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Knowledge, awareness and practice of the importance of hand-washing amongst children attending state run primary schools in rural Malawi

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A study was undertaken to determine the efficacy of hygiene practices in 2 primary schools in Malawi. The study determined: (1) presence of *Escherichia coli* on the hands of 126 primary school pupils, (2) knowledge, awareness and hygiene practices amongst pupils and teachers and (3) the school environment through observation. Pupil appreciation of hygiene issues was reasonable; however, the high percentage presence of *E. coli* on hands (71%) and the evidence of large-scale open defaecation in school grounds revealed that apparent knowledge was not put into practice. The standard of facilities for sanitation and hygiene did not significantly impact on the level of knowledge or percentage of school children's hands harbouring faecal bacteria. Evidence from pupils and teachers indicated a poor understanding of principles of disease transmission. Latrines and hand-washing facilities constructed were not child friendly. This study identifies a multidisciplinary approach to improve sanitation and hygiene practices within schools.

Keywords: children; hygiene; *E. coli*; hand-washing; Malawi

Introduction

Studies undertaken to assess personal hygiene often make use of questionnaire and/or observational techniques. A limitation with questionnaire studies is that respondents often provide the perceived "correct answer" to the question asked; however, the answer may not necessarily reflect actual practice. This is especially so when the question is of a personal nature and the truth could cause embarrassment. An alternative approach is to combine questionnaire studies with observational studies. However, a limitation with observation studies is that the respondent may alter their behaviour from the norm in the presence of an observer to present what they perceive to be a desirable image.

When such studies are combined, the findings often suggest that "desirable practices" e.g. "washing hands before or after using the toilet, etc." are usually over-reported by respondents compared with the observed practice (Stanton et al. 1987; Curtis et al. 1993; Manum'Ebo et al. 1997). Whether or not people "practice what they say" regarding hand-washing is particularly difficult to assess given the personal nature of the question. However, the microbiological analysis of hands has shown promise as

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a useful indicator of actual behaviour (Kaltenthaler & Pinfold 1995; Pinfold & Horan 1996; Dutta et al. 1997; Hoque 2003).

Bacterial "faecal indicators of pollution" have been used by the water industry for many years to assess the wholesomeness of potable water. Such indicators include *Escherichia coli*, faecal Streptococci (Enterococci) and *Clostridium* sp. spores. The presence of these organisms in water denotes that the water has been faecally contaminated and that the potential exists for other gastro-intestinal pathogens to be present. Of these, *E. coli* is regarded as the most reliable indicator of recent faecal contamination (Wright et al. 2004). To date, only a few investigators have used bacterial indicators as a measure of faecal contamination of children's hands (Laborde et al. 1993; Kaltenthaler et al. 1995; Kaltenthaler & Pinfold, 1995; Dutta et al. 1997; Hoque 2003).

Traditional methods for recovering and isolating bacteria from water or hands are tedious, time-consuming and expensive. In addition, they often require microbiological expertise coupled with the need for expensive equipment, consumables and laboratory facilities that may not be readily available in developing countries. As such, reliable and inexpensive methods that require limited expertise are needed. One such method, the Colilert® Defined Substrate presence–absence test, has been adopted by UK water authorities as the standard test for the detection of *E. coli* in water. The test is capable of detecting the presence of 1 *E. coli* colony forming unit in 100 mL water and does not require any confirmatory tests (Edberg et al. 1988).

Diarrhoeal diseases impose a heavy burden on developing countries – accounting for an estimated 1.6 million deaths and 1.5 billion bouts of illness a year in children under five (WHO 2003). Most diarrhoeal disease is caused by enteric pathogens transmitted through a variety of routes, but primarily via the faecal–oral route. The high prevalence of diarrhoeal illness in children of school age in Africa is thought to be due to poor knowledge and practice of personal and environmental hygiene (Ebong 1994). Thus, one way of reducing the incidence of such illness is to ensure that children are made aware of the concept of faecal–oral transmission and the importance of personal hygiene and the need for behavioural change through education. Personal hygiene, especially hand-washing, is frequently mentioned as an important aspect of diarrhoeal disease prevention in the developing world (Aiello & Larson 2002; Curtis 2003; Curtis & Cairncross 2003; Hoque 2003).

