Listening to food workers: Factors that impact proper health and hygiene practice in food service

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Background: Foodborne disease is a significant problem worldwide. Research exploring sources of outbreaks indicates a pronounced role for food workers' improper health and hygiene practice.

Objective: To investigate food workers' perceptions of factors that impact proper food safety practice.

Method: Interviews with food service workers in Baltimore, MD, USA discussing food safety practices and factors that impact implementation in the workplace. A social ecological model organizes multiple levels of influence on health and hygiene behavior.

Results: Issues raised by interviewees include factors across the five levels of the social ecological model, and confirm findings from previous work. Interviews also reveal many factors not highlighted in prior work, including issues with food service policies and procedures, working conditions (e.g., pay and benefits), community resources, and state and federal policies.

Conclusion: Food safety interventions should adopt an ecological orientation that accounts for factors at multiple levels, including workers' social and structural context, that impact food safety practice.

Keywords: Food workers, Food safety, Health and hygiene practice, Social ecological model, Qualitative methods

Introduction

Foodborne disease is a significant and preventable public health problem in the United States and globally. Each year, an estimated one in six Americans (48 million people) become ill, 128 000 are hospitalized, and 3,000 die from contaminated food or beverages.¹ The majority of foodborne disease outbreaks reported to the Centers for Disease Control and Prevention (CDC) originate in food service facilities, such as restaurants and delis.^{2,3} Research exploring sources of these outbreaks indicates a pronounced role for food workers, particularly through worker health and hygiene.^{2–6}

Interventions to prevent foodborne disease in food service establishments are determined at local, state, and tribal government levels. To support this process and achieve consistency with federal food safety policy, the Food and Drug Administration (FDA) publishes and encourages local adoption of the Food Code,

a reference document updated every 4 years that provides science-based guidance regarding local food safety rules.⁷ This document describes effective management of workers' health and hygiene through a number of practices, including hand washing procedures to reduce and remove foodborne pathogens; requirements for the use and maintenance of gloves and clean outer garments to reduce the transfer of pathogens from workers to food and other objects; and procedures for the identification and restriction of sick workers.^{8,9}

To ensure that workers follow these practices, restaurants rely predominantly on food safety training.^{10,11} While worker training may increase knowledge of proper food safety practices – an important part of food safety control – a number of studies show that food safety training does not ensure that workers actually perform food safety behaviors.^{12–15} These studies indicate that the problem of worker-related food contamination is more complex than a single analysis or intervention, and that food control programs must consider more comprehensive approaches and

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account for a broader set of factors, in addition to knowledge, that may impact adherence to various food safety practices.

To identify these factors, a limited number of studies have engaged workers.^{16–20} In addition to training, these studies identify worker characteristics as factors associated with proper health and hygiene practice. Barriers include workers' allergies and dry skin (related to glove use and hand washing), dedication to the job, and fear of negative consequences, such as leaving coworkers short-staffed and losing one's job or shifts.^{17,20} Conversely, worker characteristics identified to facilitate proper practice include preferences for clean hands, motivation, pride in work, experience, age, expectations of reciprocal treatment, and concerns about consequences for the restaurant, customer and personal health, and sanitary appearance.^{16,18}

Beyond food workers' characteristics, these studies also account for the influence of the food work environment on workers' proper practice. The most commonly identified workplace factors influencing food safety practices include time pressure, understaffing, high customer volume, management/coworker emphasis on proper procedures, and issues with resources and workplace design (e.g., inconvenient sink location, small spaces).^{16,18–20} In limited instances, food worker studies also identify a role for the type of restaurant, customer observation of workers, restaurant procedures (e.g., food safety tracking logs and automated reminders), and other working conditions, including issues related to pay and benefits.^{16–18}

Altogether, these studies are important insofar as they identify group norms regarding the range of factors that may impact food safety. They also achieve worker confirmation of issues seen to be food safety facilitators and problems in the literature. Missing, however, is research that prioritizes the workers' perceptions of issues most relevant to food safety, especially within the context of food workers' everyday lives and work experiences.

