

Food Preparation, Practices, and Safety In The Hmong Community

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Abstract

Foodborne illnesses are syndromes that are acquired as a result of eating foods that contain sufficient quantities of poisonous substances or pathogens. Cultural practices place the Hmong at an increased risk for food borne illnesses resulting from improper food handling, preparation, and storage. The risk for illness is further complicated by the fact that the Hmong have very limited knowledge about food-borne disease and they find themselves in a situation in which they cannot control the space in the house available for food preparation. Data for this qualitative study were collected from 25 Hmong individuals aged 18 and over residing in Fresno, California. Participants in this study did not appear to understand the direct relationship between bacteria and food borne illnesses. Similarly, study participants were more likely to report reliance on traditional medicine to address foodborne illnesses. Results from this study indicate a need to reach the Hmong community with culturally appropriate messages relating to food preparation and practice. Messages must acknowledge the role of food in cultural celebrations, while seeking to decrease the risk for foodborne illnesses.

Introduction

Foodborne illnesses are defined as syndromes (infections or intoxication) that are acquired as a result of eating foods that contain sufficient quantities of poisonous substances or pathogens (Riemann and Byran, 1979; Tauxe, Swerdlow, and Hughes, 2000). According to the Centers for Disease Control and Prevention (CDC) foodborne illnesses affect some 76 million Americans including the 300,000 who are hospitalized, and the approximately 5,000 who die every year (CDC, 2004a; CDC, 2005). The annual cost of foodborne illness is estimated at \$5 billion in medical expenditures.

Factors contributing to foodborne illness include improper cleaning of raw foods, cross contamination with microbes such as E. Coli 0157:H7 (found in unpasteurized apple cider), salmonella (found in raw and undercooked eggs), Campylobacter (found in milk), inadequate heating, and improper cooling of foods (Bryan, 1980; CDC, 2004a; McSwane, Rue, & Linton, 1998). A nationwide survey conducted in 1998-99 by the CDC found that microbiological contamination was the number one cause of food-borne illnesses in the US and chemical contamination was second (see Figure 1). The data from the aforementioned study shows that bacterial pathogens were responsible for the largest percentage of outbreaks and that most of the outbreaks were attributed to eating undercooked foods and infected eggs (CDC, 2001; Frenzen et al., 1999). Table 1 (at end of paper) shows the most common food borne pathogens and their incubation periods.

The Hmong

The Hmong, who trace their ancestry to the mountainous regions in Laos, have increasingly made the United States one of their top destinations following the end of the Vietnam War (Allen, Mathew, and Boland, 2004; Bryan, 2003; McGinn, 1989; Vang, 1999).

According to the US Census Bureau (2000) there were close to 186,000 Hmong living in the US most of whom resided in the states of California, Minnesota, and Wisconsin (See Table 2).

The Hmong present a unique demographic profile among US population groups. They are a relatively young population with a median age of 16.1 (compared to 35.3 for the entire US population), 56% of the population is under 18, average household size of 6.27 persons, and approximately 35% of people report not speaking English at all or not very well (Faruque, 2002; US Census Bureau, 2000).

The Hmong population lags behind their US counterparts in educational attainment and participation in higher education (Lee, 2005). Census data show that 51% of Hmong-Americans have less than a 9th grade education, that only 40% have earned a high school diploma, and a dismal 7.5% of adult Hmong have earned a Bachelor's Degree or higher (Census Bureau, 2000).

In Southeast Asia, the Hmong were characterized by their agricultural existence (Duran, 1995) and on special occasions families gathered to socialize usually with the preparation of traditional foods. In fact, the commemoration of births, the New Year, marriages, and other key events involved a large meal. An animal such as a pig, chicken, or cow, would be slaughtered at an altar for the cultural ceremony of blessing and, after the blessing, the animal would be prepared into several main dishes for the guests. This practice is still common in the United States (Culhane-Pera, 2003).

Health and Illness

Hmong traditional beliefs about health and disease are, in many instances, different from those found in allopathic medicine. Some Hmong believe that illness is caused by upsetting or offending ancestors who protect the family from evil. One of the best known printed accounts of Hmong health beliefs and interactions with the health care system are recounted in the popular

book “The Spirit Catches You and You Fall Down” which describes the perils encountered by a Hmong family (Fadiman, 1997).

