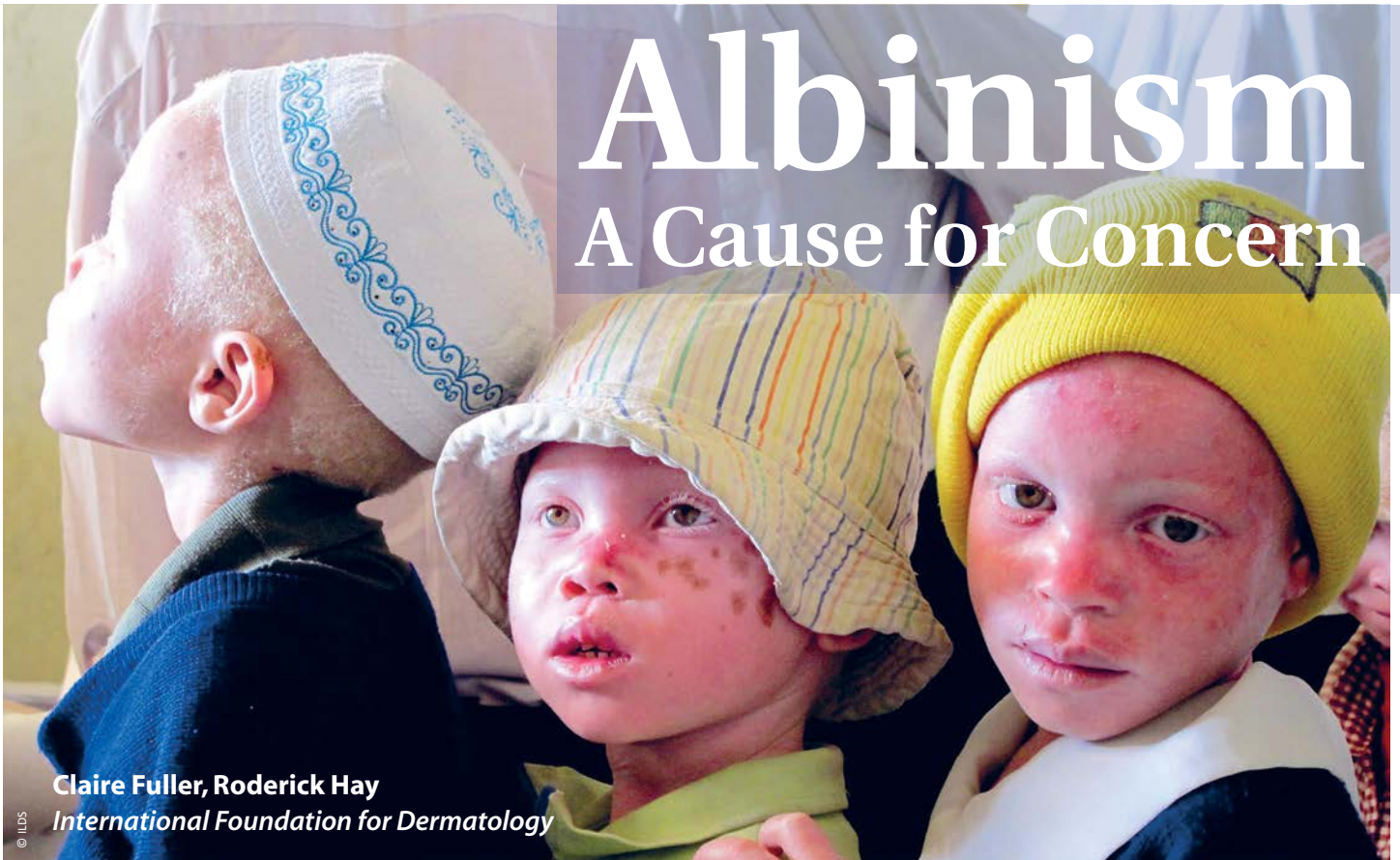




## Albinism A Cause for Concern



Claire Fuller, Roderick Hay  
International Foundation for Dermatology

**Albinism is a common medical condition in which there is a defect in the ability of the body to synthesise melanin<sup>[1]</sup>.**

Conventionally albinism or oculocutaneous albinism (OCA) is classified into types 1 to 4. Individuals with OCA1 have white to straw coloured hair, pale skin, and pale eye colour. They have a mutation in the tyrosinase1 (TYR1) gene. Those with OCA2, who have mutations in the OCA2 gene, have similar but less severe changes e.g. the hair and skin may be fair but is faintly pigmented. Patients with OCA3 have red/brown skin and reddish hair; this form is mainly seen in South Africa. Those with OCA4, which is mainly seen in Asia, have similar but milder changes than individuals with OCA2. Some individuals may have mutations in more than one gene. However while there are a number of different genetic varieties, all have similar consequences.