In order to address this gap, we conducted in-depth interviews with food service workers about their experiences with food safety health and hygiene behaviors, including hand washing, glove use, cleanliness of uniforms or outer garments, and requirements to report illness to supervisors and to be excluded from work when sick. This investigation is based on the social ecological model, which accounts for the environmental and policy contexts of behavior in addition to social and psychological influences.²¹ Ecological models also propose that these varied layers of influence interact with each other and that multi-level interventions may be most effective in changing behaviors, such as workers' health and hygiene practices.²¹

There are different versions of the social ecological model and varying definitions of the levels of influence on behavior. Workers' perceptions of factors impacting health and hygiene behaviors are organized according to five levels, defined by McLeroy and others.²² The first level, intrapersonal factors, includes individual characteristics, such as knowledge, attitudes, behaviors, and skills. The second level, interpersonal processes and primary groups, includes workers' formal and informal social networks and support systems (e.g., family, co-workers, and friendships). The third level, institutional factors, relates to the characteristics, policies, and procedures (formal and informal) of the food service workplace. The fourth level, community factors, considers characteristics and relationships among surrounding organizations or institutions. The fifth level, public policy factors, accounts for local, state, and federal laws and policies.²²

The goal of this study is to better understand and clarify the range of individual and environmental factors that explain workers' health and hygiene practice. The study's approach contributes to the literature by prioritizing workers' experiences and perceptions of the factors that influence their role as a common source of food contamination. Study findings may support the development of more comprehensive and effective food safety programs in restaurants.

Methods

The study collected data on food workers' perceptions about factors that impact workers' ability to handle food safely. Twenty-five exploratory, in-depth interviews were conducted with food service workers in Baltimore, MD, USA between March and April 2014. This sample size represents an estimate of participants needed to achieve well-saturated data based on the topic and scope of the study and the use of shadowed data, or when participants talk about the experiences of others in addition to their own.²³

Food service workers were purposively sampled through advertisements placed on Baltimore Craigslist. The advertisement outlined the study purpose, incentive, eligibility requirements, and invited workers to participate in interviews during their personal, non-work time. Because of initial difficulty recruiting female participants, additional advertisements were created and listed for female food service workers only.

Eligible participants had to be English-speaking adults who had prepared, cooked, or served food for at least 3 months in a restaurant in Baltimore, MD, USA. Interviews were conducted face-to-face and in a quiet and confidential space away from the work site. Each interview lasted approximately 45 minutes and study participants received an incentive of \$20 for their participation.

Development of food safety practice scenarios

Interviews were facilitated through a set of food safety scenarios involving workers in the food service sector. Scenarios were worded to assume, rather than ask about, worker deviations from proper health and hygiene protocols (e.g., when [instead of if] a worker is unable to change gloves). These protocols focused on health and hygiene practices, including hand washing, glove use and maintenance, cleanliness of personal clothing or outer garments, and working while ill or infected, which includes recommendations to seek medical care and requirements to report illness to a supervisor or the person in charge. Deviations from these food safety practices were selected for their identification in the food safety literature as regular sources of foodborne outbreaks in restaurants and related establishments.^{2,4,5}

Each scenario began with a description of the proper food safety protocol (e.g., instructions for proper hand washing procedures), followed by a comment about deviation from the practice (e.g., “Sometimes food workers feel unable to follow these instructions”). Participants were then asked for their perceptions about factors that may impact the situation (e.g., “Why do you think the worker would feel this way?” and “What could be going on in this situation?”). Descriptions of the recommended food safety practices were based on the 2005 FDA Food Code, which is the version currently adopted by the state of Maryland as a model for local food safety requirements (Table 1).²⁴

Interviews

Following 10 recruitment postings (five for all workers, five for female only), 29 eligible participants responded, and 25 food workers were recruited and scheduled for interviews. Of the four non-interviewed respondents, two did not schedule interviews and two canceled due to scheduling conflicts. Data collection

was anonymous and began with the informed oral consent process followed by a brief written questionnaire to assess participants’ basic demographic and job characteristics. Participants were then asked to respond to scenarios by stating factors they believed impacted each situation, or a deviation from effective implementation of recommended health and hygiene practices.

To give participants time to feel more comfortable with the discussion and interviewer, sensitive topics were talked about later in the interview (e.g., working while ill). Further, as the interview inquired about undesirable behaviors associated with food safety, the discussion was introduced with a reminder that each scenario involved common behaviors that occurred even among the best food service workers. According to Green,²⁵ these techniques may improve data quality by reducing social desirability bias and therefore increasing the probability of accurate and honest responses. The study protocol was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB No.: 00005187).

Data analysis

Each interview was digitally recorded and transcribed. Transcripts were read in their entirety and an initial coding framework was developed based on study aims and interview data. Using an iterative process, the primary author systematically applied the framework to transcripts and refined the framework to capture additional categories of factors that emerged inductively from the data. The revised framework was shared with study co-authors, and based on discussion and agreement, a final framework was created. Using the finalized framework, the primary author systematically re-reviewed each transcript and shared themes, patterns, and exemplary quotes were identified across responses. These data were then considered in relation to the five identified levels of the social ecological