Some Hmong believe that illness is due to either the separation of the soul from the body or the belief that the individual has offended the ancestors (Duran, 1995; Nuttal & Flores, 1997; Taylor, 2003). In fact many Hmong continue to rely on Shamans as the primary source of health care in their communities (Hensel, Mochel, and Bauer, 2005; Pinzon-Perez, Moua, and Perez, 2005). Furthermore, many Hmong have not fully gained trust in western medical professionals (Cha, 2003; Her and Culhane-Pera, 2004; Johnson 2002.) There is, however, evidence that the Hmong do attribute illness to both biological agents as well as to spiritual factors (Cha, 2003). In fact, the Hmong have a word, borrowed from the Lao, *phaj nyaj*, which means germs. According to a glossary of medical terminology: English-Hmong published by the California Department of Health Services (2004) the term *kab mob* can also be used to refer to germs.

Food illnesses in the Hmong community

Food plays a key role in the celebration of special occasions in the Hmong community. As with many cultures, food provides both a link to the ancestral lands while facilitating social interactions in the adopted land. Some Hmong continue to handle and prepare food in traditional ways, a practice which may contribute to the outbreak of food-borne illnesses in their communities (California Department of Health Services, 1995). At cultural ceremonies and family gatherings, a whole slaughtered animal is used as the centerpiece allowing the shaman or an elder to perform a blessing in the home; this ritual is expected to bring good health to the family. During the blessing, the slaughtered animal is left out at room temperature for a couple of hours until the ceremony is completed. It is not until that time that the animal is prepared for consumption by volunteer food handlers (Giang, 2000; Ikeda, 1999). This practice increases the

risk for foodborne illness in the Hmong community since pathogens related to foodborne illnesses may thrive during that time.

The risk for illness is further complicated by the fact that the Hmong have very limited knowledge about food-borne disease and they find themselves in a situation in which they cannot control the space in the house available for preparing food. In most cases, food is prepared in the garage and cooked outside with propane gas.

Foodborne Illness among the Hmong

Many foodborne illnesses in the Hmong population are related to the consumption of raw meat known as *laj*¹, [pronounced lah] a traditional Lao dish found at many family events. While *laj* is usually made from beef, pork *laj* is also common. In addition to the main ingredient, other ingredients such as pork skin, cooked chicken organs, and spices may be added.

One of the earliest documented cases of foodborne illnesses in the Hmong can be found in a 1982 CDC report describing an outbreak among Laotian refugees. While the CDC's report did not specifically identify the Hmong, it is possible this outbreak was in fact among this population group since during that time, the Hmong were classified as Laotian due to their country of origin.

In 1994, a large outbreak of salmonella occurred in Tulare County, California among a group of Hmong immigrants from Laos. In this episode, about 130 of the 200 guests at a family gathering sought medical treatment; this group included a two-year-old boy who died from *Salmonella typhmuri*um. The family hosting the event had purchased a steer from a local ranch, slaughtered it on site, and had it prepared by family members and volunteer food handlers. Results from an investigation revealed problems with food handling and temperature control.

¹ It should be noted that *laj* is not prepared as part of any traditional Hmong ritual.

The raw beef had been left unrefrigerated for seven hours at a time when the weather was unseasonably warm (California Department of Health Services, 1995, p.3).

Another incident occurred in October 1993 when some Mien people, also members of a Southeast Asian ethnic group from Laos, used raw pork to prepare a *laj* dish. Trichinosis was epidemiologically implicated in this outbreak in Tulare County. Ten cases were confirmed by serology or biopsy; however efforts to identify *Trichinella larvae* in the small leftover portion of the pork dish were unsuccessful (California Department of Health Services, 1995).

The California Department of Health Services (1995) reported another salmonella outbreak, occurring in the Hmong attending a gathering in San Joaquin County, at which the traditional dish *laj* was implicated. The report stated that 62% of those attending this family gathering reported illnesses. The pork had been obtained from a local ranch/custom slaughter house and was slaughtered, skinned, eviscerated, and inspected on site. The pork was transported unrefrigerated, refrigerated when they got home, and then prepared on a sheet of plastic on the floor of the family's garage. Some of the pork was cooked, but some was kept raw for the *laj*. *Samonella typhimurium* was present in stool samples taken from 17 people who were infected with the raw pork.

