional input from Mrs Elizabeth Corbett, Head of Food Safety, Environmental Protection Services of Glasgow City Council, Mr John Hutchison, Director of Hutchison Associates Limited and academic leadership from Dr Tony Grimason, Head of Environmental Health, UoS. The aim of the project is to help Chinese food businesses located within the Glasgow City area obtain greater compliance with food hygiene requirements and to improve food safety standards. It is envisaged that Chinese food proprietors and handlers receiving the training will by the end have acquired the knowledge to prepare their own risk assessment. The consortium application will be submitted later this year, with the outcome notified by June 2004. As the public becomes more demanding and more conscious of their right to seek and redress, it is obviously the commercial interest of catering business to comply with the law and support this venture.

### **Daventry Friends of Iganga, Uganda and Water for Kids**

To further the links between East Midlands Health Professionals and their Ugandan colleagues and to further the good work being done in Uganda by Daventry Friends of Iganga a 'Study Tour' is being arranged for between 2 & 3 weeks travelling sometime in June/July or August 2004. This trip will include meetings with Ugandan Health Professionals and Students, visits and workshops at Makerere University, Kampala; also field trips and work to assist the provision of a new water source. In addition there will be the chance to see plenty of this beautiful country including Lake Victoria and the Source of the Nile. If interested in joining this party contact Peter Minhinnett at Daventry DC on 01327 302549 or email [pminhinnett@daventrydc.gov.uk](mailto:pminhinnett@daventrydc.gov.uk)

*Dr Raymond Wong's article from the previous page translated into Chinese.*

華人社區發展計劃 (CCDP) 聯合莎芙溪大學 (University of Strathclyde) 攜手合作研究飲食業食品安全法例要求

英國政府正積極面對改善食物安全及衛生問題，目標是在2006年把食物中毒案件減低20%【食品標準局2003】。有關現今的食品法例，食品安全（一般食品衛生）條例1995列出特別條項要求食品行業遵守。為確保食品安全，第四節指定食肆業主必須辨認出在工作活動過程中那處是關鍵步驟，及確保安全程序以被辨認，執行，維持及復核。為符合這要求，食肆業主需要進行危害分析及分辨重點（關鍵控制點）。到現時為止，如食品行業，包括餐館和外賣店，已執行「風險評估」便能達到第四節的最低要求。預期在2006年，現今的「風險評估」將會被「危害分析重點控制系統」所取替。新的系統特別關注文獻記錄。但是，有不小華籍食肆業主對於第四節所詳述的食物安全系統概念模糊，主要原因基於語言障礙。因此要到達第四節的要求變成一件很困難的事情。

為解決以上問題，華人社區發展計劃與莎芙溪大學聯合申請社區資金（六合彩），而計劃特別集中於危害分析系統的要求。如果申請成功的話，華人社區發展計劃的Mrs Joyce Tai與及莎芙溪大學的Dr Raymond Wong將會聯手領導這個計劃。此外，還有其他專業人士亦會參與這計劃：Mrs Elizabeth Corbett - 格拉斯哥市政局、環境保護處食物安全部部長；Mr John Hutchison - Hutchison 聯合有限公司董事；與及Dr Tony Gramson - 莎芙溪大學、環境衛生部部長。這個計劃的最終目的是為協助本地華人飲食業，能夠加強遵守食品衛生法例的要求及提高食物安全標準。預測當食肆業主和員工完成訓練後，他們便具有足夠知識去設立個別「風險評估」，進而符合食品安全（一般食品衛生）條例所指定的要求。聯合申請書會在年底呈交，結果將會在2004年六月通知。現今公眾人士對於食物安全的察覺及需求較高。所以在商業的角度上，飲食行業對於符合食品法例應特別關注。故此我們特別鼓勵各餐館和外賣店業主支持這計劃。如果申請成功的話，對華人飲食業有莫大的益處。如各業主願意支持此舉，請在12月31日前寫信給華人社區發展計劃表示你對以上計劃的支持。

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## VISITING PROFESSORSHIP IN ENVIRONMENTAL HEALTH, UNIVERSITY OF MALAWI