To this end, a knowledge, awareness and practice study of standard 5 pupils attending two state-run primary schools in Chikhwawa, Malawi, on school water, sanitation and hygiene issues within the school was undertaken. At the same time, the presence of *E. coli* on the hands of the children using the Colilert® presence–absence test was undertaken as part of a health education lesson on the importance of hand-washing. This was to determine if knowledge was reflected in practice, and if faecal contamination of hands was affected by the standard of sanitary facilities available at the school.

Methodology

Prior to the implementation of the study, ethical approval was received from the National Health Sciences Research Committee and the Chikhwawa District Education Office to conduct the research at Schools A and B. Headteachers of both schools were also approached and permission was sought to undertake the study. The study used a combination of three methods: (i) a semi-structured questionnaire survey, (ii) a hygiene education lesson and hand-painting exercise and (iii) microbiological examination of sterile water used by the children for hand-washing.

Questionnaire survey

A semi-structured questionnaire was constructed to test the knowledge, attitude and practice of standard 5 (average age 9–11 years old) school children on water, sanitation and hygiene issues attending two state-run primary schools located in Chikhwawa. The two schools were identified through the District Education Office to reflect the variation in Government school facility standards in the area. School A was located on the eastern bank of the Shire River, in disrepair with only traditional sanitation facilities (soil floors and no ventilation) available. School B was located on the opposite side of the Shire River, with newly constructed improved latrines (concrete floors and ventilated) and a hand-washing facility (Photograph 2). Sixty-nine standard 5 pupils at School A were interviewed comprising 31 males and 38 females. Fifty-seven standard 5 pupils at School B comprising 34 males and 23 females were also interviewed. The questionnaire entailed 17 questions on hygiene awareness, to determine knowledge and understanding, while

Photograph 1. Paper plates with handprints.

Photograph 2. School B hand-washing tank.

Table 1. Results of a questionnaire survey.

Questions	School A% correct		School B % correct		All schools % correct		Total % correct	
	M ($n=31$)	F ($n=38$)	M ($n=34$)	F ($n=23$)	M ($n=65$)	F ($n=61$)	All ($n=126$)	95% CI
Is it important to wash our hands every time we use the toilet?	94	87	97	96	96	90	93	(89,97)
Can flies carry germs on their body and cause disease?	84	82	85	100	85	89	87	(81,93)
Do we need to wash our hands after touching animals?	94	92	91	100	92	95	94	(89,98)
Can you catch germs by touching baby feaces?	68	61	88	91	78	72	75	(68,83)
Is it ok to urinate behind the school toilet?	100	97	85	87	92	93	93	(88,97)
Is it important to wash your hands if you have diarrhoea?	94	97	94	100	94	98	96	(93,99)
Should we wash our hands after touching uncooked meal?	97	97	97	100	97	98	98	(95,100)
Is it ok to eat without washing your hands?	97	92	85	96	91	94	92	(87,97)
Do you think you need to wash your hands after coughing or sneezing?	97	95	97	100	97	97	97	(94,100)
Are germs present in our mouth?	68	71	56	78	62	74	67	(59,76)
Is it ok to bite your nails?	97	92	76	91	86	92	89	(83,94)
Do animal faeces contain germs?	74	71	88	96	81	80	81	(74,88)

Note: CI = confidence interval.

seeking opinions and preferences of the children. Answers were aggregated into a personal score for each pupil. All questions were asked in Chichewa, the national vernacular language. In addition, an observational study of the surrounding schoolyard was undertaken at each location to determine: (1) the presence and condition of water, sanitation and hygiene facilities, (2) environmental contamination of the schoolyard with human and animal faecal matter and (3) the proportion of children not wearing shoes. The findings of the study were presented and deliberated with the headteacher and class teachers of each school during a follow up visit (Table 1).