Given the cases identified above it is imperative to understand food practices and safety issues in the Hmong community. The purpose of this study was to identify the risk factors for food-borne illness associated with volunteer food handlers' age, their knowledge of safe food handling practices, and their understanding that transmission of food-borne diseases can occur during food preparation.

Methods

Participants

A convenience sample² of 25 Hmong individuals aged 18 and over residing in a heavily concentrated Hmong community in Fresno, California was selected to participate in this study. Given the qualitative nature of this study, data were collected until responses began to duplicate as suggested in the professional literature (Pase, 2001).

The first step in the process was identifying the Hmong family names common in the area. Once the family names were identified, individuals with those names were randomly chosen from a telephone book. Calls were then made to adult members of the family asking if they would like to participate in a research study. The researcher followed a telephone script for setting up interviews with interested participants, who could accept or decline the interview. This process allowed for direct contact with the Hmong community, permitting the researcher to describe the study and obtain necessary feedback. The interviews were controlled so that all individuals in the family, male as well as females, who handle and prepare food most frequently at large events were interviewed.

The interviews were conducted in either Hmong or English, depending on the participant's language preference. The questionnaire and consent form were translated from English to Hmong by a certified Hmong translator and then back translated by one of the researchers into English. All data collected from the personal interviews, which lasted no more than 60 minutes, were taped, transcribed, and translated from Hmong to English when necessary. The researcher translated the interviews when they were conducted in Hmong.

² Convenience sampling is a common non-probability sampling technique which uses pre-existing groups to facilitate recruitment into a study.

All recorded data for this study were locked in a file cabinet accessible to the researchers only.

Data Collection

As indicated above, an oral open-ended interview was used in this study. Most study participants preferred to convey their responses through oral interviews. The survey solicited demographic information regarding participants' educational level, number of years in the United States, and age. The Nudist qualitative software program was used to analyze the data from the personal interviews in order to answer the research questions posed in this study. Interviews were conducted until sufficient responses were obtained to reach a saturation point and responses were repeated by several respondents.

Findings

Table 3 summarizes demographic characteristics of the study population. The age of the participants ranged from 30 to 75, the majority had been in the US for more than 16 years, 60% reported not having any formal education, and 92% were married.

Food Storage and Preparation

Four questions on the survey instrument addressed the food handling practices of the Hmong community at cultural/family gatherings. Participants were asked "How do Hmong volunteer food handlers at large gatherings prepare, store, and handle food to ensure that cross-contamination does not occur during food preparation?" Twenty-four percent (n=6) of respondents said they used coolers, 24% (n=6) used buckets, and 68 % (n=17) stated that they used plastic bags to store food. The latter were chosen because plastic bags are convenient and easily stored in the transporting vehicle. "We use plastic bags because they are easier to handle and store the meat in" indicated a respondent.

It should be noted that none of the participants who reported using buckets, coolers, or plastic bags, indicated using ice to help maintain the meat cold. Four participants stated that a "cooler is clean and keeps the meat cold." A few stated that whatever meat was left over was bagged and stored in the refrigerator after the party.

Sixty-eight percent (n=17) of respondents indicated that space for food preparation was insufficient most of the time. Inadequate amounts of space to prepare food resulted on most food preparations being done on top of a piece of plastic on the garage floor. One participant stated: "If there is room on the kitchen table, then we use that; otherwise the garage floor is where most of the food preparation takes place. It has a lot more room."

Answers to the question "*Have the Hmong changed their methods of handling and preparing traditional cooked and raw laj dishes since they settled in the United States compared with the methods used in Laos?*" indicate little change. Twelve percent (n=3) of the volunteer food handlers said they prepared both raw and cooked *laj* just to have it available if requested by the host or a guest. One participant stated, "I do prepare both cooked and raw *laj* for the guest and per request of the host." Sixty percent (n= 15) of the respondents reported having prepared traditional *laj* for family gatherings or cultural events. The volunteer food handlers who do not know how to prepare a good *laj* dish will usually not attempt to do so.

Traditionally, men have been asked to prepared *laj* more often than women because they are perceived as being superior *laj* cooks who could make it taste better. Results from this study indicate that some women volunteer food handlers have prepared the raw dish, however, they are more likely than their male counterparts to report wanting to prepare cooked *laj* only. The process of preparing the *laj* dish, as described by many of the participants, is to "finely chop the

meat, cook it till it is white or brown, let it cool, but if the dish is to be raw, just leave it raw and add the spices."

