THE FEAR OF AWFUL SMELL: RISK PERCEPTIONS AMONG FARMERS IN VIETNAM USING WASTEWATER AND HUMAN EXCRETA IN AGRICULTURE

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Abstract. Vietnamese farmers' health-risk awareness, knowledge, and practices related to their use of wastewater and human excreta was investigated in an anthropological study by a multidisciplinary team in peri-urban Hanoi and Nghe An Province. Farmers identified health risks associated with their use of excreta and wastewater, but they viewed these as unavoidable risks related to production. They perceived the health risks as different for the use of wastewater and human feces. They perceived health risks from wastewater as non-serious because it remained on the skin and only caused skin problems, but they considered health risks from non-composted smelly feces serious because it entered the body through 'polluted' air. Most farmers were more aware of threats to health from 'dirt' entering the domestic environment than of the health risks during their work. The concept of 'dirt' should be separated from understanding of germs, viruses, and parasites so that it is understood that things that carrying health risks cannot always be identified by their 'dirtiness' or smell. Farmers mainly considered hygiene and health as women's issues. Men's responsibility for the health and hygiene of the family should therefore be emphasized.

INTRODUCTION

In Vietnamese cities, as in many other cities of Southeast Asia, farmers often cultivate fish, aquatic vegetables, and horticultural products with wastewater coming from urban centers (Leschen *et al*, 2005). The high demand for fresh vegetables and fish at nearby markets creates an opportunity for a good income for peri-urban farmers. They often use wastewater because they have no other choice due to pressure on the water resources, but the reliable flows and the nutrient values of wastewater also make farmers appreciate this resource. However, on-going research in Phnom Penh, Cambodia, indicates that exposure to urban wastewater represents a serious risk for skin diseases, especially dermatitis, on the hands and legs of aquacultural producers (van der Hoek *et al,* 2005). Moreover, the use of wastewater exposes agri- and aqua-cultural producers, as well as consumers, to increased risks of helminth infections, such as *Ascaris* (round worm), *Trichuris* (whipworm), and hookworm (Blumental and Peasey, 2002; WHO, 2006a).

In the rural areas of northern Vietnam, human excreta have been used as fertilizer in

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agricultural production for centuries, and it remains a common practice (Jensen *et al,* 2005; Phuc *et al*, 2006). However, this practice represents several health risks, and it is likely that the high prevalence of helminth infections in rural areas of northern and central Vietnam of up to eighty percent of the population are associated with the farmers' practices of using human excreta in agriculture (van der Hoek *et al,* 2003; Verle *et al* 2003; Phuc *et al,* 2006). The Vietnamese authorities have therefore issued guidelines stating that all human excreta should undergo a minimum of six months composting or retention period inside a latrine before it can be applied as fertilizer (Ministry of Health, 2005). Although the excreta-composting guidelines have been adopted by both the Ministry of Health and the Ministry of Agriculture and Rural Development, studies have shown that the farmers often store or compost the excreta for a shorter period before applying it in the field (Phuc, 2003; Jensen *et al*, 2005).

The World Health Organization has recently updated its guidelines for the safe use of wastewater, excreta, and greywater by publishing a new, separate volume on the use of excreta and greywater in agriculture, using a health-risk assessment approach (WHO, 2006b). Unfortunately, few studies have described the hygiene practices of wastewater and excreta use in agricultural production systems, and even fewer have analyzed local perceptions of the health risks associated with such systems. Without such information, it is difficult to assess the health risks because hygiene behavior is an essential component of such an assessment. Furthermore, a greater understanding of risk-related perceptions and practices is needed to plan health promotional activities that acknowledge the farmers' need for both a sustainable livelihood and health protection. Greater in-depth understanding of hygiene practices and risk perceptions of the communities involved in human excreta and wastewater use would guide health promotional efforts. This knowledge could help target high-risk groups and design gender- and age-differentiated promotion methods that use the most appropriate terminology. This could motivate hygiene-behavior change and possibly identify local agents of change in the promotion of more appropriate hygiene.