Table 1 Proper health and hygiene practices discussed by participants

Behavior	Recommended practice
Hand washing	A food employee shall wash hands, scrubbing for at least 20 seconds with soap and clean running warm water and drying, in a handwashing sink at the following times: (1) immediately before engaging in food preparation, (2) during food preparation, (3) after touching bare human body parts (other than clean hands), (4) after using the toilet, (5) before using gloves, (6) when switching between handling raw food and ready-to-eat food, (7) after handling soiled equipment or utensils, and (8) any other time where hands could become contaminated (e.g., touching the floor, trash cans).
Glove use	Workers must wear gloves when they handle ready-to-eat foods. They must also change gloves between handling raw meat and ready-to-eat food. Workers must maintain gloves, or make sure they are intact, clean, and in sanitary condition.
Ensure cleanliness of uniform/outer garments	Food employees shall wear clean outer clothing to prevent contamination of food, equipment, utensils, linens, and single-service and single-use articles.
Working while ill	A food employee is required to report to the person in charge information about their health and activities as they relate to diseases that are transmissible through food. A food employee should provide information such as date of onset of symptoms of an illness, or of a diagnosis without symptoms. The person in charge shall then exclude or restrict the [infected] food employee from a food establishment.

model and findings were rearranged according to their perceived level of influence. These categories of text, and their encompassed themes, were further organized in relation to pre-identified factors under each level (e.g., intrapersonal factors include beliefs, skills, and attitudes, etc.). The analysis process remained iterative and flexible to ensure that themes that may not fit neatly within pre-determined categories were still captured and included in results. Study coding and analysis processes were organized using ATLAS.ti qualitative data analysis and research software.²⁶

Results

Characteristics of the interview participants are shown in Table 2. Participants were between 21 and 57 years of age and approximately half were male. The majority had completed vocational/technical school or some college education (60%) and almost half currently received some form of public assistance (48%). The majority of participants lacked access to

Table 2 Characteristics of food worker participants.

Characteristic	N (%) or mean (range)
Age	31.24 (21–57)
Education	
High school diploma	7 (28)
Vocational/technical school or some college	15 (60)
4-Year college degree or more	3 (12)
Gender	
Male	13 (52)
Female	12 (48)
Participation in public assistance*	
Supplemental nutrition assistance program (SNAP)/EBT	11 (44)
Special supplemental nutrition program for women, infants, and children (WIC)	2 (8)
School breakfast/school lunch	4 (16)
Head start	1 (4)
Supplemental security income (SSI)	2 (8)
None	13 (52)
Access to paid sick days	
Yes	4 (16)
No	21 (84)
Access to health insurance	
Yes	15 (60)**
No	8 (32)
Do not know	2 (8)
Responsibilities*	
Food preparation	22 (88)
Food storage	18 (72)
Cleaning	17 (68)
Cooking	14 (56)
Serving	11 (31)
Dishwashing	9 (36)
Length of time in current position	
3 months < 2 years	13 (52)
2 to < 6 years	8 (32)
6 to < 10 years	1 (4)
≥ 10 years	3 (12)

* Numbers do not equal 25 because characteristics not mutually exclusive.

** Among participants reporting access to health insurance (60%), one-third (5 [33.3]) received access through their food job; two-thirds through other providers (10 [66.7]).

paid sick days (84%) but had access to health insurance (60%), largely through providers other than their current employer (66.7%). Participants had a variety of food service titles, including deli clerk, baker, kitchen and prep manager, cook, prep cook, breakfast cook, pastry chef, head chef, owner, server (including waiter/waitress), and barista. They varied in the amount of time that they held these roles. Across positions, participants had responsibilities that required direct contact with food, including cooking, food handling, and food storage.

Factors influencing worker health and hygiene-related practices

In response to scenarios of worker deviations from food safety practices, participants identified a range of factors they believed influenced each situation. Findings are organized using the social ecological model as a framework. In line with core principles of this framework, some factors interact with factors at other levels. Common factors were also identified across interview scenarios. In some cases, factors were difficult to categorize and/or could be placed under multiple levels of the ecological model.²⁷ Nonetheless, categorization by social ecological level was seen as the clearest way to report findings for readers.

Intrapersonal factors

Participants described a variety of intrapersonal factors they believed were influential in shaping worker health and hygiene practices. These factors centered on worker attitudes, beliefs, and motivation – including pride in one's work – as well as a number of issues related to physical and financial limitations. To a lesser extent, participants discussed barriers related to worker knowledge, age, and skills.

Attitudes

Many participants perceived the actions required to meet health and hygiene requirements as impractical, especially when considered in relation to workers' experiences at work and home. Related specifically to clean uniform requirements, one participant explained:

...it's not like you would do laundry every single day, especially if you're working full time, you're not going to come home and do a full load of laundry. You won't even have a full load of laundry to do every day, especially if you wear the same thing to work, every day. That would get washed once every week or so, and that would be that.