Eighty percent of participants (n=20), mostly male volunteer food handlers, said that it is important to cook the meat before preparing the *laj* dish. However, even the way the cooked dish is handled may poses a potential for food-borne illness. Sixty-eight percent of the volunteer food handlers who prepared the dish said they slow cooled the meat after cooking, add the ingredients, and then let it sit at room temperature until the completion of the blessing. Several participants explained: "After the meat is cooked to white or light brown, we let the meat cool and then add our ingredients."

One study participant, an elderly Christian, stated, "I have prepared both cooked and raw meat for guests and hosts, but I am a Christian and the Bible said [sic] that it is important to eat cooked meat and not raw." Another participant, a college graduate, stated that "cooked meat is safer and by cooking it would be able to get rid of most living organisms." She said that she always cooked *laj* for herself and guests because it is safer to eat cooked meat.

Although 80% of the sample agreed that food should be cooked, they know very little about the danger of raw meat and the potential for disease transmission from uncooked meat. One participant stated that she does not like eating raw *laj* meat because she is a Christian and thinks that cooked *laj* meat would taste better than raw *laj*. One of the participants, a college student, stated, "I like eating raw *laj* because it tastes better with beer." Consumers with this mindset need to be aware of the potential health threats from microorganisms.

Food Preparation

Study participants were asked to answer the question “*Have the Hmong changed their methods of handling and preparing other food since they settled in the United States compared to the methods used in Laos?*” Most study participants older than 50 remembered vividly the way they prepared food in Laos and compared it to food preparation in the United States. One participant stated, "In the United States we prepare our food totally different from that in Laos. In Laos, we live in a very poor environment and we don't have equipment box to store our food and keep it cold so we prepare food around unclean setting/kitchen, like our kitchen is in the same place that we live and it is not very clean because it is dirt flooring."

Seventy-two percent (n=18) mentioned that life was difficult in Laos because it was a poor country and most people did not have the necessary place and utensils to prepare food for large gatherings. Study participants reported having to work twice as hard to find the food they wanted for the event, and then they had to find fuel, usually wood from the forest. One participant observed, "In Laos we have to gather wood for fuel and it creates problems as far as a clean place to cook our food."

The majority of the participants stated that food preparation methods have not changed drastically from Laos. Study participants reported eating almost the same foods, yet agreed that obtaining what is necessary to cook or prepare a good meal is totally different from what it was in Laos. One participant stated that life in Laos was difficult because the food supply for good meals was limited. A female participant remembered her food preparation area:

We do not have containers that would make ice to keep our food cold or keep our foods fresh like the United States. The food preparation space is limited in Laos and we were very poor so we try to find whatever we can to prepare the food and would have to prepared food in a not so acceptable kitchen area. In this country it can be done easier because of cleaner homes we live in.

Although the majority of the participants, 72% (n=18), had resided in the United States for more than two decades and their food handling practices had not changed much, the resources available in the United States make food preparation simpler than in Laos. One participant described his perceived difference:

The only difference I can see is that we live in a technological society today and our way of living is simplified. Every thing is in one place and pots, pans, and spoons are easily cleaned. But our foods are still the same; it has not changed. Only the country has changed. In Laos when we prepare our food, it is in a poor place and not as clean like today, so we may not prepared our food as clean as in this country because it is a poor country.

Disease Transmission

Study participants answered the question: "*What does the Hmong volunteer food handler understand about the disease transmission process and the relationship between food-borne illness and refrigeration and cooking?*" The majority of the participants, 60% (n=15), indicated that they did not have a clear understanding of microorganisms and their capability to transmit diseases. Some respondents had no idea what microorganisms are or how they could make people ill. "I don't understand about microorganisms, but I believe that everything should be thoroughly cooked" stated one study participant.

Another participant admitted that she had no clue about microbes and whether people can get sick from them "I don't know much about it [microorganisms]" she said.

One elderly participant mentioned that he had some understanding of microbes because the Catholic Church taught him the importance of safe food handling. He commented:

I understand that I can get sick from bad bugs if first I don't wash my hands, knife, utensils, cutting board, or eat raw meat. The vegetable if you don't wash it well can make you sick, or the pots and pans needs to be washed in hot water. You also need towels to clean or wipe your hands after washing your hands.