Although albinism is rare in most countries of the world (1 in 17000), in Africa it is much more common. For instance it is estimated that 1 in 1400 persons in Tanzania has albinism, a potential total of as many as 150000 persons affected<sup>[2]</sup>. Most of these have Type 2 albinism, although a few have other varieties

FIG 1: The importance of photoprotection

or mixed forms. Albinism may also reach high frequencies in other societies such as native Americans from the Hopi, Lacandon Maya and Kuna groups and in native Fijians. Persons with albinism (PWAs) are more susceptible to damage to the skin and eyes

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**FIG 3A & 3B: Use of cryotherapy for premalignant skin lesions**

due to sun exposure. As a result they have a high incidence of potentially fatal skin cancers at an early age. Premalignant sun damage often occurs before the age of 10, skin cancer before the age of 20. Patients have visual impairment; low to moderate vision, photophobia and nystagmus, which may lead to learning difficulties if not recognized. Visual impairment occurs very early suggesting that there is a problem in establishing neural signaling pathways in some patients. Both of these susceptibilities, skin and visual, can be largely helped or prevented by measures that involve case detection and early treatment [3]. In addition the physical appearance of these individuals is different from others in the population because of the lack of pigment, and they have suffered from isolation and discrimination in many communities. In some areas albinism is associated with a range of local beliefs and customs which may have terrible repercussions. The social consequences are therefore serious, as albinism may lead to loss of

educational and working opportunities, lack of social integration and exploitation, and, in rare instances, murder for trade in body parts, which are believed to harbour magical healing powers<sup>[4]</sup>.

In the Regional Training Centre in Moshi Tanzania a surveillance programme for prevention of skin cancers in PWAs was established 20 years ago [5]. It has now grown to include outreach services, sunscreen production and vocational training but there is a growing realisation that by combining forces to address both medical and social needs of PWAs the development of a powerful support network is achievable. A number of highly active voluntary organizations such as Under the Same Sun, Standing Voice and the World Albinism Alliance have provided strong elements of leadership to address this issue. The declaration by the United Nations Human Rights Council in 2013 to draw the attention of member states to the plight of many of those with albinism has provided key impetus to these initiatives. This year in November Under the Same Sun is organizing an international meeting on albinism in Tanzania to explore further the needs and concerns of PWAs and to improve their well being. We are at the start of an exciting expansion in global collaboration to ensure that those with albinism can enjoy lives without the fear of persecution, cancer or blindness.



**FIG 2: Photodamage in albinism**

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# Spectrum of Skin disorders in a tertiary care hospital in Chittagong, Bangladesh

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A study of patients in a Dermatology clinic in Chittagong, Bangladesh found that more than 53% of the diseases are infectious in origin.

## Introduction

There are at least 3,000 skin diseases, a number higher than in any other organ of the body. Every individual is affected by skin problems during their lifetime.<sup>1</sup> High prevalence figures for skin disease (21 – 87%) are reported from resource-poor countries, where they place a major burden on healthcare delivery.<sup>2</sup> There are few previous studies on the pattern of skin disorders in Bangladesh.<sup>3</sup> Chittagong Medical College Hospitals (CMCH) is the oldest tertiary care and teaching hospital in this region of Bangladesh. The department of Dermatology of CMCH receives all skin patients from Chittagong and neighbouring districts. This study aims to analyze the prevalence and pattern of skin diseases in Chittagong, providing accurate baseline data for healthcare planning and resource allocation.

## Methodology

This descriptive retrospective study was carried out using records of patients attending the dermatology clinic of CMCH between the periods 2003 and 2011. Referrals come from the general outpatient department, and other hospital outpatient clinics including paediatrics, together with referrals from secondary hospitals and private hospitals within and outside the metropolis. The recorded data included the patient's name, registration number, weight, age group, sex, diagnosis, treatment and advice. All the patients were seen and examined in daylight by dermatologists. The clinical diagnosis was confirmed, where appropriate, by blood tests, skin biopsy for histopathology, skin scrapings for mycology or slit skin smear and Ziehl-Nielsen stain for acid-fast bacilli. The diseases seen were categorized into infective or non-infective dermatoses, and were subdivided into 15 groups based on aetiology and morphology. Cases of HIV infection and STI were excluded from the study. The frequencies of each skin diagnosis and that of the group were noted. Descriptive

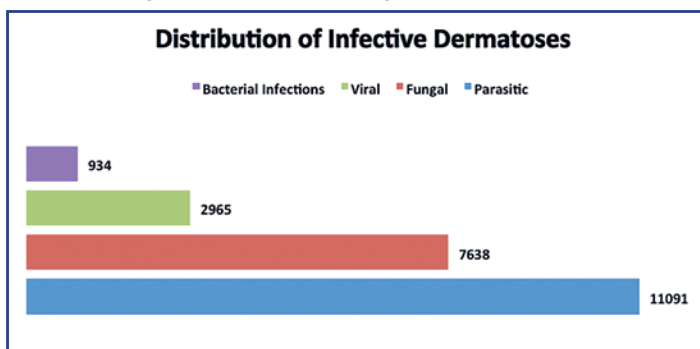


FIG 1: Distribution of infective dermatoses

## KEY WORDS

*Skin infection, infestation, scabies, arsenic toxicity, community clinics*

statistics in the form of frequency distribution tables and percentage were used for the analysis. (Figs 1,2). The data were compared with studies from other regions of Bangladesh and other parts of the world.