Significant public investments in Vietnam have been made in the water supply and sanitation sectors, but only a small percentage has been invested in hygiene promotion activities, and the efforts are fragmented. Government policy is to educate the public through the Women's Union or Farmer's Union, where the importance of specific practices is emphasized but is unlikely to have much impact on actual behavior (Curtis, 2005). Regarding the communication of essential hygiene practices, government-supported initiatives have not given much attention to the use of wastewater or human excreta in agriculture.

This study addressed the need for further insights into farmers' perceptions of risk and health risk awareness when using human excreta and wastewater for agricultural production in Vietnam. Such insights can serve to inform future promotional health activities through government and community based organizations. It was based on an in-depth anthropological study of why and how farmers use wastewater and human excreta in aqua- and agriculture. Further, farmers' health-risk perceptions and practices of health-risk avoidance were studied at a detailed level, in their everyday context, through participant observations, informal interviews, semi-structured interviews, and focus group discussions.

MATERIALS AND METHODS

Field sites

Two study sites were selected in Vietnam: Bang B Village in Thanh Tri District, peri-urban Hanoi, and Phuc Son Commune in Anh

Son District of the north-central province of Nghe An. Bang B Village was selected because farmers in this area use untreated wastewater for the production of aquatic plants and fish. Phuc Son Commune was selected because farmers here use human feces as fertilizer in the culture of rice. A male, English-speaking Vietnamese doctor with postgraduate training (Master of International Health) assisted the principal investigator during the fieldwork in Phuc Son. A female, English-speaking Vietnamese anthropologist with postgraduate training (Master of International Health) assisted the fieldwork in Bang B. Twenty key informant interviews, 38 in-depth interviews with farmers, and nine focus group discussions (FGD) were conducted. In addition, participant observations for a total of three months were undertaken at both field sites.

Approach

This study adopted an emic approach, exploring people's own terms and perceptions, rather than imposing predefined terms on informants' answers (Parfitt, 1996). By combining interviews and focus group discussions with direct observations, it becomes possible to capture the complex relationships between knowledge, perceptions, and practices of the studied population. Such *thick descriptions* (Geertz, 1973), we claim, are valuable for the planning of future interventions.

Initially, very open *grand tour* questions were asked in order to discover the farmers' own terms (Spradley and McCurdy, 1972). The fieldwork began in the commune where farmers used human feces. The researchers had expected farmers to be very open about their use of human feces as it is a common practice in this area; however, it turned out that most farmers, especially women, were embarrassed when asked about their use of human feces. After the first round of semi-structured interviews, the approach was then modified to formulate the questions in more sensitive and general terms. Only when researchers and farmers had met several times and were on friendly terms, did the researchers ask directly about personal use of human feces.

"The fear of smelly human feces" was a phrase repeated by all informants and seemed to be a very central idea. A *cover term* is a domain, a culturally defined category, which relates a range of terms (Spradley and McCurdy, 1972). Thus, the researchers decided to study the "fear of smelly human feces" as a *cover term* and sought to grasp the meaning behind this term through structural questions seeking to find the qualities of different kinds of organic fertilizers such as their smelliness, dirtiness, and nutritious value. In this manner, people's understandings of the relations between dirt, nutrition, smell, and health risks were studied.

When the researchers arrived in the second field site, where farmers used untreated wastewater, the researchers set out with open *grand tour* questions again to avoid imposing on them the focus of "smell." They asked about the farmers' perceptions of their aquacultural practices and their word for the water they used for their plants. In this way, the researchers found that these farmers did not use the official word for wastewater but usually called it "smelly water." The researchers asked descriptive questions about the water and its effects on people and farm products; "smell" was also found to be central concept to these farmers.

In order to improve the validity and test the relevance of the findings and to improve the comprehensiveness of the data analysis, interviews were combined with other methods through triangulation (Mays and Pope, 2000; Rifkin and Pridmore, 2001). Participant observation, informal interviews, and focus group discussions were undertaken to see if and how the cover terms were used in other situations. Furthermore, the same informants were asked the same questions in slightly different ways

and in different situations, that is, in their homes, in the fields, among other people and alone, and so forth. Additionally, the relevance of the analysis was tested among different groups using a normally selected sample that was based on the following factors: sex, age, occupation, status, education, and economic standing. These people were all asked in-depth questions on the same cover terms.