In this sample, 68% did not mentioned using refrigeration or any other means of keeping food cold. Most of the respondents were elderly and had no prior knowledge about transmission of food-borne diseases. They have been taught that only ancestral souls can make a person sick.

Dealing with Foodborne Illnesses

Study participants answered the question "*What do Hmong volunteer food handlers do when they or their family members get sick with symptoms of food poisoning?*" Fifty-six percent of the respondents reported having had symptoms of food-borne illness after dining at a gathering for which they volunteered to help prepare food. However, the majority of the ill persons did not have a clear understanding of what may have been the cause of their illness. One participant stated, "I have been ill after eating foods prepared by other guests, but it could be a lot of things. Maybe the food was not right for my stomach." Another participant reasoned, "I think I got sick because I am old and my stomach is no good, so some food is not right for me."

Some of the respondents said they have had symptoms of food-borne illness such as stomach ache, vomiting, nausea, and stomach cramps. One participant shared, "I have been sick before after eating at a party where I have come down with symptom of nausea, stomach cramp, and abdominal pain before. I believe that the food made me ill."

Sixty-eight percent (n= 17) of the participants reported that their first choice of healthcare for possible symptoms of food-borne illness was traditional medicine from within their family. If that did not cure the symptoms, then they would seek professional healthcare. This point of view

was summarized by one study participant "I try to find some traditional herb, but if it gets worst or more severe, and the traditional medicine doesn't work, I would go to the hospital or consult a physician." Another participant concurred: "I would tell my family that I am sick. If minor illness occurs I would seek traditional medicine, but if the pain becomes more severe I would have to seek professional care."

There are several possibilities as to why subjects may prefer to seek help within their family instead of seeking professional attention. Access is easier, little or no money is needed to acquire traditional herb remedies, and people may not think that foodborne illnesses are serious health problems.

Conclusions

The professional literature clearly denotes that in order to prevent food-borne disease, food handlers must understand how to handle food safely (Bryan, 1980; Kohl, Rietber, Wilson, and Farley, 2002; Scott, 2000; Shehidan, 1992). Results from this study clearly show that the Hmong are at an increased risk for foodborne illnesses due to lack of awareness of proper food preparation practices as well as adherence to ancient ways of preparing food. Some food handlers may not even be aware that bacteria are capable of growing at certain temperature ranges on food left unattended or that cross-contamination can occur. Many Hmong do not realize that proper storage and handling of foods prevent bacterial growth (McSwane, Rue, & Linton, 1998). They may not realize that consumption of raw meat conflicts with current guidelines for safe food preparation.

Participants in this study did not appear to understand the direct relationship between bacteria and food borne illnesses. Similarly, study participants were more likely to report reliance on traditional medicine to address food borne illnesses. These findings, however need to

be carefully considered in light of the vast differences in acculturation levels of the Hmong. The literature suggests that the Hmong do have a concept of germs, but may not relate those germs to their food preparation practices.

Results from this study suggest that in addition to every day responsibilities, public health practitioners must have a working knowledge of several cultures, be familiar with the food handling practices of various peoples, and must be able to identify factors that place people at risk for food-borne illness. This knowledge must then be transformed into the implementation of educational strategies designed to decrease the risk of food borne illness among their target populations in this case the Hmong. Efforts to reach the Hmong, however, will not be successful if approaches are not culturally based and take into account the day-to-day realities of the target population. A first step in decreasing the number of food borne illnesses in the Hmong community will be to start a dialog about food preparation practices and gradually introduce proper food handling practices which do not interfere with century's old traditions.