**Mr. S. Taulo, Head of Environmental Health, University of Malawi**

Dr. Tony Grimason, Head of Environmental Health & Protection at the University of Strathclyde (<http://www.strath.ac.uk/Departments/Civeng/staff/intros/grimason.htm>) has been made a Visiting Professor in Environmental Health at the University of Malawi. This is in recognition of the various research projects instigated between the University of Strathclyde and University of Malawi over the last seven years. Projects and scholarships have been funded by various sponsors including the United Kingdom Department for International Development (<http://www.britishcouncil.org/education/helinks/>), United Kingdom Commonwealth Scholarship Commission (<http://www.acu.ac.uk/cgi-bin/targettop.pl?ml=scholarships&sl=scholarships&select=scholarships&page=scholarships>), University of Strathclyde Malawi Millennium Project (<http://www.strath.ac.uk/press/prism/iss162.htm>), Carnegie Trust for the Universities of Scotland (<http://www.carnegie-trust.org/>), Royal Society of Edinburgh (<http://www.ma.hw.ac.uk/RSE/>), amongst others. During this period, numerous academic staff, undergraduate students and practicing officers in the field of environmental health from both universities and recognized professional bodies have enjoyed reciprocal exchange visits to undertake research, develop curriculum and promote the profession.



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## HAROLD HARVEY – DISTINGUISHED TEACHING FELLOWSHIP

It is always good when one of our members representatives receives a prestigious award and even more so when that person is a regular contributor to this Journal

Dr Harold Harvey is a Fellow of the Chartered Institute of Environmental Health, and has served on the Northern Ireland Centre Council and Executive of CIEH for the past 23 years. He is an environmental health professional and was leader of the BSc Hons Environmental Health and MSc Environmental Health courses at the University of Ulster for 15 years. He is currently Associate Head of the School of the Built Environment and Director of the Environmental Health Protection and Safety Centre. He is a frequent contributor to E&HI and has organised research conferences in association with the IFEH.

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The following is the text of speech by Professor Richard Barnet, Pro Vice Chancellor, in presenting Harold Harvey for the Distinguished Teaching Fellowship Award, University of Ulster, December 2003.

*“Chancellor,*

Excellent teaching has many facets. Excellent teachers inspire and challenge their students. They influence their students positively to achieve clearly thought out learning outcomes. And they are student centred in all that they seek to achieve from initial curriculum design through to delivery in the classroom and the assessment of student learning. Crucially, they are restless; never being satisfied with what they or their students have achieved. Instead, they are constantly reflecting on how and what they have taught and how and what their students have learnt with the aim of seeking continuous improvement in both.

To be the student of the excellent teacher is not the soft option; it is, however, the rewarding and life-enhancing option.

In making Distinguished Teaching Awards the University is not only seeking individuals who meet these demanding requirements, but who have

also disseminated their best practice and inspired others to achieve excellence in teaching. Only two or three awards are made each year. In Harold Harvey we have a member of staff who excels when judged against these exacting requirements.

Mr Harvey is an experienced teacher of environmental health who regularly receives the highest accolades from his students. Moreover, he is an educational innovator who for many years has been at the forefront of teaching and learning developments in his area.

A central value of this University is that wherever possible we seek to work in partnership with professional bodies, employers and other partner stakeholders to provide a learning experience for our students which will prepare them for employment or in the case of many part-time and post-graduate students, for career advancement. Harold's work over a period of many years as a programme leader in environmental health can only be described as providing an example of best-practice in developing such partnerships to the undoubted benefit of our students.

In particular he has been painstaking in ensuring that our students gain both the professional knowledge and the required personal skills to operate as effective practitioners. And it is his pioneering work in the more difficult and less tangible, but equally important, area of personal skills development that his substantial achievements are perhaps most noteworthy. And at the advanced undergraduate and postgraduate level he has also pioneered the development of research skills within the teaching and learning curriculum, and each year several student assignments are now published in the professional journals.

In recognition of his achievements Harold has been asked to take on wider teaching and learning responsibilities within his School and Faculty and has served the wider University community through his membership of several committees and working groups. Through these wider activities he has been able to disseminate the best-practice that he has pioneered to the benefit of our students more generally; and he has also published papers and presented conference papers on his teaching and learning developments, thereby ensuring that students more widely can benefit from his work.

Harold has also been asked to serve as an external examiner by several other universities, as an examiner for his professional association, and on two occasions as advisor on the establishment of degree programmes in African Universities. He has served as Chairman of the Institution of Environmental Health Officers in Northern Ireland and is an Academic Member of the Chartered Institute of Environmental Health, National Education and Professional Development Committee. He also currently serves as Editor in Chief of the Journal of Environmental Health Research.

Chancellor,

In the name of the Senate, I present to you Harold Harvey for the award of a Distinguished Teaching Fellowship."

