

Food Safety Within the Household¹

Lucianna Grasso, George L. Baker, Renée M. Goodrich-Schneider, and Keith R. Schneider²

In 2008, foodborne disease outbreaks in the United States resulted in 23,152 documented illnesses (CDC 2011a). Approximately 15% of these incidents originated at home, ranking the household as the second most common setting where foodborne illness takes place. Bacterial pathogens were the predominant cause of private home foodborne illness episodes, of which the top three causal agents were *Campylobacter*, *Salmonella*, and Shiga toxin-producing *Escherichia coli* (e.g., serovars O104, O111, O157:H7, and others) (CDC 2011b).

Household Risks and How They Occur

Campylobacter

Campylobacter is the primary cause of bacterial foodborne gastroenteritis, which causes symptoms such as acute diarrhea and vomiting (Blackburn and McClure 2009). *Campylobacteriosis* is often a result of consuming undercooked poultry and meat, contaminated water, raw milk, and salad vegetables. Cross contamination due to inadequate hygiene practices within the kitchen is a high risk factor for contracting *Campylobacter*. A study conducted in 2000 revealed that home-cooked chicken was linked to higher incidences of *Campylobacter* infections, compared to other food sources (Studahl 2000).

Salmonella

Resultant symptoms from *Salmonella* infections can cause serious illness and even death; symptoms include acute



Figure 1. Food preparation area in the home kitchen
Credits: USDA photo

diarrhea, vomiting, dehydration, septicemia or bacteremia (when the bacteria enter the bloodstream) (Bell and Kyriakides 2009a). Possible secondary illnesses associated with this infection are reactive arthritis, meningitis, and urinary tract infections. *Salmonella* is often linked to egg and egg-based products as well as chicken and other poultry, but produce, fruits, chocolate, and nuts have also been associated with this microorganism. These food sources may become contaminated with *Salmonella* by

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2. Lucianna Grasso, student; George L. Baker, assistant scientist; Renée M. Goodrich-Schneider, associate professor; Keith R. Schneider, contact author and associate professor; Food Science and Human Nutrition Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611-0370.

contact with fecal matter (either directly or through cross contamination), inadequate cooking techniques, and cross contamination due to poor personal hygiene or improperly cleaned equipment. In a survey performed in Australia, about 90% of *Salmonella* infections were found to have been associated with manufactured foods and food handling practices in the home (Jay et al. 1999).

Shiga toxin-producing *E. coli* (STEC)

Shiga toxin-producing *Escherichia coli* (STEC) bacteria, such as *E. coli* O157:H7, can cause severe abdominal cramping, bloody diarrhea, and vomiting (Bell and Kyriakides 2009b). STEC infections can lead to hemolytic uremic syndrome (HUS), which is potentially fatal, especially in young children. *E. coli* O157:H7 infections might occur from consuming contaminated food or water products, undercooked meat, unpasteurized milk products, and leafy green vegetables. The majority of hamburgers associated with *E. coli* O157:H7 infections in a survey conducted in Canada were cooked and/or consumed at home (Saux et al. 1993).

Risk Reduction Requires Knowledge and Behavior Change

Even though the number of foodborne illness cases occurring in domestic settings appears to be decreasing, educating consumers on home food safety is of the utmost importance (Scott 2003). Having insufficient knowledge of the risks associated at each level of food preparation can increase the number of incidents of foodborne illnesses at home (Collins 1997). Yet, the correlation between knowledge of proper hygiene practices and actual hygienic behavior in the home kitchen is still low among consumers (Worsfold and Griffith 1997).

The most common food-safety handling mistakes that occur within the household are improper food storage, inadequate cooking or reheating temperatures, cross contamination, and infected food handlers (Scott 2003). However, research has shown that maintaining good hygiene practices can greatly help reduce many of the occurrences of foodborne illnesses (Scott 1996).

Food Storage

There are many guidelines for storing food in an adequate manner. To minimize microbial growth, cooked food should be stored in the refrigerator or freezer (IFH 2004). Refrigeration temperatures should be below 40°F and freezer temperatures should be below 0°F. Refrigeration temperatures do not eliminate the potential growth of

pathogenic bacteria. As a general rule of thumb, food stored in the refrigerator as leftovers should be used within 3–5 days, and expiration dates for foods should also be checked regularly and items discarded as needed (NNC 1999). Thawing frozen food may be accomplished by placing item in the refrigerator until ready, submerging the item under running cold water (below 70°F), or defrosting it in a microwave oven (Washington State Department of Health 2005). Raw foods and cooked foods should be kept separate in the refrigerator in order to prevent contamination between the two, and each item should be covered or wrapped (IFH 2004).

Cooking and Reheating

Cooking foods properly is of equal importance. All cooking equipment (e.g., ovens and microwaves) should be used as instructed in the manufacturer's guide and maintained and cleaned (IFH 2004). Internal cooking temperatures should reach and sustain the safe minimum as recommended in **Table 1** and should be checked with the appropriate food thermometer in accordance with these latest USDA guidelines.

Keeping It Clean

High-risk sources of contamination in the kitchen where cross contamination may occur include hands and food-contact surfaces (IFH 2004). It is very important to adequately wash hands and food-contact surfaces after they've come in contact with raw meat (IFH 2004; Washington State Department of Health 2005).