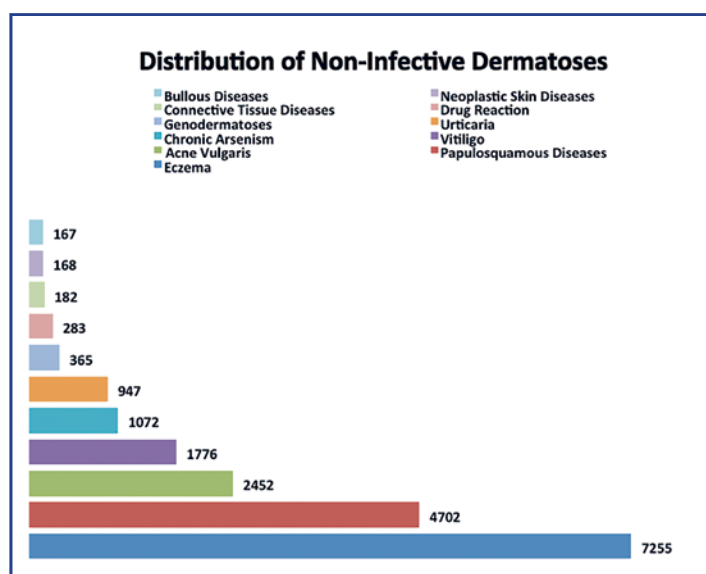
## Results

41,997 patients were studied; 51% were male and 49% female. Infective dermatoses were commoner (53.88%); parasitic disorders comprised 26.41%, mostly scabies (26.16%). Other

Name of Diseases	Frequency	Prevalence (%)
<b>Parasitic</b>	<b>11091</b>	<b>26.41</b>
Scabies	10987	26.16
Pediculosis	60	0.14
Demodicitis	23	0.05
Cutaneous Leishmaniasis	21	0.05
<b>Fungal</b>	<b>7638</b>	<b>18.19</b>
Tinea Cruris	1699	4.05
Tinea Corporis	1534	3.65
Tinea Versicolor	1203	2.86
Candidiasis	1197	2.85
Intertrigo	705	1.68
Onychomycosis	437	1.04
Paronychia	393	0.94
Tinea Capitis	200	0.48
Tinea Pedis	159	0.38
Tinea Unguium	63	0.15
Tinea Manuum	48	0.11
<b>Viral</b>	<b>2965</b>	<b>7.06</b>
Viral Wart	1058	2.52
Herpes Simplex	585	1.39
Chicken Pox	473	1.13
Molluscum Contagiosum	470	1.12
Genital Wart	217	0.52
Herpes Zoster	112	0.27
Measles	50	0.12
<b>Bacterial Infections</b>	<b>934</b>	<b>2.22</b>
Impetigo	394	0.94
Leprosy	155	0.37
Folliculitis	154	0.37
Tuberculosis	90	0.21
Furunculosis	60	0.14
Others	81	0.19

TABLE 1: Distribution of infective dermatoses

Continued overleaf...



**FIG 2: Distribution of non- infective dermatoses**

infective disorders were fungal (18.19%), viral (7.06%) and bacterial (2.22%), (Table 1, Fig 1). Non-infective dermatoses comprised 46.12%, most commonly eczema/dermatitis (17.28%), followed by papulosquamous disorders such as psoriasis (11.20%), acne vulgaris (5.84%), vitiligo (4.23%), chronic arsenism (2.55%), urticaria (2.25%), genodermatoses (0.87%), drug reactions (0.43%), cutaneous neoplasms (0.40%) and bullous diseases (0.40%), (Table 2, Fig 2).

## Discussion

The study was conducted to determine the spectrum of skin diseases in the Chittagong region. As it is hospital-based, it may not entirely reflect the true prevalence of skin diseases in this region, but because of the large number of patients over a long period of study involved, it provides a rough indicator which can serve as a baseline upon which future studies can be built, to enable effective planning of patient-oriented dermatological services and prudent allocation of scarce resources. The pattern of skin diseases is influenced by the developing economy, illiteracy, social status, varied climate, industrialization and religious, ritual and cultural factors.