Microbiological examination of hand-washing samples

Before the questionnaire and health education lesson was conducted, pupils were invited to participate in a hand-washing exercise. Each child was requested to wash the palms and backs of the hands rigorously for a period of one minute in an autoclave bag containing 500 mL sterile distilled water and a sterile sponge. One hundred millilitres of "hand wash water" was transferred into a sterile Colilert® collection vessel, the defined-substrate reagent was added and the vessel was shaken vigorously to dissolve the reagent which was then incubated at 37 °C for 24 h. Thereafter, samples were examined to determine the presence of total coliforms (indicated by a yellow colour) and *E. coli* (indicated by a fluorescent blue colour under UV light at 365 nm: IDEXX Ltd., UK). To ensure that the Colilert® reagents were working effectively, positive (spiked with *E. coli*) and negative (spiked with *E. coli* and autoclaved) water controls were examined.

Health-education lesson and hand-painting exercise

After the questionnaire was conducted, a two-part interactive lesson was presented in Chichewa on: (i) how germs are transmitted focusing primarily upon the faecal–oral route and (ii) the importance of hand-washing in the prevention of diarrhoeal disease. Each pupil was given a black and white photo-reduced copy of the illustrated lesson written in Chichewa and children were given the opportunity to highlight any reasons why they do not use facilities or ask questions.

To demonstrate how "germs" can be transmitted from one person to another by hand shaking, putting a finger to mouth or touching inanimate objects, yellow paint was used to simulate the presence of faecal pathogens. To demonstrate the potential for hand to mouth contamination, pupils were invited to place a finger in the paint and then to touch the side of their mouth. To demonstrate the potential for pathogens to be passed from person-to-person by handshaking without washing hands, a few pupils were selected and invited to place a palm in the paint. They were then asked to shake the hand of the pupil sitting next to them.

At the end of the demonstration process, each pupil was invited to come forward and make a palm print on a white picnic paper plate pre-labelled with the message "Remember to wash your hands" (in Chichewa) and their name inserted (Photograph 1). Plates were allowed to air dry whilst the children were requested to wash their hands thoroughly to remove the germs (paint) and encouraged to dry them by waving their hands in the air. Upon completion of the lesson, each child was presented with a bar of soap for hand-washing and encouraged to take both items to their families to reiterate the hygiene message.

Analysis

We used the confidence interval tests of proportions to estimate the proportions in our samples provided np and $n(1-p)$ (where n is the sample size and p is the estimated proportion) were more than five.

Results

Facilities

School B, with a population of 800 pupils, had three ventilated improved pit latrines (VIPs) with concrete platforms. They had been constructed within a few months of this study by the Ministry of Health, and comprised of burnt brick with corrugated roofing. Every latrine had a ventilation pipe attached to the rear of the latrine emanating from the pit; however, none were fly-proofed at the exit point. All were located at the rear of the school. One VIP was used exclusively by teachers, one for boys and the other for girls. The school had constructed a hand-washing tank (Photograph 2) with a tap, located at the front of the school approximately 100 yards from the latrines. No fencing around the school existed and domestic animals were observed walking around the perimeter of the schoolyard.

School A, in contrast, had a population of 1025 pupils and was serviced by four earthen-floored VIPs; two for the boys and two for the girls. No hand-washing facilities were observed. They were constructed a few years back and comprised of burnt brick with thatched roofing. No ventilation pipes were attached. No fencing around the school existed and domestic animals were observed wondering along in the distance.