One of the limitations of the present study is that the researchers were unable to observe the composting and use of human feces because the timing of these activities did not coincide with the fieldwork. However, the period of intensive participant observation provided the researchers with good hands-on insights into the farmers' everyday hygiene practices and risk avoidance methods (Ellen, 1984). Another limitation of anthropological research, such as the present study, is that the study locality is very small; therefore, it may not be possible to generalize the findings to a larger area. Conversely, survey-based quantitative studies of risk perceptions are often based on pre-defined terms, which may not resonate with the terms and meanings used by the study population, thereby eliciting inaccurate or very superficial data (Leach, 1967).

To investigate the potential for the generalizability of the in-depth findings of this study, a short-term study was conducted in a different province, Nam Dinh, where farmers also use wastewater. Interestingly but not unexpectedly, the farmers there did not use the phrase "smelly water." They simply called it "wastewater" and described it using mainly negative terms because it contained too much chemical pollution, which made it useless for farming. This suggests that the findings of this study on perceptions of wastewater and human feces cannot necessarily be applied directly to all other farming communities in Vietnam. Definitions and descriptions of wastewater and human feces will differ depending on the local circumstances and qualities of the organic fertilizer. Nevertheless, this study is relevant in a more general sense about perceptions of dirtiness, smell, and health risks. It offers insights into how North Vietnamese farmers structure and describe their experiences of work-related health risks.

Key informant interviews

In the initial phase of the field research, 20 key informant interviews were carried out. Seven of these were conducted with informants at the commune level in Bang B, and thirteen of the key informants were found in Phuc Son Commune. The key informants were selected among leaders of the Women's Union, People's Committee, and the Farmers' Union. In addition, interviews were conducted with the staff at the local health station, schoolteachers, and heads of the villages. General information about the communities, and their use of wastewater and human feces was obtained from key informants, who also assisted in facilitating contacts with individual farming households.

Focus group discussions

Focus group discussions (FGD) were used as another approach to get to know the communities and their concerns about health risks and their use of wastewater and excreta. Nine focus group discussions were held at the two study sites, with about eight participants in each group, including male and female producers in separate groups.

Semi-structured interviews

Fourteen semi-structured interviews were conducted with farmers using wastewater and 22 semi-structured interviews with farmers who used human feces in their production. These interviews included questions on the following topics: practices of using wastewater and excreta; perceptions of wastewater and excreta; risk-reducing strategies related to the reuse of wastewater and excreta; perceptions of the quality of the final agri- and aqua-cultural products; and knowledge and

attitudes towards hygiene, health, cleanliness, and dirtiness. This was a useful method of studying perceptions of health risks to acquire knowledge on agricultural practices throughout the agricultural calendar.

Participant observations and informal interviews

Two researchers took part in the everyday life in the two field sites during the three months of research, from October to December 2005. This was carried out while community members performed their daily tasks, and the researchers adopted roles as natural members of the community. While participating in farming activities, the researchers used the opportunity to carry out informal interviews about how people perceived and practiced farm work. Participant observations and informal interviews were crucial tools, especially for studying everyday practices of excreta and wastewater use, which people are not used to verbalizing.

Data analysis

The data was carefully noted or tape-recorded. Every day, detailed and full records were written. The written data was ordered and coded in themes as the research progressed. By the end of the fieldwork, the main themes and terms were found and analyzed in depth.

RESULTS

Phuc Son: the use of human excreta

Why and how farmers use human feces in agriculture. Phuc Son is a mountainous rural commune located close to the Lao PDR border. It is the central commune in Anh Son District, with 4,184 inhabitants and has a relatively large center, with shops, a post office, guesthouses, restaurants, and several internet cafés. New houses with two floors are not a rare sight in this commune, which is wealthier compared to neighboring areas. Nevertheless, many families in Phuc Son live under poor living conditions, especially the ethnic minorities in the mountainous outskirts of the commune.