Almost all participants perceived food safety practices to be inconsistent with the nature of food service work. Many interviewees indicated that they were chronically challenged to balance food safety practices with other workplace responsibilities. Participants described the issue as a “lose-lose situation” where “it's either you get the job done, and not

follow the [food safety] rules, or you follow the rules and don't get the job done." Some participants explained that managing this tension put a burden on workers to "bend the rules," including rushing or skipping food safety practices altogether, especially hand washing and proper glove use.

Almost all respondents mentioned that the anticipation of negative consequences shaped health and hygiene behaviors. In some cases, the potential to make customers sick encouraged worker adherence to certain practices; one participant explained, "We don't wanna be responsible for giving someone *E. coli*, so we're gonna switch out gloves." A few respondents were encouraged to follow procedures by putting themselves in the customer's position: "If this was my food, I would not want anyone touching it with their bare hands."

At other times, however, the expectation of negative consequences acted as a barrier to proper health and hygiene practices. Some workers felt that staying home from work, even when ill, would harm their reputation with supervisors. One server explained, "[Workers] want to show up to work and be a good worker, they want to look good in the manager's eyes and be that girl that never calls up, because that's good." A number of respondents extended this point to other practices (hand washing and glove use) and consequences (being yelled at, losing pay and shifts, and being fired). For example, in discussing why workers may rush or skip hand washing or changing gloves, one participant said, "If you're slow, you're not going to last, you'll get pushed out, they'll cut your hours and all that stuff."

Among a few participants who worked as chefs and cooks, it was suggested that glove use requirements might not be followed because of challenges they create for food preparation and other food safety tasks. These workers expressed how gloves made it hard to prepare certain dishes and ingredients, handle knives safely because "gloves can make things slick," and to gauge food temperatures because "you can't feel as well."

Beliefs

Beliefs regarding the effectiveness of glove use and hand washing were expressed as barriers to each practice. A few participants indicated that some workers felt gloves provided a sufficient barrier to contamination and that hand washing was redundant. As one participant summarized, "People will say 'Why do I have to wash my hands when I'm wearing gloves?'" Another participant went on to explain the reasons and problems with this belief:

...they feel as though my hands are not going directly on the food, it is going on the glove first, but if you don't wash your hands, once you go to pick the gloves up, you've contaminated the gloves, because your hands are dirty.

Alternatively, a few participants suggested the opposite situation to be true, or that beliefs in the effectiveness of hand washing lead some workers to find gloves less important.

Motivation

Many interviewees indicated that workers' health and hygiene practices were impacted by workers' motivation, which was seen as either a facilitator or barrier to safe practice depending on a number of factors. For some participants, workers who saw their job as a career and who enjoyed the work were positively motivated to adhere to health and hygiene requirements. One interviewee explained,

If you have people that like their job and they enjoy what they are doing, they will make sure that everything is good. They want to make good food because they want the customers to come back because they want to be at that job.

A few participants considered the role of pride, that workers who were proud of their food service role and culinary craft were motivated to "look presentable" and, as one female chef remarked, "keep their station very neat and tables clean, hands clean, aprons clean, things like that." Some participants complemented this idea by asserting that some workers did not like their job, or felt disengaged from the work, and that these factors led to "laziness" or workers who did not care about health and hygiene requirements. Still, many respondents considered the possibility that workers, regardless of their perspective on work, were forgetful, and that there are times when workers are "just not thinking about [food safety]."

Physical and financial limitations

Certain physical and financial limitations were also identified as barriers to food safety practices. Some participants described reducing the frequency of hand washing due to hand pain and dryness from repetition, sanitary soap that "eats your skin up," and hot water. Others extended these issues to avoiding gloves because certain types "make your hands real, real, real dry." Physical limitations were also related to whether or not some workers chose to work when ill. Specifically, a few participants suggested that their decision was influenced by the severity of the cold, such that one would stay home only if they felt unable to work through it.

As a barrier to meeting clean uniform or outer garment requirements, some workers discussed issues of personal stress and fatigue. Participants mentioned that requirements to clean uniforms after work hours may compete with rest, catching up on sleep, and managing other strain "outside of the workplace."

Almost all participants talked about financial barriers to proper health and hygiene practice.

They described requirements to regularly clean garments and to not work while ill as unaffordable and competing with needs to “pay their car payment or pay their rent,” and to generally make ends meet. In relation to requirements to not work when ill, many respondents indicated that they work sick because they could not “afford to take off.” With regard to clean uniform and outer garment requirements, some participants suggested that “most people don’t have enough clothes to constantly keep changing between stuff” and, where lacking their own cleaning equipment, “can’t afford to be able to wash their clothes all the time” using alternative means, like a Laundromat.