Questionnaire

The level of knowledge was similar in both schools with, on average, pupils from School B giving correct answers to 15 (88%) of the 17 questions posed, while from School A 14 (82%) of the 17 questions posed were answered correctly. There was no statistical significance between the responses from both schools (Figure 1) despite the provision of improved sanitation and hygiene facilities at School B ($A = 87.29$: 95% CI [79.43, 95.15]; $B = 89.81$: 95% CI [81.96, 97.66]). Several questions were frequently answered incorrectly. For example, when asked if they thought that germs could be

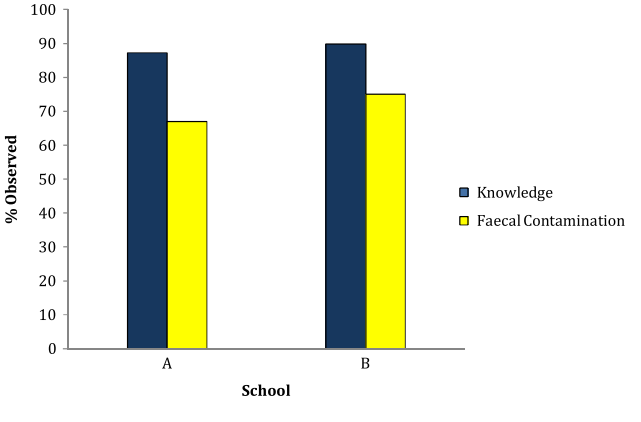

Figure 1. Graph showing the relationship between school A and school B in relation to knowledge and faecal contamination.

found on their hands, about half [42%; 95% CI: 33–51%] of the pupils from both schools answered correctly. With further probing, however, the majority of children would relate "visibly dirty hands" with the possibility of ill-health, but not necessarily hands that were not visibly dirty. In relation to the question on whether or not they thought it necessary to always wash their hands after touching soil the majority [95%; 95% CI: 91–99%] answered correctly, indicating that they had a firm grasp of the concept that germs are spread throughout the environment. At both schools, there appeared to be a lack of recognition that handling baby faeces may cause disease if hands are not washed afterwards. Approximately, one in three pupils in School A and one in five in School B were not aware of that baby faeces can contain "germs".

Just over half of School A pupils and approximately a quarter of School B pupils were of the opinion that soap does not make a difference to hand-washing compared with water alone. The majority of children [87%; 95% CI: 82–93%] stated that their mothers always insisted that they wash their hands with water before eating at home, but that this is not enforced at school by teachers or always practised by children at school. The level of personal hygiene knowledge demonstrated by pupils was reasonably good. School A pupils scored 62% [95% CI: 51–73%] and School B pupils scored 65% [53–77%]. Statistically, there was no difference in correct responses between boys and girls.

Microbiological examination of hand-washing samples

The results of the microbiological study revealed the presence of *E. coli* bacteria on the hands of three out every four [75%; 95% CI: 64–86%] pupils at School B and two in every three [67%; 95% CI: 56–78%] pupils at School A. However, at a 95% confidence level, there was no statistical difference in the presence of *E. coli* bacteria on the hands of the pupils between the two schools despite the difference in facilities available (Figure 1). Similarly, there was no statistical difference between boys and girls in both schools.

Observational studies

The vast majority of children correctly identified the importance of hand-washing [93%; 95% CI: 88–97%] after using the latrine, although highlighted that this was not always possible due to a lack of water provision at the schools. Examples of the material used by the children for anal cleansing were scrap paper (when available), leaves, small stones and partially eaten corncobs. It was stated that this material was discarded to waste after usage through the squat hole; however, "used" leaves were noticed lying around the squat hole of the sanitation platforms in School B. Evidence of indiscriminate defecation was observed at the rear of latrines at both schools. A number of children, mainly girls, explained that they refuse to use the latrine because it is dirty and smelly, and would defecate at the rear of the latrine or walk to the nearest bush for privacy. Some children were frightened of the pit hole (squat hole) because it was dark and deep, or were frightened by the darkness when the door was closed.