FOOD-CONTACT SURFACES

Food-contact surfaces (cutting boards and counter tops) should be washed with warm, soapy water and a sanitizing solution soon after coming into contact with high-risk food items (NNC 1999; IFH 2004). The use of a dishwasher has been found to be more effective in reducing contamination of cutting boards and flatware than washing them by hand (NNC 1999).

HAND HYGIENE

In general, hand washing with soap and water should be performed prior to handling any kind of food, eating, and after using the restroom, handling a pet or child, after contact with any other potentially contaminated reservoir or disseminator, and whenever the hands are visibly dirty (IFH 2004). Hand washing helps reduce the risk of contamination from an infected food handler (IFH 2004).

Resources for Educators

Healthy People 2020, an initiative set forth by the US Department of Health and Human Services, has already begun to outline objectives that will improve these food safety practices among consumers (DOH 2011). These objectives (Figure 1) aim to increase the number of people who wash hands and food contact surfaces (CLEAN), do not cross contaminate (SEPARATE), cook to adequate temperatures (COOK) and refrigerate promptly (CHILL). Thus, adequate hygiene factors are the basis of many educational and assistance programs to help food handlers at home with food safety. Each of these food safety goals can be traced back to the general conclusion that prevention of foodborne illness occurs through proper food preparation and sanitation techniques (Collins 1997).

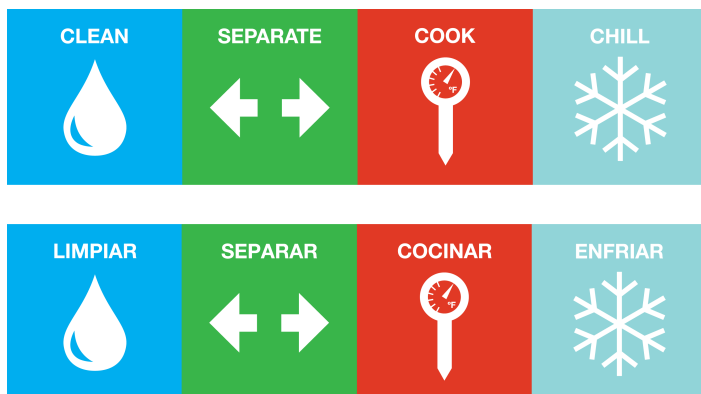


Figure 2. CLEAN–SEPARATE–COOK–CHILL / LIMPIAR–SEPARAR–COCINAR–ENFRIAR

Credits: <http://www.healthypeople.gov/>

The Partnership for Food Safety Education works toward eliminating illness and death from foodborne diseases through various educational campaigns. This non-profit organization was established in 1997 in response to the need for programs that bring education and awareness of food safety to all consumers, especially at risk populations, such as pregnant women, young children, the elderly, and immuno-compromised individuals. Food-safety education programs provide information on foodborne illness, from the causes to the costs to society, and curricula for school-aged children. As well, various food safety education campaigns, such as **Fight BAC!** and **Be Food Safe**, increase the knowledge of food safety at home and these promote lifestyle changes (The Partnership for Food Safety 2011a).

Another newly established campaign, **Food Safe Families**, is a collaborative project of the USDA's Food Safety Inspection Service (FSIS), the US Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention (CDC). Its aim is to raise awareness about foodborne illness and encourage consumers to make lifestyle changes

that lower their risk of contracting foodborne illness and practice safe food-handling techniques. The target audiences are English- and Spanish-speaking families who cook at least four times a week (USDA-FSIS 2011)

Closing Remarks

Although food safety education is well established, people still become infected with foodborne illnesses by practicing unsafe behaviors in their kitchen. Individuals who know the basics of home food safety may not always put these theories into practice. Because of this, the goal of Healthy People 2020 is aimed to change current consumer behaviors towards food safety within the public domain (DOH 2011). While over 50 percent of consumers perform well in each food-safety category, the Department of Health and Human Services believes more Americans should be exceeding such standards (DOH 2011). In order to decrease associated food safety risks at home, consumers must become increasingly knowledgeable of how food becomes unsafe to consume and modify their current beliefs and behaviors (Worsfold and Griffith 1997).

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Table 1. Safe Minimum Cooking Temperatures Chart (USDA, 2011)

Category	Food	Temperature (°F)	Rest Time
Ground meat & meat mixtures	Beef, Pork, Veal, Lamb	160	None
	Turkey, Chicken	165	None
Whole cuts of beef/veal/lamb	Steaks, roasts, chops	145	3 minutes
Whole cuts of poultry	Chicken & Turkey, whole	165	None
	Poultry breasts, roasts	165	None
	Poultry thighs, legs, wings	165	None
	Duck & Goose	165	None
	Stuffing (cooked alone or in bird)	165	None
Whole cuts of pork	Fresh pork chops, loin	145	3 minutes
	Fresh ham (raw)	145	3 minutes
	Precooked ham (to reheat)	140	None
Eggs & egg dishes	Eggs	Cook until yolk and white are firm	None
	Egg dishes	160	None
Leftovers & Casseroles	Leftovers	165	None
	Casseroles	165	None
Seafood	Fin Fish	145 or cook until flesh is opaque and separates easily with a fork.	None
	Shrimp, lobster, and crabs	Cook until flesh is pearly and opaque.	None
	Clams, oysters, and mussels	Cook until shells open during cooking.	None
	Scallops	Cook until flesh is milky white or opaque and firm.	None

Source: USDA, Keep Food Safe (<http://www.foodsafety.gov/keep/charts/mintemp.html>)