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## BIBLIOGRAPHY OF ARTICLES APPEARING IN IFEH MEMBER MAGAZINES

**Anyone wishing a copy of any of the following articles should contact me by e-mail or post with their name and address.**

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### NEW ZEALAND JOURNAL OF ENVIRONMENTAL HEALTH

**Through Seven Pairs of Kidneys: Managing the Hazards of Water Re-use – Chris Derry, Sandy Booth and Roger Attwater, School of Environment and Agriculture (ICEM Research Group) University of Western Sydney**

Past efforts to manage potable water supplies and associated effluent generation have not always been successful in ecological or environmental health terms. The present paper outlines some of the problems and the systems which have been developed in response to lessons learned. While water reuse involving terrestrial application appears to offer a viable solution the paper emphasises the need for all water use strategies to be properly planned and managed from an integrated health, environmental and ecological perspective. The Hawkesbury Water Reuse Scheme located in Sydney's rapidly populating North Western sector is used to illustrate a number of points relevant to the

health risk management of reuse schemes, and specific steps in risk assessment are discussed. A conclusion of the paper is that good environmental health theory and practice have an important role to play in the integrated planning and management of reuse schemes.

Key words: water reuse, risk management, environmental health, environmental management.

**The 8th International congress on Noise as A Public Health Problem – Rotterdam, The Netherlands – Terence Moody, Principal EHO, Christchurch City Council, New Zealand**

This five yearly congress is held under the auspices of the International Commission on the Biological Effects of Noise.

**ENVIRONMENTAL HEALTH OFFICERS' ASSOCIATION, IRELAND, YEARBOOK 2002-2003**

**The Application of Scanning Electron Microscopy and an in Situ Redox Dye Visualisation Technique to Determine the Influence of Dryness on Bacterial Survival – Belinda Stuart-Moonlight, Norman Parkinson, Mahmoud Halablab and Roger Miles**

Foods can become unsafe when bacteria surviving on structural and food contact surfaces are cross contaminated into foods. Little experimental work is reported regarding bacterial survival or desorption with methodologies constrained by undefined cellular losses due to lethal injury or incomplete removal. In this research, an in situ method was developed to detect surviving bacteria on surfaces. It was applied to examine the critical factor of surface dryness in relation to bacterial survival. For the in situ method, surfaces were experimentally contaminated with bacteria suspended in deionised water, and dried. The test surfaces were overlaid with agar and after incubation, colonies were visualised by reaction with nitroblue tetrazolium. Surface drying significantly reduced the number of all organisms. Log<sub>10</sub> reductions of 4-6 were recorded for the Gram negative *Escherichia coli* compared with 3-4 for the Gram positive *Staphylococcus aureus*. Survival of the Gram negative varied with inoculum density, and scanning electron microscopy confirmed Gram negative cell wall collapse after drying. This research demonstrates valuable hygiene benefits would be gained for food businesses if surface drying were universally practiced. Similarly, hygiene inspectors auditing businesses with cleaning schedules defining post-cleaning drying should consider a reduced risk. Key Words in situ, bacterial survival, surfaces, cross contamination

**JOURNAL OF ENVIRONMENTAL HEALTH – NEHA**

**Skills, Knowledge, and Abilities of Graduates from Accredited Environmental Health Science and Protection Undergraduate Programs – Gary S Silverman, Denv, RS and Marian K Silverman PhD**

The National Environmental Health Science and Protection Accreditation Council (EHAC) has the mission of enhancing the education and training of students who intend to become environmental health science and protection practitioners/professionals. Academic programs that demonstrate compliance with EHAC guidelines can become accredited with the expectation that graduates of accredited programs will have the knowledge, skills, and abilities needed for professional success. The study reported on here reviewed these guidelines in light of results from a survey of pro-program graduates and their supervisors. The survey results were found to establish that the current approach is quite successful, and that graduates of the programs have the potential to make substantial professional contributions in protecting environmental health.

**The Welsh Food Microbiological Forum and the All-Wales Shopping Basket Sampling Program: A Model for the Surveillance of Microbiological Quality in Ready-to-eat Foods – Richard Meldrum PhD, C Donald Riberio, MB, FRCPath, DpBact, Michael Simmons, MSc, MB, FRCPath, MFPHM David Worthington, MCIEH, DMS, MPH and Christopher Griffith PhD.**

In the United Kingdom, the monitoring of microbiological food quality and the prevention of food borne disease are the responsibility of a number of different organizations. In 1993, to develop and extend ongoing local collaborations within selected local food groups in Wales (comprising local authorities and the Public Health Laboratory Service) the Welsh Office invited all local food groups in Wales to create a forum to coordinate the sampling and examination of ready-to-eat foods and the centralized collection of results for the whole of Wales. This paper describes the development, structure, and aims of the forum. It also discusses the outcomes of the first nine years of activities, describes the randomized sampling program for ready-to-eat foods that has been developed; and assesses the benefits that have resulted.