The main occupation in the commune is agriculture, but income from jobs in the construction sector is of increasing importance. Rice is the main crop and usually planted twice a year, in January-February, and June. Corn and/or sweet potato is the third crop of the year, and usually planted in October. In addition, most families cultivate vegetables in their garden; some families work in tea plantations; and most raise pigs, ducks, and chickens. A water and sanitation program offers loans to the poorest households and to schools so that they can afford to invest in latrines and an improved domestic water supply. There are also Information, Education, and Communication (IEC) activities in the area focusing on hygiene promotion. People usually have a traditional double vault latrine, a single vault latrine, or a new project-supported double vault latrine that either have single or double ventilation pipes.

In interviews, people with single vault latrines said that they used the pit until full, then they removed the excreta through a shutter from the outside. They usually composted the excreta behind the latrine before they carried it in bamboo baskets to fertilize the fields. Households with double vault latrines sealed off one vault when full and then used the other vault. In this way, they could compost the excreta inside the latrine. Only a few households could afford septic tanks, which were preferred primarily by households that did not work in agriculture. With a septic tank they did not have access to the human feces.

All interviewed farmers, local authorities, and health staff agreed that human feces were better fertilizer than the commercially available fertilizer. At the same time, everyone agreed that fresh human feces were the most unclean fertilizer with an awful smell (*mui hoi*/*hoi thoi*). Farmers ranked human feces first, as the most unclean, smelly, and nutritious fertilizer; pig

feces were the second most smelly and nutritious fertilizer; chicken feces were the third; and buffalo feces were the fourth. Their explanation was that humans ate more nutritious and a greater variety of food than pigs; pigs ate better food than chickens, and so on. They said they always composted human feces in order to reduce the smell and obtain a dry product, which was easier to distribute in the fields. A parallel between human feces and food was also expressed by an older woman who stated how she was careful not to use too much human feces for her plants. She compared plants over-fertilized with human feces to humans eating too much food. Both would result in sickness or death. Despite the fact that human feces were a cost-free fertilizer, they did not mention this when discussing its advantages; rather they praised its nutritious value for the soil and plants.

Some farmers made an analogy between human feces and Eastern medicine (traditional Chinese and Vietnamese medicine), and between chemical fertilizers and Western medicine. Western and Eastern medicines exist as two parallel and often complementary systems in Vietnam, where Eastern medicine is perceived to strengthen the whole body and Western medicine has a more focal but immediate effect on the infected part of the body (Craig, 2002). In similar terminology, farmers perceived human feces as having a fertile and long-term effect on soil and plants, while chemical fertilizers had an immediate effect with a short-term impact.

Health risk awareness related to the use of human feces

Smell. Farmers highly appreciated human feces in their production; but at the same time, they knew it carried harmful health risks. They associated these health risks with the awful stench. If human feces did not smell, they thought it was clean and decomposed. Their definition of decomposed human feces was "dry like sand and dark like kitchen ash with no or very little smell." They described fresh, uncomposted human feces as extremely dirty because it was wet and had a terrible smell. 'Dirty' and 'bad smell' were synonymous. Many even said they 'feared' the awful smell. Farmers with single vault latrines said that they collected all the feces–including the fresh on the top-and composted it outside for less than one month. They considered it decomposed and at no risk because it had no or very little smell.

This perception influenced the way they used protective measures. In practice, the majority of our informants found it unnecessary to wear protective measures when the feces did not smell. Farmers rarely mentioned any protective practices for their work in the fields. They typically wore only a hat, canvas working clothes, and occasionally a mask when they applied human feces. In principle, they knew they should use protective measures; but in practice, they did not apply this knowledge. In interviews and focus groups, many expressed their intentions of wearing protective clothing; but based upon observations in the field, it did not seem to be a widespread practice. In a male focus group discussion, the participants at first said that they all knew that they should wear protective measures in order to protect their health. They explained that the reason why they did not do so was that boots and gloves were too expensive. It was not because gloves and boots were not practical to wear, they said. Later, in the same focus group discussion, they said that protective measures were very inconvenient for them. They explained that it was very difficult to wear boots when they walked on the narrow paths along the rice fields. This suggests that, while these farmers knew that boots and gloves could protect their health, they prioritized the need to work effectively.

Interviews and focus group discussions indicated that farmers were not afraid of

using human feces if it had been composted. If it did not smell anymore, it meant that it had been composted long enough and no longer carried health risks. The length of the composting period and the use of ash and lime were also understood as important factors in the composting process, but the smell was the main indicator of whether it had fully decomposed or not.