Skin infections and infestations predominate in our study (53.88%). Similarly high prevalence rates are reported from India by Gupta *et al.* (68.5%), Dayal and Gupta (40.4%) and Mehta (40.1%). The high prevalence of scabies may reflect a large rural population of low socio-economic status. There is a lack of health education, overcrowding, poor sanitation and hygiene in rural areas and city slums. In poorer communities scabies is a risk factor for potentially life threatening post-streptococcal glomerulonephritis. The prevalence of scabies in school children of India is 5%, whereas it is much lower in British schoolchildren. The most common fungal infection was tinea cruris; no cases of deep mycosis were recorded. Viral wart was the most common viral dermatoses while impetigo was the commonest bacterial infection. Impetigo and dermatophyte infections were recorded mainly in rainy and summer seasons, while scabies was mostly seen in winter and rainy seasons.

Atopic dermatitis (AD) was the commonest form of eczema (25.44%). Two other studies in Dhaka<sup>10</sup> and Faridpur<sup>11</sup>, Bangladesh,

Name of the Disease	Frequency	Prevalence (%)
<b>Eczema</b>	<b>7255</b>	<b>17.28</b>
Atopic Dermatitis	1846	4.40
Contact Dermatitis	1772	4.22
Seborrhoeic Dermatitis	1528	3.64
Pompholyx	867	2.06
Lichen Simplex Chronicus	799	1.90
Nummular Eczema	91	0.22
Nappy Dermatitis	90	0.21
Undetermined Type	262	0.62
<b>Papulosquamous Diseases</b>	<b>4702</b>	<b>11.20</b>
Psoriasis	2095	4.99
Lichen Planus	1499	3.57
PRP	489	1.16
P.Rosea	524	1.25
Parapsoriasis	95	0.23
<b>Genodermatoses</b>	<b>365</b>	<b>0.87</b>
Ichthyosis	141	0.34
Epidermolysis Bullosa	83	0.20
Neurofibromatosis	82	0.20
Darier's Disease	25	0.06
Incontinentia Pigmenti	18	0.04
Tuberous Sclerosis	16	0.04
<b>Connective Tissue Diseases</b>	<b>182</b>	<b>0.43</b>
SLE	63	0.15
Scleroderma	39	0.09
Dermatomyositis	38	0.09
Rheumatoid Arthritis	22	0.05
MCTD	20	0.05
<b>Neoplastic Skin Diseases</b>	<b>168</b>	<b>0.40</b>
Premalignant Skin Disease	51	0.12
SCC	48	0.11
BCC	44	0.10
Melanoma	25	0.06
<b>Bullous Diseases</b>	<b>167</b>	<b>0.40</b>
Pemphigus Vulgaris	120	0.29
Bullous Pemphigoid	21	0.05
Dermatitis Herpetiformis	19	0.05
CBDC	7	0.02
<b>Acne Vulgaris</b>	<b>2452</b>	<b>5.84</b>
<b>Vitiligo</b>	<b>1776</b>	<b>4.23</b>
<b>Chronic Arsenism</b>	<b>1072</b>	<b>2.55</b>
<b>Urticaria</b>	<b>947</b>	<b>2.25</b>
<b>Drug Reaction</b>	<b>283</b>	<b>0.67</b>

**TABLE 2: Distribution of non- infective dermatoses**

found similar findings (14.93% to 19.2%). In India the prevalence is 15% - 20%<sup>12</sup>, and in Abu Dhabi and Saudi Arabia 20.98% and 18.64% respectively.<sup>13</sup> The prevalence of dermatoses is influenced by season and climate; thus atopic and seborrhoeic dermatitis predominate in winter. Other possible environmental factors such as non-electric heating systems with poor ventilation and the presence of moulds in homes may predispose to the increasing prevalence of AD in Chittagong.

Psoriasis is the most common papulosquamous disorder (4.99 %). Its impact on quality of life of psoriasis is as significant as other chronic conditions such as diabetes, hypertension, arthritis and



**FIG 3: Raindrop depigmentation in chronic arsenism**

depression.<sup>14</sup> Acne vulgaris is the commonest disorder of the appendages. Although it may not be regarded as severe, acne may have a profound psychosocial impact. Vitiligo (4.28%, M 49.60%, F 50.40%) is an important source of concern in many communities like ours, creating problems with marriage, employment and other social situations.

Chronic Arsenism accounted 2.55% (n=1,072) of all patients (M 53.45%, F 46.55%). Bangladesh faces the largest mass poisoning of a population in history because ground water used for drinking has been contaminated with naturally occurring inorganic arsenic. It is estimated that about 77 million inhabitants of Bangladesh are at risk of drinking arsenic contaminated water.<sup>15</sup> Chronic ingestion of arsenic from drinking water leads to disfigurement, multiorgan diseases, carcinogenicity (including skin cancer<sup>16</sup>) (Figs 3-5) and social problems. The Bangladesh Government (GOB) is implementing a project to replace shallow tube wells by deep tube wells (Figs 6,7). Government and NGOs need to make short and long term interventions to prevent further cases of arsenism. Early case detection and management with follow up will reduce morbidity and mortality.