**Do Newspapers Lead with Lead? A Content Analysis of How Lead Health Risks to Children are Covered – Christine Brittle, and Michaela, PhD**

Lead poses a serious environmental health risk to young children, causing such irreversible health effects as mental retardation, stunted growth, and hearing and visual impairment. Studies suggest that various sectors of the public, including children's caregivers, are not sufficiently concerned about this risk or knowledgeable about ways of minimizing it. Because newspapers are one of the primary ways members of the public learn about risks, the authors examined the characteristics and content of 152 newspaper articles on lead to determine when coverage occurred and what information was provided. Results revealed that newspapers most often covered lead as a local news story. Few articles identified children under six years of age as the most vulnerable group or provided important information on health effects, sources of exposure, or abatement methods. The authors' recommendations focus on helping environmental health professionals' work with newspaper journalists to improve the information available to the public.

#### **CANADIAN ASSOCIATION OF PUBLIC HEALTH INSPECTORS – ENVIRONMENTAL HEALTH REVIEW**

##### **A Survey of Thermometers used by Public Health Inspectors across Canada in Food Auditing – Marilyn B Lee, ScM, CPHI©, School of Occupational and Public Health, Ryerson University, 350 Victoria ST, Toronto ON M5B 2K5**

Temperature measurement is a critical step in controlling food-borne pathogens. Bryan analyzed 766 food-borne outbreaks, which occurred in the United States from 1977 through 1982 and found that temperature abuse was a major contributing factor to illness<sup>1</sup>. Specifically, inadequately cooled foods were associated with 41 of illnesses, inadequately cooked foods with 14.2, instance the durability of a thermometer may not be and inadequate reheating and hot holding with 9.1 each. More recently Panisello et al. analysed 530 outbreaks of food-borne illness, which occurred in England and Wales between 1992 and 1996 and found that temperature abuse was associated with 79 of outbreaks<sup>2</sup>. In order to minimize the risk of food-home illness it is important for a public health inspector (PHI) to measure temperatures during their inspections or food audits, to determine the risks and offer advice for corrective action if problems are found. This observation of the PHI taking temperature measurements also serves an educational role to the food premise operator or food worker to learn which foods are important to monitor, how to monitor, and the criteria for acceptability. There are literally hundreds of models of food thermometers in the marketplace. It would

be difficult for the Public Health Inspector (PHI) to know which to select based solely on the manufacturer or distributor's specifications. For apparent sometimes until after many months of use. The present study was undertaken primarily to survey PHIs experiences and to share their assessment on the advantages and disadvantages of different thermometers. The survey also sought information on how these thermometers are used in the field, the frequency and method of verifying their accuracy, types of food and stages of their preparation most frequently monitored, and whether food premises operators had a thermometer available for use on-site.

##### **Performance of indoor fall surfacing materials used in day care settings – Frey Bratland, BSc., CPHI(C), Social Care Consultant, Calgary Health Region**

Each year more than 28,500 children in Canada are treated in hospitals for playground related injuries. The majority of these injuries occur when children fall off playground equipment. The risk of injury due to falls is directly related to the height of the fall and the shock-absorbing properties of the impact surface below.<sup>3</sup> The Canadian Parks and Recreation Association rates inappropriate fall surfacing as a high priority life threatening hazard because of the risk of head and other injuries that may result from a fall. Serious head injuries from falls are less likely to occur if the head's peak deceleration during impact does not exceed 200 times the acceleration due to gravity (200G). Some surfacing materials are able to reduce this peak deceleration and are therefore one of the most important aspects of injury prevention on the playground. Although the CSA Standard for Children's Play spaces and Equipment has guidelines for outdoor surfacing, there are no guidelines for indoor surfacing. Loose fill surfacing (sand, pea gravel, wood chips) is not practical in an indoor setting and unitary materials (rubber tiles, pour in place) while feasible indoors, are costly and may be inconvenient.<sup>4</sup> Portable outdoor playgrounds that do not require concrete footings are sometimes brought indoors where appropriate surfacing may not be available.<sup>4</sup> Most day care centres in the Calgary Health Region have some type of indoor playground equipment with slides and climbers that may be 1-2m high. Many day cares use what they can find around the day care for surfacing such as sleeping mats or carpeted areas. This raises questions about how well these types of surfaces absorb impact and what type of surface is appropriate for an indoor setting. The Calgary Health Region, as part of an ongoing assessment of safety in day cares, decided to conduct testing of the most commonly used indoor surfaces to determine if

## ENVIRONMENT AND HEALTH INTERNATIONAL

they were adequate as protective surfacing.