All of the latrines inspected in this study were warm inside due to the ambient temperature outside (up to 45 °C), foul-smelling and attracted flies. Evidence of smeared handprints on the internal walls was observed in one latrine and the presence of faeces and used anal cleaning material lying around the squat holes of a few others. Of the pupils questioned, it was noted that three in every five did not wear shoes. Pupils

wearing shoes was less common amongst pupils attending School A [57%; 95% CI: 45–69%] than School B [71%; 95% CI: 59–83%].

Teachers at School B claimed that pupils were encouraged to wash their hands using the tap on the hand-washing tank, however, on the two days when the study team visited the tank was dry. The pupils collected water from a nearby borehole when there was a need to refill it. Pupils also stated that they also used the tap at the hand-washing tank as a source of drinking water. Teachers at School A stated that pupils were not actively encouraged to wash their hands after latrine usage as no hand-washing facilities were available at the school. They also indicated that there is little interaction between the school committee, schoolteachers and local health workers.

Discussion

Malawi is one of the poorest countries in the world. To improve the health of the nation and the economy, the Government introduced free primary school education for all in 1994. Nearly 20 years later, many of the state run schools, especially those in remote rural areas, have fallen into a state of disrepair, lack appropriate sanitary facilities (exacerbated by the ever-increasing pupil intake over the years) and lack basic water service provision. It is not unusual to find schools with teacher to pupil ratios of 1:100 and greater as a result of this policy. The observations noted in this study on poor school sanitation, environmental contamination with human and animal faecal matter and lack of water provision are not atypical in state-run schools in rural areas like Chikhwawa. These factors have been shown in other African studies to be an important risk factor for diarrhoeal illness in young children (Tumwine et al. 2002, 2003). Therefore, schools should incorporate interventions that promote hygienic defecation and stool clearance practices. It is important that children are educated about these benefits, as behavioural change is easier to bring about in children than adults who often find it difficult to break "old habits" (Pinfold & Horan 1996).

This study was conducted in two schools (School A and School B) with latrine to pupil ratio of 1:256 and 1:266, respectively. Although School B had been recently provided with VIPs and a customised hand-washing facility, the findings of this study demonstrate that there was no significant difference in the knowledge, practices or environment between the schools. Evidence from both – pupils and teachers at the schools indicated that the poor sanitation and hygiene practices were not only associated with the presence of facilities, but also their design and placement. For example, the placement of a large concrete tank which requires to be independently filled, and is located 100 yards from the latrines, is less likely to be used regularly than a simple device located outside the facility, as demonstrated by findings at School B. These design issues need to be addressed in combination with effective health education and reinforcement to encourage pupils to use both latrines for safe disposal of faeces and subsequent hand-washing to prevent faecal oral transmission of infections. This outcome concurs with Ebong (1994) who found that though secondary school pupils in Nigeria had good knowledge of environmental hygiene, inadequate opportunities for hand-washing and lack of sanitation facilities at school did not allow them to practice the health knowledge they had acquired. As such, these issues require to be tackled in combination not isolation.

In this study, teachers at both state-run schools explained that part of the reason for the provision of so few sanitary conveniences and lack of hand-washing provision was due to financial constraints placed upon their budgets and uncoordinated activities by

specific Ministries responsible for sanitation (Ministry of Health) and water (Ministry of Irrigation & Water Development). This meant that a school could be constructed with minimal sanitary conveniences and no water service provision, unless located near to a borehole. As a result of the confinement of many hundreds of pupils in an open schoolyard with access to a small number of latrines at playtime, it is only natural that certain areas of the school ground will become heavily soiled with faecal matter. In this study, areas around the latrines were heavily soiled with human faecal matter (Photograph 3) and around the perimeter of the schoolyard by animal faecal matter by wandering livestock, as no fencing is available to keep them out. In addition to the lack of facilities, certain children refuse to use the latrines for a number of understandable reasons: foul smell, high temperature, fear of the dark, flies, scary squat hole, faecal matter around the squat hole, used anal cleansing material around the squat hole and hand-smeared walls (Photograph 4) brought about through the lack of anal cleansing material. In addition, higher percentage of children without shoes in School A was also of concern in conjunction with presence of traditional latrines, as these have soil surfaces which can provide a conducive environment for the transmission of soil-mediated helminths.