Knowledge, age, and skills

A couple of participants suggested that improper health and hygiene practice might be related to knowledge. Participants described this issue as lacking knowledge about proper practices and the reasons for requirements. A number of participants, however, stated that knowledge was unrelated to improper practice, and that workers, “knew what to do.” A few respondents suggested that proper food safety practice may be related to age, such that young workers are potentially less mature and focused on the importance of food safety compared to their older and more experienced counterparts.

Interpersonal-level factors

Many participants identified workers’ social relationships as influential for health and hygiene behaviors. Across all participants, workers’ relationships with managers were the most commonly discussed, though some participants also identified relationships with co-workers, customers, and families as factors that were relevant to the issue.

Relationships with management

Workers presented food safety practices as being influenced by various manager characteristics and the nature of the worker–manager relationship. These factors were described as both facilitators and barriers to proper health and hygiene practice in restaurants.

Many participants described specific manager qualities that deemphasized the importance of food safety and impacted worker motivation and ability to follow protocols. These factors included manager apathy toward proper food safety practices. One participant asserted, “If the manager saw [signs of worker illness], they wouldn’t acknowledge it.” A server added that such disregard “rubs off” on workers: “If a manager doesn’t care that there aren’t gloves for the bread, so what if I care?” Some participants talked about experiences where efforts to report issues or meet health and hygiene requirements were met with negative responses or consequences. One cook explained,

Some supervisors can be real nasty. Mine, one time, when I told him I was sick and I said I need to go home, and he said well you can’t, because he only had three cooks on a Friday night. So I had to stay and work sick, it was either that or be suspended for a week without pay.

To avoid these situations, some participants would “pick and choose [their] battles,” try to handle issues themselves, or stop reporting or addressing food safety problems.

The majority of participants identified pressure to prioritize other food service tasks (e.g., “getting the food from the fryer to the table”) over proper food safety procedures as a barrier. A few participants who described working sick mentioned that they were encouraged by a manager to do so:

Unless the person’s obviously physically very sick, chances are [the manager’s] gonna say to try and stick it out, maybe take a break, go sit outside for 10-15 minutes and see if you feel any better, you know, eat something or drink some water, eat some crackers or something. She’s gonna try and get them to stay.

While this pressure was perceived to reduce adherence to proper practice, some workers also empathized with managers, who they suggested were obligated to make and save money for the restaurant and had to manage workers who took advantage of rules.

A few participants who described limited barriers to proper practices attributed their experience to “good managers,” characterized as those who were available (e.g., present on work floors), consistently modeled proper food safety practices, and took ownership over associated tasks (e.g., refilling soap, restocking gloves). Across all participants, there was a general perception that manager supervision and enforcement of proper practice, such as through verbal and written reminders, promoted worker attention to food safety and adherence to safe practice. Many participants also suggested that it was easier to meet health and hygiene requirements when they had a personal relationship with managers and felt respected and valued as a team member.

Strategies identified to support these relationships included helping workers in their day-to-day tasks (“When [things] get hectic, good managers will come out and help”); talking and listening to employees, including through staff meetings to “discuss ways to make the restaurant safer”; providing workers with preferred schedules, opportunities for promotion and raises when earned; and good working conditions, including health care, vacation time, paid sick days, and equipment to prevent injury (e.g., cushioned mats to protect workers’ joints when standing).

Relationships with co-workers

Some participants indicated that co-workers often reminded them to engage in proper health and hygiene practice. For most interviewees, these efforts were real-time verbal reminders. For others, just the awareness that others were watching was enough to encourage adherence. Some participants suggested that this regulation was most effective when co-workers operated like a team and, “everyone is looking out for one another.” A few participants related this concept to family (“being your brother or your sister’s keeper”), or relationships that allowed enforcement to be more supportive than “tit for tat” or adversarial. For one participant, these relationships were afforded by working alongside the same people for years:

... It's a small owned business, so we've all known each other. One of the ladies, she's an older lady, she has been with [the owner] since he started the business. Another lady came in behind me 'cause he had started rapidly picking up, so all of us are close-knit. So we know each other 'cause sometimes you do forget [food safety practices] in your head. You're busy, and it will slip your mind, so that's where you say, "You forgot to wash your hands" or something like that. It's like family-oriented..

This perspective contrasted with participants who worked for larger, chain establishments with bigger workforces and regular turnover. For some of these participants, experiences of frustration and pressure from co-workers were described as factors that promoted unsafe health and hygiene practice. A few participants mentioned that co-workers would be let down or would “give you a hard time about having to leave,” when experiencing illness. Others indicated that hand washing and glove use practices were skipped or rushed because co-workers yelled at them for taking too long. Most interviewees considered these factors to be a product of interconnected responsibilities in food service. Discussing the work-related impacts of engaging with food safety practice, one participant explained,

It might affect someone else's work. It might affect the person working with you at that station. It could affect the progress of something else that needs to be made. It could affect your co-workers' attitudes, your work environment. There are a lot of variables, a lot of things that can happen and be affected by one person or one set of policies or rules that you're supposed to be following to the T.