Chronic urticaria accounted for 2.25% (M 48.36% F 51.64%). (Acute urticaria sometimes presented as medical emergency usually requiring admission to the medical ward). A very few cases were associated with autoimmune diseases. Genodermatoses accounted for 0.87% (n=365); ichthyoses were the most common (0.34%). Epidermal and dermal naevi and vascular malformations were very rare and not recorded in this study. Drug reactions accounted 0.67% only, of which only 3-8% required hospital admission. This low figure is because patients with severe drug eruptions present to the emergency

department. Connective tissue diseases accounted 0.43%, of which systemic lupus erythematosus (SLE)(0.15%) was the commonest. Rheumatoid arthritis may have a higher prevalence as these patients usually attend medicine and rheumatology OPD. Most of the patients with connective tissue diseases only visit Dermatology OPD with cutaneous manifestations. Neoplastic skin diseases accounted only 0.40% Premalignant skin diseases (Actinic keratosis, Leukoplakia, Bowen's disease, Dysplastic nevi) were the most common (0.12%) followed by Squamous cell carcinoma (0.11%), Basal cell carcinoma (0.10%) and malignant melanoma (0.06%). Although a tropical country, the prevalence of skin cancer in Bangladesh is relatively low due to deep brown complexion of people protecting from ultraviolet ray (UV-rays) and lack of genetic predisposition. Blistering disorders accounted 0.40%; pemphigus vulgaris was the most common. Other diseases like metabolic disorders, alopecia, benign tumors were found in small numbers.

The frequency of infections and infestations reflects a lack of education. Patients may not report for treatment unless compelled by the severity of the symptoms. Up to 80% of the populace worldwide suffering from skin problems do not seek medical help.<sup>17</sup> To minimize this burden, the Government of Bangladesh (GOB) has many opportunities to collaborate with non-government organizations (NGOs). Currently, it provides an anti-scabies service with general health care delivery system at village level. With the existing health infrastructures (like Community Clinic, Union Health Center, Upazila Health Complex and District Hospital) the Government has the opportunity to expand its "Anti-scabies Program" with the following:

- 1) Mass awareness programme as a part of Health Education by print and electronic media and involving all tiers of community leaders.



**FIG 4: Palmar hyperkeratosis and squamous cell carcinoma in arsenism**

*Continued overleaf...*



FIG 5: Basal cell carcinoma in arsenism

- 2) Specific training of the health personnel working at community level.
- 3) Ensure availability of scabidical drugs and logistics at the Health Centres.
- 4) Establish an evaluation, monitoring and proper record-keeping system. Promote information, education, communication (IEC) in the community including social, religion and public leaders. Promote co-ordination between NGOs and government agencies.

## Limitation

The limitation of the study is that it is hospital based and findings may be difficult to extrapolate to the general population. However, this type of study is still necessary because it gives account of ongoing changes and provides a reference point for future community based studies.

## Conclusion

Skin diseases remain a low priority for many health authorities despite the large demand for services. Our study revealed that over 53% of skin diseases were of infectious origin. This high proportion of transmissible disease demands a preventive approach. This study provides a preliminary baseline data for



FIG 6: Red spout indicates not safe for use



FIG 7: Green spout indicates safe for use

future epidemiological and clinical research and at the same time will contribute to proper health care planning. A suitable and skin friendly health policy is needed to improve dermatological care for common skin diseases at all levels of health care delivery in a developing country such as ours.

## Acknowledgements

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## Ethical adherence

The study was approved by our institute's ethics committee.

## Contributors

MRM designed the study concept with input from other authors. SA and RH participated in data collection and checked data sources. NUM and MHR assessed data and prepared result. MRM and MA participated in writing. All authors saw and approved the final version of the paper before submission. MRM coordinated the review, submission and revision.

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# Challenges of using point-of-use (POU) water purification treatment systems for wound cleansing

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## KEY WORDS

Water purification, *Escherichia coli*, sodium hypochlorite, filters, N-halamine, flocculant disinfectant

**It has been established that water fit for drinking is fit for cleansing wounds<sup>[1]</sup>, however, more than one billion people worldwide have no basic access to clean water for domestic use. Therefore, it is important to develop point-of-use (POU) water purification treatment systems that are suitable for individual use at low cost.**

This article assesses the suitability of using POU water treatment products in resource poor settings, and includes comparisons of simply boiling water with four water treatment products; dilute liquid chlorine (sodium hypochlorite solution), silver-coated ceramic siphon filter, a combined flocculant-disinfectant powdered mixture (the PUR Purifier of Water) and N-halamine (bromine and chlorine). The comparison is based on the cost, acceptability, post-treatment contamination and sustainability. There is evidence that the efficiency of POU water treatment technologies is very high however efficacy can be reduced due to lack of understanding of how to use the technology properly. Boiling water remains a useful method, however it burns fuel and can be time consuming. A better understanding of individuals' preferences and examining the cost effectiveness and marketing of the different methods is needed to help decide which POU water purification system is best suited to individuals.