In the absence of financial support from the state to facilitate the construction of improved sanitary facilities, the schools themselves could implement a number of modest, low-cost improvements. Thought needs to be given to the design and construction of latrines that meet the needs of primary school children, and not the current standard based upon that of an adult. For example, based on the findings of this study, ventilation holes could be inserted in the surrounding walls at a height that would provide privacy whilst providing additional light within the latrine and better ventilation. Equally, the size of the door could be adjusted at the top and bottom to do likewise. The concrete squat-hole cover which is "too heavy" for young children to lift should be replaced with a lighter plastic or wooden alternative. This would result in children covering the squat hole more often after usage and thereby reduce the presence of flies and smells within the latrine. Ventilation pipes with flytraps should be incorporated into VIP that does not have them. Earthen floors should be replaced with concrete sanitation

Photograph 3. Evidence of defecation at the rear of school latrine.

Photograph 4. Hand-smearing of the inside wall of school latrine.

platforms, which facilitate better anal targeting and cleansing (Grimason et al. 2000), and should be designed with appropriately sized squat holes, squat hole covers and footprints suitable for children.

Separate urinals for boys and girls would reduce the associated urine/ammonia smells within the latrine brought about by indirect targeting of urine into the squat hole. The walls and floor of the latrine should be mopped on a regular basis with scented washing liquid or a chlorine based compound. The internal walls could be painted a white colour to enhance light transmission within the latrine and dissuade hand smearing. Anal cleansing material should be provided, if possible, and around the external wall, fragrant flowers could be planted. The outside walls could be plastered to portray health-related messages and images to remind children to wash their hands after usage. The provision of water in plastic containers with taps or recycled containers next to the latrine, as opposed to those seen 100 yards away, would also be a more realistic and manageable means to encourage children to wash their hands.

Pupils should be taught about the importance of environmental sanitation and hand-washing, and encouraged to participate in sanitary surveys and school ownership. For example, a programme to "clean up" the school environment could be introduced using "senior" pupils to lead by example. This could involve a mentoring scheme for younger pupils to ensure sustainability. Senior pupils could take turns at patrolling latrines to ensure that younger pupils are reminded and encouraged to wash their hands after use, make use of the latrine and not defecate behind it, thereby allowing pupil to take control of their school environment. With a plastic bucket and spade, pupils could take turns to patrol the perimeter of the environment clearing up animal faeces for disposal into the squat hole or be used within a school garden. This may instil pride within pupils whilst re-enforcing the importance of safe sanitary excreta disposal methods and hand-washing practices. Such schemes could be introduced by headteachers at little cost and include the involvement of community-based health-care workers such as Health Surveillance Assistants and Area Environmental Health Officers.

With the introduction of free primary schooling in 1994, the Ministry of Education & Culture was forced to recruit many unqualified and untrained teachers to meet the targets set by the Government of the day; many of whom are still in place today. Based upon discussions with the teachers involved with this study, it appears that there is lack of knowledge on person-to-person, zoonotic, water- and food-borne transmission of diarrhoeal disease. This problem is exacerbated today by changes to the school curriculum, which no longer reflect specific health lessons for children but instead focus on integration with other subjects. A recent situation analysis (PATH 2011) reported concerns that with this change, health and hygiene messages are no longer being provided or reinforced within the teacher training or school system.

Teachers stated that primary schools with hand-washing facilities in Chikhwawa are in the minority. "The fortunate few schools that have hand-washing facilities only do so as a result of funding from non-governmental organisations (NGOs). However, this is usually dependent upon the priorities and impact area of the NGO". The provision of hand-washing facilities does not necessarily have to incur excessive costs, such as those associated with the construction of a water tank (Photograph 1). Low-cost, practical and appropriate homemade devices, such as the "tippy tap" (i.e. a simple hand-washing device, constructed from a gourd or plastic bottle, which stores several litres of water that are instantly available for economical hand-washing), have been shown to be a suitable alternative (Watt 1988; Hurtado 1993), and teachers and pupils should encourage its use. This basic health intervention measure could also find its way to the homes of pupils and be implemented there.