These participants indicated that once one person slowed down the “well-oiled system,” the consequences for business operations could be significant. For many workers, such unfavorable consequences

weighed on their perceived ability to follow safe health and hygiene practice.

Customer satisfaction

Some interviewees described customer happiness as the most important part of the job. One participant summarized, “At the end of the day, if the customer is not happy, you might be out of a job; before you know it, the business owner might not have a business anymore.” These respondents equated customer satisfaction with speed in getting orders filled and food out, which often impacted proper glove use and hand washing practice.

For a number of participants who worked as servers, customer-related pressure was particularly salient. Interviewees indicated that they were the face of the restaurant and “received the backlash” (including reduced tips) if food did not look right (e.g., sitting in the kitchen too long) or was not served quickly. While these issues were described as barriers to proper glove use and hand washing, however, a couple of servers suggested that interaction with customers, and a desire for their satisfaction, may facilitate adherence to clean uniform requirements and not working while visibly ill.

Family and friends

Family responsibilities left workers feeling obligated to work when sick. A few participants described situations where co-workers continued to handle food despite experiencing severe illness symptoms because workers “have to feed their children,” and “have a family and bills to pay.” Other participants indicated that some workers lack the family and friend networks necessary to follow illness requirements, such as accessing health care services for treatment and doctor's notes. One interviewee explained, “[Workers] might not have a way to the hospital; they have no one to take them.”

A couple of participants suggested that whether or not a worker lived alone, or as a part of a multi-unit household, may impact adherence to clean uniforms or outer garment requirements. These participants explained that households with more participants were more likely to have consistent and full loads of laundry (especially homes with children), which may facilitate nightly uniform cleaning.

Institutional factors

Participants focused heavily on factors associated with the food service environment and food service jobs. All participants discussed the influence of various workplace demands, including time pressure, high customer volume, understaffing, and strenuous work schedules. Depending on the type of health and hygiene practice discussed, participants mentioned small workspaces and issues with resources

as barriers to proper practice. Participants asserted that various restaurant policies and procedures supported unsafe practices and that low wages and a lack of access to health insurance and paid sick days strongly influenced decisions to work when sick. In addition to these factors, a couple of participants identified insufficient training as a barrier.

Working conditions: time pressure, high volume, work schedules, and understaffing

All participants cited time pressure as a barrier to following food safety practices. Many informants indicated that food safety contends with an extremely busy and fast-paced environment where workers are “rushed to get things done” and, “you just don’t have the time” to change gloves or wash hands according to procedure. Time pressure was also related to short staffed (including from turnover), strenuous work schedules (e.g., long hours, back-to-back shifts), high customer volume, and food service tasks that do not “allot the time” for food safety. For example, many workers expressed how working late, long hours, and back-to-back shifts supported unclean uniforms:

On a Saturday night you probably get out of there at 2:00 or 3:00 in the morning, and then you’re expected to be back at 10:00 the next morning. I just don’t have time to bleach and, you know. You know, it starts out the week perfectly bleached, ironed. Everything’s great. I have a couple of uniforms lined up and waiting. But like by the sixth double, I don’t even have time to do that.

Other participants related high customer volume to problematic hand washing and glove use practice. One participant explained,

Even with not changing our gloves, there are still multiple lines or multiple orders - there are too many people in the store. There’s too many. [Workers will] skip steps to get it done. And cleanliness is probably one of the first ones they skip.

For a number of interviewees, these factors supported behaviors such as working while ill, including coming to work and failing to leave when experiencing illness symptoms. One participant explained that despite feeling sick during her shift, “If they’re busy, they’re not going to send you home; they are going to let you work.” Other participants connected strenuous schedules to prolonging and increased experiences of illness (“When I get sick, it’s hard for me to get over it because I am pushing and pushing and pushing”) and being forced to choose between meeting food safety practices or taking time for basic needs, such as a break to eat, rest, and use the restroom.

To balance time pressure and food safety, a few participants described potentially problematic and

high-risk solutions. A couple of interviewees discussed “doubling-up on gloves,” so that they could quickly remove and replace a pair when soiled or torn. Other workers suggested that it was common for workers to keep extra pairs of gloves in their pants and aprons, so that they could still access them and save time.