### **Risk Evaluation of Arsenic Exposure in Playgrounds (part 2) – Nelson Fok, MSc, CPHI(C), Associate Director Environmental Health, Capital health, Edmonton, Alberta.**

The highest consumer risk may not be playing in public parks, but with soil around and underneath household decks.

## ENVIRONMENTAL HEALTH JOURNAL CIEH

### **Remote Monitoring – Tracey Khanna**

The Cassiopea project aims to monitor electromagnetic fields in the environment and provide interested stakeholders with data on levels in their community.

### **Healthy Communities Matter – Rob Faulkner**

Health impact assessment is being used as a tool in the regeneration of Liverpool through improved services and more responsive delivery. EHJ talks to Rob Faulkner

### **From Farm to Table – protecting the consumer – Nick Warburton**

What will the European Commission's new regulations on genetically modified (GM) food and feed and traceability and labeling mean for enforcers?

### **A holistic approach to housing – Viv Mason**

Carrying out a health impact assessment can greatly assist a local authority assess the wider effects of its housing strategy.

### **Music to your ears? – Tracey Khanna**

Neighbour noise in the guise of music, parties, televisions, raised voices and dogs barking is the largest single category of noise complaint made to local authorities – yet the public's expectation of peace and quiet and the abilities of EHPs to resolve problems using the statutory process may not be in balance.

## ENVIRONMENTAL HEALTH SCOTLAND – REHIS

### **Current perspectives on BSE and CJD – Professor James W Ironside, National CJD Surveillance Unit, University of Edinburgh.**

Bovine spongiform encephalopathy (BSE) and Creutzfeldt-Jakob Disease (CJD) belong to a group of disorders known as the transmissible spongiform

encephalopathies (TSE) or prion diseases. Since the identification of BSE in the mid 1980s and the subsequent identification of variant CJD a decade later, there has been enormous medical, scientific, political and public interest in this hitherto obscure group of neurological conditions. The impact of these diseases on public and animal health, farming, politics and public trust in terms of food safety has been enormous, yet some fundamental aspects of these disorders remain poorly understood. This article attempts to review the current status of BSE and CJD in the UK and to outline the uncertainties concerning future predications of cases of variant CJD.

### **Community Planning in Action – An Environmental health Perspective – Val Cameron, MREHIS, FRSH, MCM**

The Public Health Change Process Over the last two centuries there have been huge changes in society and the health of the population. This has been brought about by reactive controls through systems, advances in science and technology, and statute. In the nineteenth century issues like poor housing, overcrowding, unfit food and water supplies, and unsanitary workplaces caused tremendous hardship for people and infectious diseases were rife. In 1846 alone, around 200,000 people died in the UK from cholera. As these changes took place our professional ancestors changed to meet the demands of the day. We heard, at the Institute's Congress in 2002, that 13,000 Scots died in 2001 from smoking related illnesses like cancer and coronary heart disease. As these are not infectious diseases, we feel powerless to control them, and yet we know that the health of the population must be improved. In the twenty-first century, people are still sleeping on the streets, food poisoning figures continue to rise, and water supplies are affected by pollutants and organisms like cryptosporidium. It is now time for us to change our approach, and to emerge to meet the challenges facing the people of Scotland, whose health is amongst the poorest in Europe.

*The next meeting of the  
IFEH Council will be held in  
Denver, Colorado, USA, on  
11th & 12th September 2004*

**International Journal of Environmental Health**

This is a peer-reviewed journal published quarterly and which the IFEH is associated with.

Further information is available from the website:  
<http://www.tandf.co.uk/journals>.

*The following are abstracts from the papers that featured in the December 2003 edition.*

**Impact of housing conditions on the health of the people at al-Ama'ri refugee camp in the West Bank of Palestine** ISSAM A. AL-KHATIB, AHMAD JU'BA, NADINE KAMAL, NIHAD HAMED, NUHA HMEIDAN and SALWA MASSAD Institute of Community and Public Health, Birzeit University, P.O. Box 14, Birzeit, West Bank, Palestine

Al-Ama'ri camp is situated to the south of Ramallah city in the West Bank of Palestine. It is densely populated, with a total population of 4,046, divided into 760 households, on a surface area of 93 dunums (93,000 m<sup>2</sup>). In this research, the relationship between the housing conditions at Ama'ri camp and the prevalence and incidence rates of upper respiratory tract diseases has been studied. The diseases and symptoms most encountered in winter, and those include: common cold, cough, pharyngitis, influenza, ear infection, asthma and bronchitis have been studied. It was found that these are diseases directly related to poor housing conditions. Cold housing, presence of dampness and moulds, dust and smoke, burning of biomass fuel, crowding, poor ventilation and inadequate lighting problems are commonly found in the houses of this refugee camp.