Of interest in the results was the low number of pupils who believed that washing hands with soap and water was more effective than water alone. Curtis and Cairncross (2003) estimate that hand-washing with soap could potentially reduce the number of diarrhoea deaths by approx. One million per year, and reduce the risk of diarrhoeal illness by up to 47%. However, soap is rarely accessible in state-run schools due to the cost associated with providing it on a daily basis and the financial priorities of the school management. However, this may change in the near future as the Ministry of Health in Malawi is to tackle the problem of morbidity and mortality associated with diarrhoeal disease through the introduction of a campaign on hand-washing with soap. In the absence of commercial soap, the effectiveness of soap made from natural grown plants and seeds in the local area could be evaluated. For example, studies have shown that ash and mud appear to be equally as effective as soap at reducing bacterial contamination of hands (Hoque & Briend 1991; Hoque et al. 1995; Hoque 2003).

The findings of this study indicate that the foundations of good personal hygiene have been laid in the primary school community and teachers at one of the two schools, as they emphasised the importance of hand-washing after latrine use within their classes. However, knowledge and practise are two different things. In this study, children were well aware of the importance of hand-washing after latrine usage or before eating, but seldom practised it at school. Although nearly every child stated that their mothers always insisted they washed their hands before eating at home, this message was not being re-enforced at school by teachers who indicated that "there was no point in teaching hand-washing when there were no hand-washing facilities for the pupils to use". This again may be a reflection on the lack of training and emphasis on health and hygiene at both teacher training colleges and schools. This is particularly important with the increase of school feeding programmes across Malawi, providing supplementary foods, which the children eat with their hands, often without washing hands first. To address this knowledge gap, Village Health Committees (volunteers) and HSAs

(Community health workers) could work in partnership with headteachers, school committees and parent–teachers associations to ensure that the parental guidance given to children on such matters is re-enforced at school and vice versa.

Failure to implement these measures and messages will mean that children from the poorest backgrounds of society attending state-run schools in rural Malawi, irrespective of the facilities provided, will continuously be exposed to an environment conducive to the spread of diarrhoeal disease.

This study concludes that in order to improve sanitation and hygiene, and, therefore, reduce the spread of diarrhoeal diseases in schools in Malawi, a multidisciplinary approach is required, including: (1) appropriate design, construction and location of sanitary and hygiene facilities; (2) incorporation of hygiene education into teacher training and school curricula activities; (3) reinforcement of health and hygiene messages with pupils in all school activities; (4) implementation of pupil led hygiene initiatives, e.g. sanitary surveys and action plans; and (5) involvement of community health workers (both government and voluntary) with school activities to promote hygiene messages.

Finally, pupils responded well to the pro-active learning techniques employed in this study using paint, enlarged A2-sized pictures for the health-education presentation and participation in the hand-washing exercise. The use of yellow paint to demonstrate the potential for germs to be transmitted from hand-to-mouth and person-to-person through hand-shaking, and to and from fomite objects, attracted much interest and laughter from the teachers and pupils alike. Teachers were of the opinion that it was a simple and effective way of demonstrating to children within this age group how germs on their hands can cause diarrhoeal disease and how they can be passed from person to person or from the environment to a person. Colourful paint is, however, a luxury material for children and teachers in state-run schools, and cheaper alternatives need to be found e.g. maize flour and natural food colourings. Nevertheless, this novel approach using paint introduces an element of fun into health education and appears to have potential. Washing off the paint (germs) was very clear to the pupils who participated in this study. This may be an effective tool for the delivery of hygiene education in primary schools, which the authors plan to assess in further school-based studies.

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