Conversely, the majority found it necessary to protect themselves when collecting fresh human feces due to the stench. More farmers emphasized the importance of masks when emptying the latrines than when applying feces in the field. They said they wore masks "to protect their health." Uncomposted human feces were perceived as presenting a higher risk to human health than decomposed feces as it could infect people through food or a stench atmosphere. Most people were not sure about what diseases the smelly air actually caused, but some had an idea that it caused diseases in the respiratory or digestive systems. They believed that germs from uncomposted human feces would disperse in the air and could infect people who breathe it and thereby attack their lungs. The uncomposted human feces could also infect the digestive system if farmers got it on their hands and then touched their mouth or their food with the dirty hands. Bad smell from uncomposted human feces could also cause digestive diseases. Furthermore, the farmers were aware that flies could transmit digestive diseases if the flies had first been sitting on uncomposted human feces and then landed on their food. The head of the local health center expressed a similar concern with health risks from the smell of human feces. His explanation was that smell could affect the food and then infect people when they eat this food.

Familiarity. An important aspect of people's perceptions of cleanliness and hygiene was 'familiarity' (Craig, 2002). Most of the farmers would never fertilize with human feces from a latrine that did not belong to family members. The smell from neighbors' latrines was a point of annoyance, a cause of hidden local conflicts; most people avoided using other people's latrines. During informal interviews, many people brought up the topic of how they were bothered by smell from their neighbors' latrines. In a focus group discussion, a woman said:

> "My house is over there. My neighbor's septic tank is located next to my entrance. When I pass by his house, I can smell bad things. When it has high humidity, we cannot stand the stench. It gives off awful smell."

An older man had even built a double-height fence to keep out the stench from his neighbor's latrine. Moreover, farmers did not fear their own children's feces as much as that of adults because they were already familiar with their children's, as they had raised them.

Bang B: using wastewater

Why and how farmers use untreated wastewater. Bang B is a village with 1,310 inhabitants that is located on the outskirts of Hanoi, in a region with rapid urbanization, although 80% still get their main income from farming activities. The farmers there have abandoned rice cultivation in favor of land-intensive aquaculture, which brings them a much higher income. A pump station supplies the irrigation canals with untreated wastewater from Hanoi, which runs into the field ponds through small pipes. The farmers grow aquatic vegetables, such as water morning glory, water dropwort, watercress, and water mimosa. These vegetables are sold at markets in and around Hanoi. Aquatic vegetable fields are normally cultivated by the family. Women are the main workforce in the fields, while men help with heavy work tasks, such as carrying tools and harvested plants.

There are six fishpond owners in Bang B, who all raise their fish with wastewater from

the To Lich River. Only men work with fish production, and the fishpond owners usually hire a couple of young men to help manage their ponds. Aquatic vegetable production and fish production are labor-intensive and demand a rigorous work schedule. Harvests often take place in the dark morning hours, from 04:00 AM and the vendor arrives on bicycle around 06:00 AM to collect the newly harvested vegetables to sell at the market. Before the vendor arrives, the farmers rinse the vegetables in one of the wastewater-fed ponds to make them appear fresh and clean. The working hours and schedule depend very much on the type of plant; but in general, there can be around six harvests within one year. Thus, aquaculture producers are busy during most of the year.

That water is an essential source of life for plants and therefore for the livelihood of the farmers was expressed as an adage mentioned in a focus group discussion: "People can survive three days without food, but vegetables cannot survive without water for three days."

The respondents' descriptions of the positive effects of wastewater were similar to those of human feces as fertilizer: the awful smell was emphasized. Usually they said *nuoc thoi*, which means "bad smelling water," instead of the official word for wastewater (*nuoc thai)*. Black, bad smelling water with white bubbles was the most common type of water. The water quality changed with the direction of the river's flow. When the water had pink bubbles, farmers called it "soap detergent water" (*nuoc sut*) and considered it the worst type of water because it had a high content of chemical waste, for example, from soap detergent factories. They referred to wastewater as "organic fertilizer water" (*nuoc phan*) if the water was black and smelled bad because they thought this water primarily came from the toilets of the city's households that had been directly discharged to the river. Farmers thought chemical waste settled in the fields and ponds one or two days after they had pumped in fresh wastewater; at which point, they considered the wastewater less chemical and therefore better for plants and fish.