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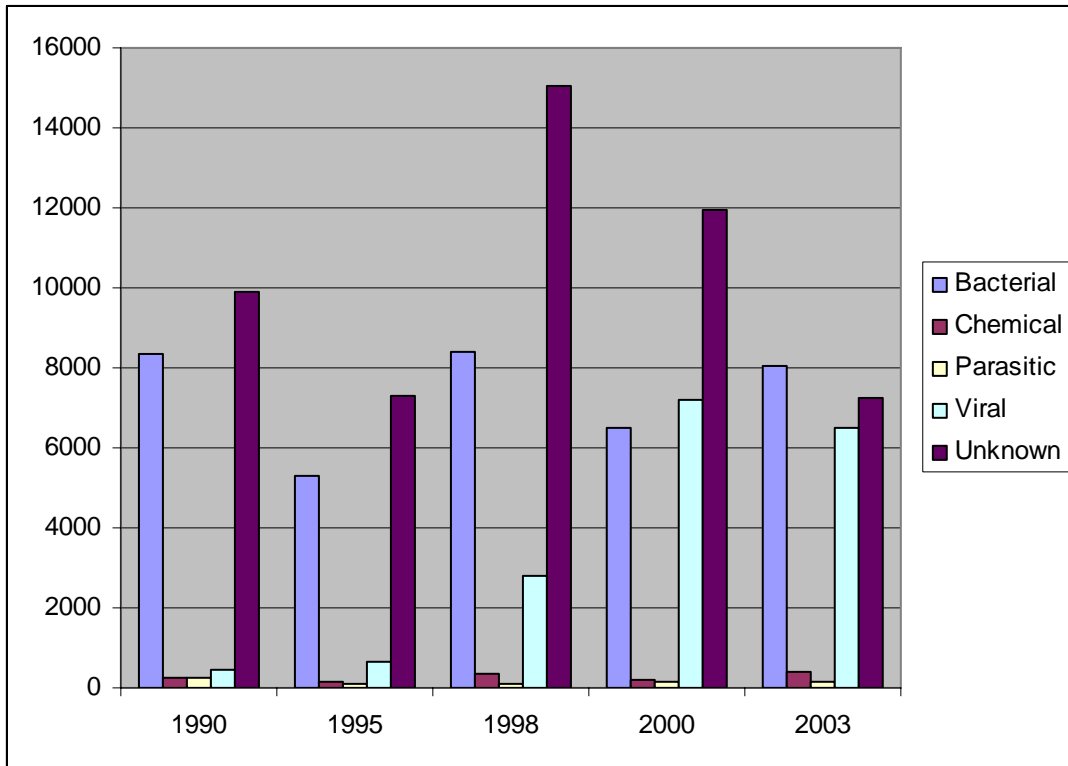
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Figure 1