A few participants noted that these issues were exacerbated by factors such as the location of the restaurant (centrally located or community restaurant), time of day (lunchtime, post-school or work hours), and day of the week (Friday and Saturday), since these were factors associated with high customer volume. An interviewee who worked in a fast-food restaurant near a high school explained: “It’s always, fast, fast, fast, fast, fast! Unless it’s between school time, or when kids are in school or overnight. But 3 to 11; it’s busy.”

Working conditions: the physical environment

Some participants mentioned elements of the physical workspace as promoting unsafe health and hygiene practice. A few participants expressed how unhygienic restaurants, such as dirty workspaces, “grease-caked floors,” and kitchens that did not “meet clean standards,” signaled a lack of restaurant commitment to food safety and discouraged their own hygienic efforts. One cook explained, “If the place is dirty, some people may say then what am I worrying about it for?”

A number of other participants suggested that smaller kitchens and cramped spaces, combined with other factors (e.g., how many people are working and busyness), could reduce the frequency of hand washing and changing of gloves. Conversely, a couple of participants described small kitchens with less staff as conducive to regulating proper food safety practice (“We’re such a small kitchen; you would know if someone was being gross”), and accessibility of sinks and other resources to exercise proper behaviors.

Working conditions: resources

All participants described issues with resources as a factor that impacted health and hygiene behaviors. Improper hand washing practice was related to a lack of soap and drying towels and issues with sinks (limited number, poor functioning, and blocked from use). One participant explained,

A lot of kitchens I have worked in, they will have access to only a couple of sinks, some of them don’t work properly, some of them a lot of times will sit stuff in the sink, or block it with things in the kitchen, like tubs of bread or whatever. They will make the sink completely inaccessible to you.

A number of workers also mentioned that sinks were inconveniently located, a factor perceived to impact

hand washing frequency and the effectiveness of the procedure. One cook explained, “If this is my stove, and I have to go out there to wash my hands, it’s going to discourage me because I don’t want to leave my station. My food might burn.” A number of participants identified sinks that were located such that workers had to touch contaminated objects, such as doors, to use them and return to work stations.

Some workers discussed the potential for contamination associated with poor glove quality. Discussing the differences between latex and non-latex gloves, workers identified the latter as a clear and plastic glove that was “trash bag material,” “loose” and “terrible.” Some participants mentioned that gloves were not available in their size, which meant gloves were sometimes too large and “they came off in food” (a situation described as disproportionately affecting female workers) or too small and ripped to expose food to workers’ hands. Due to their awkward fit, many workers also felt that these gloves slowed them down, which encouraged less frequent use. In contrast, latex gloves were described as superior in quality and fit, which made them better for food handling and more likely to be used. Though many workers preferred this option, they mentioned that latex gloves were not readily available since restaurants prefer “less expensive and disposable” options.

A few participants added that gloves were often not easily accessible, such that they were located away from their prep station or other work areas. These workers suggested that as a result, workers “may not wear them or change them as much.” In some cases, gloves were identified as simply unavailable, including “at the end of the month before the order comes in,” popular sizes that would always “go out very fast,” and restaurants that would “run out and be out for a couple of days.”

Issues with fit, poor quality, and cost were identified as barriers for workers in meeting clean uniform and outer garment requirements. In some cases, workers described supplied outer garments, such as aprons, that were thin, plastic, and prone to ripping. These characteristics were suggested to deter workers from using them regularly. A few other workers mentioned that certain elements of their work uniform, such as a chef jacket, were prohibitively expensive, which precluded them from having enough garments to ensure their cleanliness throughout the work week.

Working conditions: wages and benefits

A number of workers suggested that low pay impacted the ability to stay home when ill. One worker explained, “You can’t afford to take off. You can’t afford the doctor’s fees and all that. People cannot

afford that in this industry at all; the food industry does not pay like the corporate industry.” The situation was described to be worse for servers, who “work off tips” and must “give up shifts” and tips to stay home. A few servers also explained that they earned a tipped minimum wage (and not tips) if they had to stay past their shift to complete other tasks. Such low pay encouraged servers to rush or skip hand washing and glove use practices to avoid these situations. One server explained this pay breakdown,

When you are serving [and completing side work], you’ll get minimum wage for a server for that time; you won’t get the minimum wage because you won’t be making tips for that time. It’s like \$3.60 usually, you’ll just get paid that for the extra hour you stay. But not the tips.

Some workers suggested that workers, including managers, were paid to complete certain requirements (“to cook the food, to prepare the food, to stock the food”), but that they were not “paid enough” to also ensure food safety practices. Considering health and hygiene requirements in addition to other job tasks, one participant explained, “You’re not getting paid the amount you should for the things that you have to do.”