According to the farmers, the organic wastewater had a positive long-term effect on the soil, whereas chemical wastewater damaged the soil and even destroyed the aquaculture products and killed fish. Thus, aquacultural producers were well aware of the negative impacts of chemical wastewater, although they never mentioned any harmful effects of organic wastewater. Some aquatic producers preferred to use rainwater because it was cleaner than wastewater. Still, wastewater was appreciated because the plants needed more water than the rains could provide.

The farmers perceived wastewater as dirty and harmful for people but nutritious for plants and fish. Ultimately, as one male farmer in a focus group discussion said:

> "In my opinion, health and food are both necessary and important. I think they are two sides of the same coin. All of us need both: health and food. I mean that, when we are strong, we can produce food, whereas we get energy by eating food and our health can be kept."

Health risk awareness and use of protective measures when using wastewater

Aquatic producers' use of protective gloves and boots depended on their gender. During participant observations, the researchers found that women generally wore protective measures more frequently than men did, and that they used different kinds of protective measures compared with men. Women used three types of gloves: elbow-length thick rubber gloves, short latex gloves, and elbow-length cotton gloves. Men only used the first two types of gloves. Similarly, women mostly wore long

rubber boots, while men mostly wore shorter rubber boots. Observations revealed that men more often than women went barefoot or only wore plastic slippers. During fish harvests, when men dragged fishnets with their bodies submerged in wastewater, they rarely wore anything but a pair of shorts, a t-shirt, and, sometimes, plastic slippers; only a few men wore raincoats over their regular clothes.

In focus group discussions, it was explained that it was easier for women to wear gloves and boots. Everyone, including women, thought that women's work tasks could better be carried out with gloves and boots than men's could. The typical explanation for this was that "men do the 'heavy work', they have to walk a lot, and therefore it is difficult for them to wear boots, whereas women can work in the same place." Nevertheless, it was observed that men often did "women's jobs," such as working in the fields and sometimes washing vegetables. One man who worked in the fields explained that he did not wear protective measures because it was not his real job; he just helped the women.

Both men and women felt that using protective measures constrained their work. For example, all informants said that they could not wear gloves when harvesting water morning glory because they needed the close contact between fingertips and the plants to pick the plants correctly. Many women preferred long cotton gloves because they were tighter, more like their "real hands."

Cotton gloves could protect them against the cold from the water and against the sun. Many women mentioned keeping their hands warm and their skin light before they mentioned preventing skin problems from the polluted water. While male and female aquaculture producers did consider gloves as a way of reducing skin problems related to working in the wastewater, they did not think gloves and boots could prevent their skin problems completely.

The skin and nail problems, from which most aquaculture producers suffered, were not considered serious health problems. A focus group of male aquaculture producers explained that they did not worry about their skin and nails because it was not a severe problem. They would only stop working for a day if they got a heavy headache caused by pesticide spraying, they said.

The female farmers who were interviewed perceived skin and nail problems as a cosmetic concern. As long as the problem remained on the skin, it was considered a minor problem, and people would treat the problem themselves with antibiotic containing topicants purchased from local pharmacies. They would only seek help at the health station if a skin problem developed into an infection, especially if the infection was perceived as affecting the inside of the body through scratches. For example, when one informant got an infection in his thumb from working in the water, he went to the health clinic for an injection of antibiotics. This was very costly, but since the illness had got serious and the finger was perceived as infected "inside," he and his wife were willing to spend the money.

Through participant observation, agricultural producers were found to have a habit of washing their hands and feet in the wastewater ponds before they returned home. Many would even wash their hands and feet directly in the wastewater canals. They explained they did it "to get the dirt off." They did this although they knew the water in the pond was not clean, and when they came home, they would wash again with clean water and soap.