**Cardio-respiratory morbidity and long-term exposure to particulate air pollution** CHRISTINE SOLOMON<sup>1</sup>, JASON POOLE<sup>1</sup>, LARS JARUP<sup>2</sup>, KEITH PALMER<sup>3</sup> and DAVID COGGON<sup>1</sup> <sup>1</sup>MRC Environmental Epidemiology Unit, University of Southampton, UK, <sup>2</sup>The Small Area Health Statistics Unit, Department of Epidemiology and Public Health, Imperial College, London, UK

To explore the long-term influence of particulate air pollution on cardio-respiratory morbidity in the UK, a cross-sectional postal survey was conducted. Women were randomly selected from the electoral rolls of 11 wards in which Black Smoke measurements had been collected over at least 30 years. Our analyses included 1,166 women aged 45 years or older who had lived within 5 miles of their current address for at least 30 years. After adjustment for potential confounders there was no clear increase in prevalence of productive cough or medically diagnosed ischaemic heart disease with long-term residence in places with higher levels of particulate pollution. The prevalence of asthma was lower in wards with the highest Black

Smoke measurements (prevalence ratio 0.7, 95 CI 0.5-1.0). Our findings provide no indication that prolonged residence in places with relatively high levels of particulate pollution causes an important increase in cardio-respiratory morbidity. This is in contrast to observations in US studies. In view of this discordance, there is a need for further evaluation of the long-term impact of particulate pollution on health in the UK.

**The regionality of campylobacteriosis seasonality in New Zealand** MARK HEARNDEN<sup>1,\*</sup>, CHRIS SKELLY<sup>2</sup>, REBEKAH EYLES<sup>1</sup> and PHILIP WEINSTEIN<sup>1</sup> <sup>1</sup>Department Of Public Health, Wellington School Of Medicine, The University of Otago, Wellington, New Zealand, <sup>2</sup>Public Health Intelligence, Public Health Directorate, Ministry of Health, Wellington, New Zealand

New Zealand has one of the highest incidences of campylobacteriosis in the developed world, which leads a global trend of increasing notifications of Campylobacter infections over the last decade. Food borne and waterborne transmission have been implicated as significant mechanisms in the complex ecology of the disease in New Zealand. We examined both regional and temporal variation in notification rates to gain some insight into the role of the New Zealand environments in modifying disease incidence. Firstly, there is a marked difference in the seasonality of campylobacteriosis between the North and South Islands of New Zealand. The Far North and much of the rural North Island were found to display relatively low summer incidence and small inter-seasonal variation. Secondly, there appears to be a dispersed grouping of North Island urban areas, including Auckland, Hamilton, Napier and their hinterlands as well as a few areas on the South Island that exhibit higher summer incidence and more seasonality than the first group. Thirdly, Christchurch, Dunedin, much of the South Island and the lower North Island cities of Wellington and Upper Hutt appear to experience the highest summer incidence and strongest inter-seasonal variation in New Zealand. These three broad groupings of campylobacteriosis seasonality, constructed using a principal components analysis, suggest that the importance of transmission routes may vary regionally in New Zealand. The observed variation in seasonal incidence indicates a complex ecology that is unlikely to be explained by a single dominant transmission route across these three groupings.

**Assessment of noise annoyance in three distinct communities living in close proximity to a UK regional airport** A. WHITFIELD Division a/Environmental Health and Risk Management, Public Health Building, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK

Previous researchers have considered demographic variables relating to deprivation such as income, social status and home ownership, and their relationship with both community and individual reaction to environmental noise. These variables have been found not to be important. Intuitively this seems implausible and the findings of a recent African study increase the doubt. The present study aims to look at the effect of deprivation using an index of deprivation developed and adopted in a different context. A postal questionnaire was used to survey three communities around Birmingham International Airport, UK. The main selection criterion for these areas was the Townsend overall index of deprivation (ODI). The typical aircraft noise exposure levels for all of the survey areas were determined from the aircraft noise exposure contours provided by Birmingham International Airport. An overall response rate of 40 was achieved and it was found that the area of lowest deprivation (greatest affluence) has a significantly greater proportion of highly annoyed persons due to aircraft noise than the other two areas, with the lowest noise exposure category accounting for the significant difference. The differences in reaction are not explained by deprivation as measured by the ODI nor by other factors previously reported in the literature and by those that were measured in this study. However, a link between housing type and noise annoyance due to aircraft noise suggests an avenue for further research.