## Introduction

A study established by the Cochrane Collaboration compared the effects of tap water, cooled boiled water, distilled water, sterile normal saline and other solutions including procaine spirit on wound cleansing. It concluded that using tap water of drinkable quality did not increase infection rate and it was the most cost-effective. (1) A skin care project was carried out in a 160 bed district hospital in Uganda,<sup>[2]</sup> where they cleansed wounds using water purified by a powdered water treatment technology. The powder was a 4g sachet combined flocculant-disinfectant (PUR®). The results showed that there was no increase in the wound infection rate.

## Preference of POU water treatment technologies

Two studies conducted by Albert *et al*<sup>[3]</sup> and Luoto *et al*<sup>[4]</sup>, investigated preferences for POU water treatment technologies among poor communities in Kenya and Bangladesh respectively. They tested 1) dilute liquid chlorine (sodium hypochlorite solution), 2) combined flocculant-disinfectant powdered mixture (PUR), and 3) siphon-driven porous silver-coated ceramic filters. In both studies, households were educated about the danger of untreated water, and the proper way of using water purification devices. In the end of both studies, households were asked to self-report and rank the devices. Efficiency of water treatments were also compared by measuring the concentration of *Escherichia coli*.

Silver-coated ceramic filtration was the most popular device used, although it was not as effective as PUR and sodium hypochlorite. 67% of households who preferred the filter said it was the easiest to use. Reasons why sodium hypochlorite or PUR were their least preferred products were difficulties in using (27%), failure to remove turbidity (24%) and duration of the treatment process (20%). PUR has a long duration of treatment process, (30 minutes per treatment is needed for the sedimentation to settle). POU products with an odour or taste were also less popular; however these are less relevant when considering water used for wound cleansing.

The results also showed that PUR was preferred in areas with turbid water (which varies according to the source and season especially when a rainy season was progressing into a dry season). The cost of PUR, however, was prohibitive to some users. For example, in local markets in Bangladesh, a six-month supply of PUR cost more than ten times a six-month supply of sodium hypochlorite (US\$9.33 compared to US\$0.80).

## Post-treatment contamination

Recontamination remains a difficult issue. Although POU treatment systems could significantly reduce the recontamination of water during distribution (i.e. between the point of collection and the point of use), problems of post-treatment contamination remain as storage tanks or containers might not be clean.<sup>[5]</sup> In a study conducted in Masaka, Rwanda,<sup>[6]</sup> 96% of participants kept their water storage containers indoors, and 92% of them dipped into the storage vessel with a cup held in their hands, which in turn increased the risk of contamination by contact. It was advised that the hygiene of the water storage should be maintained daily; however, only 9% of participants indicated that they cleaned storage containers every day, while 26% rarely cleaned the storage containers. Also 67% of participants reported that they did not cover their water storage containers.

Each water treatment technology carries different risks of post-treatment contamination. PUR has a low risk of recontamination, as each time a new sachet of powder is used, whereas the risk of recontamination by the filter was relatively higher. Effectiveness of the filter declines over time due to contamination problems in the lower reservoir of the filter resulting from poor maintenance. Mellor *et al*<sup>[7]</sup> demonstrated that 12% of filters were likely to break in one year, and around 20%

*Continued overleaf...*



**FIG 1: Women collecting lake water in Ethiopia;**  
Photo Chris Lovell

of them broke over two years. After three years of usage, filters became largely ineffective, therefore cleaning filters every four months was recommended. A new filter costs around US\$10-12, however it remains unclear how likely individuals are to buy a new filter. Unlike filters, sodium hypochlorite solutions have a residual effect that prevents recontamination of the water over time.

## Compliance

Luoto *et al* <sup>[4]</sup> showed that despite four bimonthly household visits explaining the health hazards of untreated water, and free distribution of the water treatment technologies during the trial period, even the most popular product (the filter) exhibited less than 30% usage. More effective marketing and education might be needed to increase the awareness of safe water use. In the study from Rwanda <sup>[6]</sup>, school-educated individuals were more likely to cover their storage containers than those who did not have any schooling; they also had a better awareness of hygiene.

Both studies indicated that education was the key to compliance and proper use of water treatment technology. Further education about the influence of turbidity, retention times and dosage was also suggested.