Total Number of Foodborne Disease Outbreaks by Etiology



Source: CDC 2003a-d, 2004b

Table 1

Foodborne Illnesses (Bacterial)						
Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
<i>Bacillus anthracis</i>	2 days to weeks	Nausea, vomiting, malaise, bloody diarrhea, acute abdominal pain.	Weeks	Insufficiently cooked or contaminated meat.	Blood.	Penicillin is first choice for naturally acquired gastrointestinal anthrax. Ciprofloxacin is second option.
<i>Bacillus cereus</i> (preformed enterotoxin)	1–6 hrs	Sudden onset of severe nausea and vomiting. Diarrhea may be present.	24 hrs	Improperly refrigerated cooked or fried rice, meats.	Normally a clinical diagnosis. Clinical laboratories do not routinely identify this organism. If indicated, send stool and food specimens to reference laboratory for culture and toxin identification.	Supportive care.
<i>Bacillus cereus</i> (diarrheal toxin)	10–16 hours	Abdominal cramps, watery diarrhea, nausea.	24–48 hours	Meats, stews, gravies, vanilla sauce.	Testing not necessary, self-limiting (consider testing food and stool for toxin in outbreaks).	Supportive care.
<i>Brucella abortus</i> , <i>B. melitensis</i> , and <i>B. suis</i>	7–21 days	Fever, chills, sweating, weakness, headache, muscle and joint pain, diarrhea, bloody stools during acute phase.	Weeks	Raw milk, goat cheese made from unpasteurized milk, contaminated meats.	Blood culture and positive serology.	Acute: Rifampin and doxycycline daily for ≥6 weeks. Infections with complications require combination therapy with rifampin, tetracycline, and an aminoglycoside.
<i>Campylobacter jejuni</i>	2–5 days	Diarrhea, cramps, fever, and vomiting; diarrhea may be bloody.	2–10 days	Raw and undercooked poultry, unpasteurized milk, contaminated water.	Routine stool culture; <i>Campylobacter</i> requires special media and incubation at 42°C to grow.	Supportive care. For severe cases, antibiotics such as erythromycin and quinolones may be indicated early in the diarrheal disease. Guillain-Barré syndrome can be a sequela.
<i>Clostridium botulinum</i> —children and adults (preformed toxin)	12–72 hrs	Vomiting, diarrhea, blurred vision, diplopia, dysphagia, and descending muscle weakness.	Variable (from days to months). Can be complicated by respiratory failure and death.	Home-canned foods with a low acid content, improperly canned commercial foods, home-canned or fermented fish, herb-infused oils, baked potatoes in aluminum foil, cheese sauce, bottled garlic, foods held warm for extended periods of time (eg, in a warm oven).	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some state health department laboratories and CDC.	Supportive care. Botulinum antitoxin is helpful if given early in the course of the illness. Contact the state health department. The 24-hour number for state health departments to call is (770) 488-7100.
<i>Clostridium botulinum</i> —infants	3–30 days	In infants <12 months, lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag and sucking reflex.	Variable	Honey, home-canned vegetables and fruits, corn syrup.	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some state health department laboratories and CDC.	Supportive care. Botulinum immune globulin can be obtained from the Infant Botulism Prevention Program, Health and Human Services, California (510-540-2646). Botulinum antitoxin is generally not recommended for infants.
<i>Clostridium perfringens</i> toxin	8–16 hrs	Watery diarrhea, nausea, abdominal cramps; fever is rare.	24–48 hrs	Meats, poultry, gravy, dried or precooked foods, time- and/or temperature-abused food.	Stools can be tested for enterotoxin and cultured for organism. Because <i>Clostridium perfringens</i> can normally be found in stool, quantitative cultures must be done.	Supportive care. Antibiotics not indicated.
Enterohemorrhagic <i>E. coli</i> (EHEC) including <i>E. coli</i> O157:H7 and other Shiga toxin-producing <i>E. coli</i> (STEC)	1–8 days	Severe diarrhea that is often bloody, abdominal pain and vomiting. Usually, little or no fever is present. More common in children <4 years.	5–10 days	Undercooked beef especially hamburger, unpasteurized milk and juice, raw fruits and vegetables (eg, sprouts), salami (rarely), and contaminated water.	Stool culture; <i>E. coli</i> O157:H7 requires special media to grow. If <i>E. coli</i> O157:H7 is suspected, specific testing must be requested. Shiga toxin testing may be done using commercial kits; positive isolates should be forwarded to public health laboratories for confirmation and serotyping.	Supportive care, monitor renal function, hemoglobin, and platelets closely. <i>E. coli</i> O157:H7 infection is also associated with hemolytic uremic syndrome (HUS), which can cause lifelong complications. Studies indicate that antibiotics may promote the development of HUS.

Source: CDC, 2004a

Table 2
Hmong Populations by State

State	Population	Metro areas with largest Hmong
California	65,095	Minneapolis-St Paul
Minnesota	41,800	Fresno, CA
Wisconsin	33,791	Sacramento-Yolo, CA
North Carolina	7,093	Milwaukee-Racine, WI
Michigan	5,383	Merced, CA
Colorado	3,000	Stockton-Lodi, CA
Oregon	2,101	Appleton-Oshkosh-Neenah, WI
Georgia	1,468	Wausau, WI
Washington	1,294	Hickory-Morganton-Lenoir, NC
Massachusetts	1,127	Detroit-Ann Arbor-Flint, MI

Source: US Census Bureau, 2000

Table 3

Characteristics of the Study Subjects

Characteristic	N	%
AGE, YEARS		
18-35	7	28.0
36-50	8	32.0
>51	10	40.0
IN U.S.A, YEARS		
Less than (< 5 years)	0	0.0
5-10 years	3	12.0
11-15 years	2	8.0
16 years or more	20	80.0
EDUCATION		
No educational at all	15	60.0
Some elementary school level completed	1	4.0
Elementary school level completed	1	4.0
Some Junior High School completed	0	0.0
Junior High School Completed	0	0.0
Some High School level completed	0	0.0
High School level completed	2	8.0
Some College level completed	2	8.0
College level complete	2	8.0
Other	2	8.0
RELIGION		
Animist	2	8.0
Christianity	22	88.0
Buddhism	0	0.0
None	1	4.0
Other	0	0.0
MARITAL STATUS		
Single	1	4.0
Married	23	92.0
Other	1	4.0