**Wessex shopping basket survey - a structured approach to local food sampling** CAROLINE WILLIS and MELODY GREENWOOD Wessex Environmental Microbiology Services, Health Protection Agency, Southampton General Hospital, Southampton, UK

The shopping basket approach to food sampling, in which ready-to-eat food items from a shopping list were sampled at premises chosen at random, was adopted by 15 Environmental Health Departments in the Wessex region. A total of 2,037 samples were analysed over a 30-month period. The microbiological quality varied considerably between food categories, with gravy and stock samples giving the highest proportion of satisfactory results. Sliced meats, cooked rice and sandwiches gave the poorest overall results. Whilst the majority of unsatisfactory results were due to elevated levels of indicator organisms (Aerobic Colony Count, Enterobacteriaceae and *Escherichia coli*), unsatisfactory or potentially hazardous levels of pathogens (*Staphylococcus aureus*, *Bacillus cereus*, *Clostridium perfringens* or *Listeria monocytogenes*) were detected in 1 of samples. *Salmonella* was not

detected in any sample. The shopping basket survey was considered to be a useful way of structuring local sampling, and the random selection of premises was found to be a considerable advantage over previous sampling plans. In addition, the survey drew attention to a number of microbiological problems with specific food types, leading to more detailed investigations.

**Genotoxic effects of vanadium pentoxide on human peripheral lymphocytes and mucosal cells of the upper aerodigestive tract** NORBERT H. KLEINSASSER<sup>1</sup>, PETER DIRSCHIEDL<sup>3</sup>, RAINER STAUDENMAIER<sup>1</sup>, ULRICH A. HARREUS<sup>2</sup> and BARBARA C. WALLNER<sup>2</sup>  
<sup>1</sup>Department of Otolaryngology, Head and Neck Surgery, University of Regensburg, Germany, <sup>2</sup>KUnisch experimentelle Onkologie, Ludwig-Maximilians-University Munich, Germany, <sup>3</sup>Department of Biometrie and Epidemiology, Ludwig-Maximilians-University Munich, Germany

In addition to tobacco and alcohol consumption, pollutants found in certain industries and in the environment play an important role in carcinogenesis in the upper aerodigestive tract. The aim of the present study was to investigate whether vanadium pentoxide may have a genotoxic effect on human mucosal cells and lymphocytes. The single cell microgel electrophoresis assay (Comet assay) was used to detect DNA damage induced by vanadium pentoxide in human nasal epithelia (n = 11) and in lymphocytes (n = 11). Mucosa was harvested from inferior nasal turbinates, while lymphocytes were obtained via venous puncture. Vanadium pentoxide was applied at concentrations of 0.06 mM, 0.12 mM, 0.24 mM, and 0.47 mM. Aqua bidestillata served as solvent and negative control and N-methyl-N'-nitro-N-nitrosoguanidine at 0.07 mM (MNNG) was used as positive control. The trypan blue exclusion test was applied to assess cytotoxicity. Whereas vanadium pentoxide induced dose-dependent DNA migration in lymphocytes, mucosal cells did not show comparable genotoxic effects. Cytotoxic effects allowed for viabilities exceeding 80. The results indicate that vanadium pentoxide is capable of inducing single-strand-breaks and/or alkali-labile damage in the DNA of human lymphocytes. By contrast, mucosal cells proved not to be sensitive in this setting. Thus, a possible role of vanadium in the tumorigenesis of head and neck cancer appears unrelated to direct genotoxic effects.

# Sustainability Indicators

## [www.ifeh.org/indicators](http://www.ifeh.org/indicators)

The International Federation of Environmental Health has launched a project with the target to build up an internet based example collection on how indicators until now have been used by the local environment and health authorities across the World.

The project has been presented at the UN World Summit on Sustainable Development in Johannesburg, South Africa, in 2002, at the World Congress on Environmental Health in San Diego, USA, in 2002 and at an international conference on Sustainability Indicators and Intelligent Decisions in Vilnius, Lithuania, in 2003".

We would like very much to expand the example collection even more. Check out the project website to see how your authority or organisation can contribute to the collection with your experience in the field of using indicators, or mail to [indicator-project@ifeh.org](mailto:indicator-project@ifeh.org)

Many national IFEH member organisations around the World are now represented in the project and several examples from local authorities and other organisations can be found on the project web site: [www.ifeh.org/indicators](http://www.ifeh.org/indicators)"

By using indicators it should be easier to answer some basis questions related to sustainable development at the local level, such as:

what is the actual pressure on, and the state of, the environment and health of our local/regional community;

on which topics should we focus our efforts;

do our efforts result in measurable changes to the state of the environment and/or health; and

do we contribute to the move towards sustainable development both locally as well as globally?"