## N-halamine

N-halamine, which uses bromine and/or chlorine (HaloPure<sup>®</sup>) is another low cost water purifier used widely in India. It disinfects water effectively, and its residual acts further upon any surviving pathogens or regrowth. N-halamine that uses bromine has another advantage over using other halogens, such as iodine and chlorine, as humans can tolerate bromine residuals at a higher level. There is, however, lack of information about the exact cost and comparison with other POU water purification treatment systems.<sup>[11]</sup>

## Boiling water

Although there is great variety of water purification methods, some households still rely heavily on boiling water. Boiling or heating with fuels is one of the most old-fashioned yet most efficient ways to treat water. Data from 67 national surveys revealed that 21% of the study households (598 million people) disinfect water by boiling<sup>[8]</sup>. Boiling water can effectively treat water, and this applies even in the rainy season when water is highly turbid with suspended solids. According to one study,<sup>[9]</sup> boiling could efficiently remove 99% of faecal coliforms.

Nevertheless, boiling water has many disadvantages that limit its use. Firstly, obtaining fuel requires time, energy and effort; mainly women and children go out to collect wood, precluding other activities. Secondly, boiling can potentially cause burns and poor indoor air quality which may lead to health hazards,

Type of POU	Suitable for drinking/washing (E. coli concentration after treatment in colony-forming unit(CFU))	Estimated cost (for six months supply)
sodium hypochlorite solution	31% had no detectable E. coli (Median E. coli concentration was 13 CFU/100mL)	US\$0.80
silver-coated ceramic siphon filter	24% had no detectable E. coli (Median E. coli concentration was 22 CFU/100mL)	US\$10-12 (a filter treats well over six months worth of water)
LIFESAVER <sup>®</sup> products with ultrafiltration hollow fibre membranes	≥ 8.30 log reduction (Median E. coli concentration was ≤ 16.7 CFU/100ml)	US\$184.65 (a 4000L cartridge in a 4000UF Bottle will last approximately 3 years and 7 months, based on usage of 3L/day)
the PUR Purifier of Water	24% had no detectable E. coli (Median E. coli concentration was 25 CFU/100mL)	US\$9.33
N-halamine bromine/chlorine	Complete inactivation (>6.6log) of E. coli (0 CFU/100mL)	Data not available
Boiling Water	44% had no detectable E. coli (73% had <10CFU/100mL)	US\$5.28 for LPG users US\$4.14 for wood users

**TABLE 1: Comparison of different POU water treatment technologies<sup>[3,9,10,12]</sup>**



including respiratory infections, anaemia and stunting. Children are particularly at risk. Thirdly, burning fuel is not environmentally sustainable, and contributes to greenhouse gases. Finally, cost is one of the biggest issues encountered by low-income populations. The annual cost of fuel for boiling is US\$10.56 and US\$8.28 for liquid petroleum gas (LPG) and wood users respectively; this is significantly higher than the cost of treating the same amount of water with sodium hypochlorite which costs about US\$1.60. The five-year cost of boiling water with fuel will exceed most filtration options such as ceramic filters. There will also be extra opportunity cost of time spent on boiling water, although no actual studies were conducted to compare the opportunity cost of boiling water and other water purification methods.

## LIFESAVER® products

LIFESAVER® products were first marketed in 2007. They contain a cartridge which holds ultra-filtration hollow fibre membranes with microscopic pores which are 15 nanometers / 0.015 microns in size which means they can block the smallest known waterborne virus, parvovirus at 18 nanometers / 0.018 microns in size and the smallest known waterborne bacteria at 400 nanometers / 0.4 microns in size. The products are sealed units that are pressurised by using a hand pump. The products comply with all British, US and European Drinking Water Regulations for microbiological reduction as tested and certified by the London School of Hygiene and Medicine<sup>12</sup>. Although these products are too expensive for individuals in resource-poor settings to buy (a LIFESAVER® cube to serve a family for 5,000L of water costs US\$184.65), LIFESAVER® works with global Non-Governmental Organizations (NGOs) to ensure large-scale distribution of the products to disaster areas. For example in November 2013, Oxfam and UKAid distributed LIFESAVER® jerrycans in the aftermath of Typhoon Haiyan in the Phillipines. A single jerrycan can hold 18.5L of water and can provide water for four people for over 3 years. A person only needs to use the product to produce clean water at the point of use, thus negating the need to filter water and store it clean, and reducing risk of re-contamination. The process of filtering only takes 20 seconds which augers well with respect to compliance but the authors are not aware of any formal comparative compliance studies with other POU systems.