DISCUSSION

This study demonstrated that farmers knew there were health risks associated with their use of excreta and wastewater, but they viewed these as unavoidable risks related to their production. The analysis above also drew

attention to the important difference between health risk awareness related to the use of wastewater versus the use of human feces. Wastewater-related health problems were perceived mostly as surface problems, which were not considered serious as long as they only caused skin problems and did not enter the body through its orifices. In contrast, farmers perceived human feces as being much more harmful and with ambiguous health risks. They understood that health risks from human feces were caused by bad smell that could enter the body through either mouth or nose.

"Inside"-"outside"

The widespread concern found in this study with air, wind, gas, and smell is a common way of explaining diseases in Vietnam. This perception is related to Chinese medical theory in which air or winds are assigned a central disease-causing function. All sorts of 'wind' are understood to be harmful to people. Winds can bring disorder, changes, carry dirt and germs, and make people sick if they breathe it (Hsu, 1999; Craig, 2002). According to both agricultural and aquacultural farmers, the main health risks from using human feces and wastewater in their production occurs if awful smell, pathogens, or dirt enter the body through the orifices. This corresponds to David Craig's findings in his medical ethnography, *Familiar Medicine*, on popular understandings of health and use of medicine in northern Vietnam (Craig, 2002). Craig finds that a strong distinction between the "inside" of the body and the "outside"/surface of the body exists in everyday medical beliefs and practices in Vietnam. According to these popular understandings, it is important to maintain an inner strength and stability to be able to resist influences from outside: "Possible thresholds between inside and outside domains become important foci for resisting pathological influences" (Craig, 2002). Either harmful pathogens can stay on the surface of the body, where they only cause light diseases, or they can enter via bodily orifices into the depths of the body, causing severe diseases (Craig, 2002).

Protecting the "inside"

The analogy between the inside/outside of the body and the inside/outside of the household has been pointed out by several anthropologists (Douglas, 1966; Gammeltoft, 1999). Similarly, in the present study, the farmers were very careful to clean off dirt from the fields before entering their homes, and when asked about hygiene they always mentioned the importance of cleaning themselves upon returning home. Conversely, farmers were more carefree when they were "outside" and actually worked in the wastewater or applied human feces in the fields.

The fact that women used protective measures more often than men in the fields might be because many of the risks, such as dark skin, skin diseases, and eroding nails, were associated with cosmetic concerns. In Vietnam, concepts of beauty and appearance involve more than aesthetics in a strict sense. Aesthetics is part of the Vietnamese understanding of health, which includes social, moral, aesthetic, and physical concerns (Gammeltoft, 1999; Craig, 2002). The presentation of a nice and pleasant appearance is indicative to society of a socially, morally, and physically healthy family. Vietnamese women are typically responsible for the inner functions of the family and home and are supposed to invest their energy in the health of the family, while men take care of concerns outside the family (Bich, 1999; Gammeltoft, 1999; Craig, 2002). Hygiene and health of the family were also mainly women's concern in this study. It seemed as if the bodies of women represented the family's health – the "inside" of the family, – and therefore it was more important that women protected their health. Practices such as wearing a mask to avoid breathing in bad smells and washing in wastewater before going home from work might at first sight not have much to do with health care. However,

when understood from the perspectives of the people, these practices are ways of protecting the family's health.

Relevance for health promotional activities

While issues related to health promotion and specific intervention strategies were not parts of the conceptual framework of the research presented in this paper, some of the findings may serve as inspiration for future health promotional activities. Future programs should be directed primarily towards male responsibilities and include a discussion of the potential health risk concerns of the male activities.

In addition, it may be beneficial if promotional activities separate the understandings of germs, parasites, and viruses from the local concept of 'dirt' (Craig, 2002), which is a term that also serves to organize people's social world (Douglas, 1966). In the present study, farmers saw 'dirt' as coming from outside the home and potentially infecting what they understood as the 'clean' family unit. Therefore, more information is needed on the risk of infection coming from inside the home and while working outside in the fields. Future health communication may also have to make it clear that things carrying health risks do not always look or smell dirty, and that it is not the smell itself that affects humans.

The mass communication facilities available in Vietnam and the outreach organized by the Department of Prevention, Ministry of Health, provide many opportunities for more targeted communication. Similarly, the Ministry of Agriculture and Rural Development could play an important role in promoting sound practices from both an agricultural and hygienic perspective.

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