### Aims of the project:

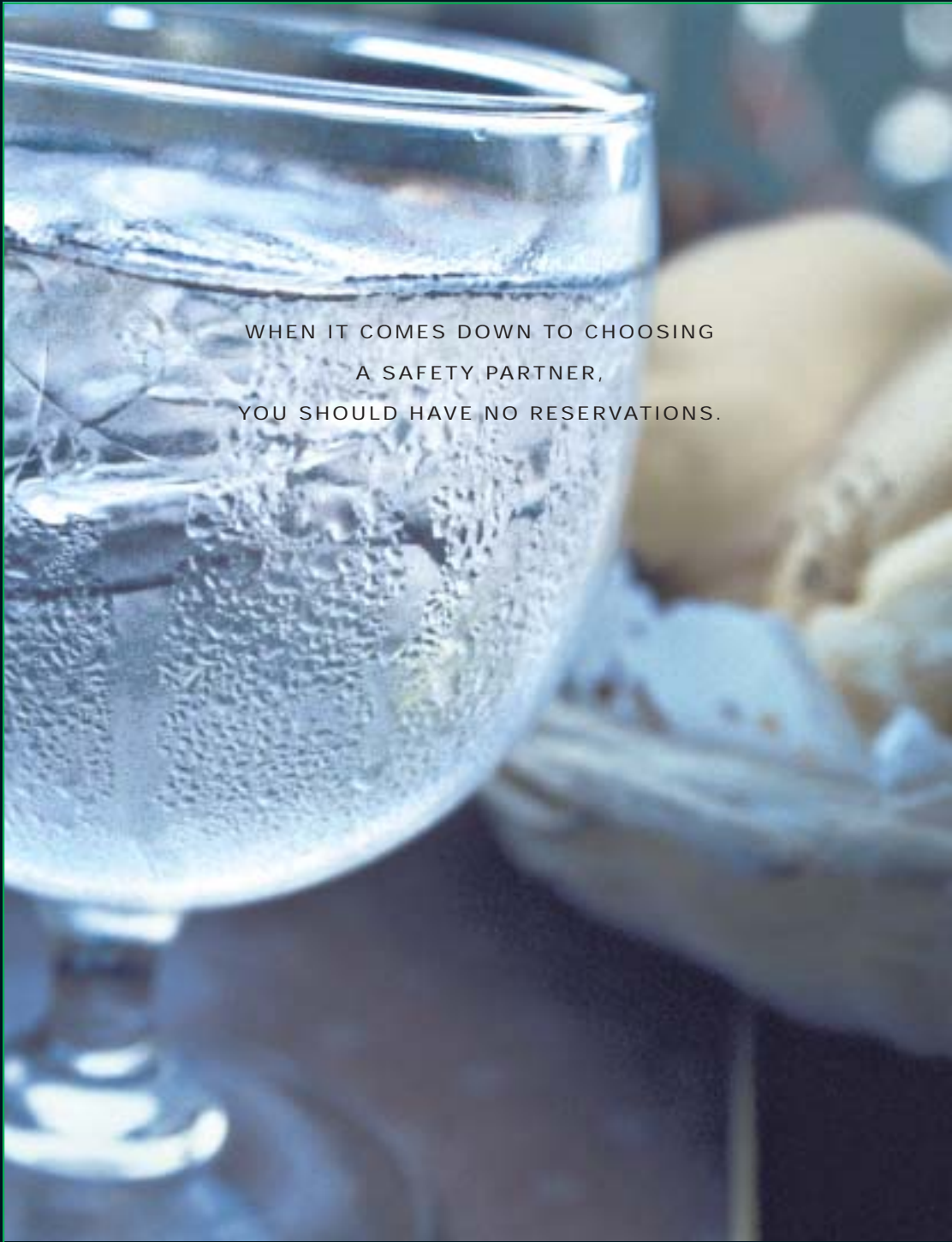
To build a collection of initiatives and activities undertaken primarily by local and regional environment and health authorities world-wide, in order to demonstrate how indicators can be used as a tool for planning and monitoring.

To share the experience of using indicators, primarily at local and regional level.

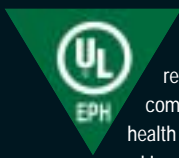
The use of indicators will allow for a more accurate assessment to be made by local authorities and others on whether progress has been made towards sustainable development.







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