## Conclusion

This article focuses on the challenges encountered when using different methods to purify water. Problems such as post-treatment recontamination and compliance need to be considered, and may be highlighted by improved education. In Rwanda, for example, community health care workers are trained to conduct health promotion to try to prevent diarrheal diseases through water treatment<sup>6</sup>. Education concerning water purification for wound cleansing should be established in a similar way. Preferences of water treatment technologies should be taken into consideration, as these can affect compliance. Although it can be assumed that households would use same water treatment technologies for both drinking and cleaning wounds, further studies are needed to determine if this is the reality.



**FIG 2: Example of a collaborative approach to water improvement, northern Ethiopia; Photo; Chris Lovell**

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# Scarification: A commentary

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**Lymphatic Filariasis (LF) is endemic in rural India with an estimated 40 million people at risk. Although the numbers of new cases are decreasing due to mass drug administration (in India it is only albendazole and diethyl carbamazine citrate-DEC), India harbours 1/3 of world's disease burden.**

LF is a neglected disease of the poor with a national average of 0.29%. India has poor road connections to rural areas and most endemic villages have no access for services of quality biomedical doctors. Patients consequently approach traditional healers in remote villages as their first choice. The Institute of Applied Dermatology (IAD) is a leading lymphoedema clinic in India, treating patients from 23 provinces across all regions of India. The IAD treats lymphoedema using integrative medicine comprising therapeutics of ayurveda, a traditional Indian medicine, biomedical prescriptions for care of bacterial entry lesions, a set of yoga exercises and compression therapy. Patient education and repeated counselling to improve the adherence to this regimen is important<sup>1</sup>. Up to November 2014, IAD treated 1500 patients for lower leg lymphoedema predominantly due to LF. IAD also conducted free treatment to 1008 LF patients in the endemic villages of south India. All of them had received several courses of DEC earlier. During treatment we observed scarification in 511 (20.4%) patients' lymphoedematous legs. Enquiry revealed that such scarification resulted as part of treatment done in their villages given by Traditional Health Practitioners (THP). None got any relief due to scarification; occasionally lymphoedema worsened precipitating acute cellulitis.

Some of the practices of THP may have their origin in Ayurveda, perhaps learning the procedures from Ayurveda experts and adapting them to their own style. Some THPs have worked for many years with Ayurvedic practitioners as 'compounders', assisting in preparing herbal medicines. Ayurveda is a traditional Indian System of Medicine (ISM). The ISM includes Ayurveda, yoga and naturopathy, Unani, Siddha, and homeopathy, which are collectively referred to by the acronym "AYUSH". The ISM represents the well-established systems of medicine used by the rural masses in India. Ayurveda is the most widely used system among the ISM. It is ancient and has developed on the basis of sound logic and centuries of observation of nature<sup>3</sup>.

The following six illustrations of scarification marks illustrate a problem that was worldwide practice until quite recently. It is now only practiced by Traditional Health Practitioners. It is not an effective way of dealing with swelling due to a failure of venous nor lymphatic systems and it adds an entry point for bacterial infection. It is an important public health problem requiring cooperation with such practitioners as discussed by Ryan et al<sup>2</sup>.

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**FIG 1: Recent scarification of lymphedematous limb in Gulbarga district of Karnataka, South India.**



**FIG 2:** The scars after cauterization done using Lead sticks of used battery shell. The arrow shows the scar marks.



**FIG 3:** Multiple, longitudinal scars of lymphoedema limb after cauterization using razor blade. This was done by a traditional health practitioner to drain 'impure blood'



**FIG 4:** Multiple scars of lymphoedema limbs after cauterization using seed oil of marking nut (*Semecarpus anacardium L*)



**FIG 5:** Vertical scars on foot region after venesection done by a traditional health practitioner. The knife was used to do the venesection without any disinfection methods.



**FIG 6:** The multiple scars of a lymphoedema patient around abdomen. This was done during early childhood before acquiring lymphoedema. Parents decided on this treatment as prevention from disease that could be caused by ill fate.

## JOURNAL CLUB

### Sporotrichosis: an overview and therapeutic options

**Mahajan VK. *Dermatol Res Pract.* 2014 epub. (free article online)**

The saprophytic soil fungus *Sporothrix schenckii* is inoculated into skin by plant material, producing a solitary nodule or multiple nodules spreading proximally by lymphatics ("sporotrichoid spread"). In this useful review, the author outlines clinical features and discusses management. Saturated potassium iodide solution, which is inexpensive, is still favoured for skin lesions in resource-poor countries, although itraconazole is the preferred treatment. Terbinafine is also effective. Immunosuppressed individuals may develop systemic disease, requiring amphotericin B initially, then itraconazole for maintenance therapy.

CRL



# A fond farewell

Dr Michael Waugh is one of those people who have achieved fame not only within his speciality but with a countless number of nurses, health officers, doctors and students who have benefitted from his erudite, enthusiastic and immensely practical teaching.

He has now left the editorial Board and we record our deep gratitude for his wise advice and counsel and all his contributions to the journal.

PK Buxton

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