Participants mentioned that, “very rarely do [workers] get benefits,” which impacts their ability to stay home when ill or obtain doctor verification of illness (a requirement for most food workplaces). A number of participants indicated that they lack health insurance through work, and that they have to “worry about healthcare” on their own. In these instances, doctors’ visits were described as unaffordable (“It will cost me a fortune”) and many avoided them – and worked through sickness – for these reasons.

Decisions to access health care to treat or verify illness were also related to paid sick days. Participants mentioned that, in the food industry, this benefit was “unheard of.” In conjunction with lack of access to health insurance, one worker explained, “If you don’t have sick time, and you don’t have insurance, you’re gonna walk into that job halfway dead because you gotta pay the bills.” In a few cases, access to paid sick days was prioritized as an essential benefit determining worker health and hygiene practice. Discussing why workers work sick, and not tell supervisors, one server explained,

If I’m not getting paid sick time, I’m not going to go spending money to go see a doctor. Even though I have insurance, there are still co-pays. And okay, they could write me an antibiotic prescription, so now I’ve got to go pay for that. And if I’m not – if I don’t have any sick leave, I’m not only losing money for not being at work, I’m putting money out of my own pocket.

A few participants mentioned that some workers rely on free clinics and emergency rooms to help meet workplace food safety policies, such as doctor's note requirements.

Formal and informal policies and procedures

A variety of formal and informal policies and procedures were cited as factors that impacted proper health and hygiene practice. Some participants mentioned that restaurants might lock up resources, such as gloves, towels, and soap, and give specific people access and responsibility for restocking. Participants suggested that these policies may promote proper practice if followed, but that they often left workers without resources and thwarted from obtaining more. One worker explained, "If you have to find a key to unlock a cabinet or something, just to get the soap, then you're going to say to heck with the soap."

Some participants described informal instructions to reduce glove use and save costs as factors that impacted proper glove practices. One participant was told to not "change gloves every single time, but only when they are torn" while another was instructed to "use the [single-use] gloves, then take them off, then put them on the side, then put them back on." Still others were asked to conserve gloves by washing them after use. A few participants qualified these statements by suggesting that such "crazy" policies were less prevalent in larger establishments that had an "endless supply of gloves," which were readily accessible and properly used.

Restaurant policies for uniform distribution, purchase, and cleaning were identified to impact adherence to clean garment requirements. Participants mentioned that employers provided only a certain number of uniforms, ("You may get two, starting off with two chef coats, two pairs of pants..."), which often did not match the number of consecutive days that one worked ("...but you need at least 5-7"). In many instances, workers also paid for garments, either up front or out of a paycheck later, and were responsible for their cleaning, and washers and dryers were not accessible through work. Together, these policies increased the costs and effort required of workers to ensure clean uniforms, which some workers described as reducing adherence to this requirement. A few participants described workplaces where uniforms were given in sufficient quantities, and workers had access to free workplace cleaning services. These participants suggested that these factors promoted clean uniforms.

Workplace policies to manage staffing and worker illness, including that a worker cover his or her own shifts and obtain doctor's notes when sick, were cited as barriers to proper practice. A number of participants indicated that it was frowned upon to report

illness on short notice, even though this was often how illness happened. They also described difficulty in getting shifts covered. To manage these situations, participants indicated that they would work sick or be asked to do so. One worker explained,

If you call up an hour before, they will say why didn't you tell us earlier that you were sick? And then they usually won't believe you if you say you just got sick. They will tell you to come in, see how you feel, and we will try to send you home early if it's that bad.

Most participants explained that restaurants require doctor's notes as proof of illness when workers call out sick or as verification of workers' convalescence. Though this policy's purpose is to ensure sick workers are excluded from work, it may actually encourage presenteeism as workers attempt to prove illness without incurring health care costs they cannot afford. One server explained,

So you have to have a doctor's note in order to not come to work. And I think that sometimes leads people to showing up ill because you know, it is \$88 to \$100 to go to a doctor, and if they're just sort of feeling eh, it's maybe not worth it to do that. They'd rather come in and have the manager see that they're ill and then send them home.

Participants understood that workplaces had to protect against absenteeism. At the same time, a few suggested that restaurant penal systems to protect against this problem, such as points and strikes, also encouraged working ill. Participants mentioned receiving points associated with absences and other situations, such as being late and not having a doctor's note. At a certain number of points, workers faced consequences, including losing their job. In response to these systems, participants described pressure to choose employment over food safety requirements:

You can only get like two or three strikes before they fire you anyway. You better go in there. You go in there dying sick, "Hey, okay. You want me to come in? I'm coming in."

As an exception to penal systems, a couple of interviewees described reward-based systems and other food safety-specific policies that were perceived to facilitate proper practice. These procedures included the ability to accrue "good write-ups" and receive new titles (crew leader) and food safety resources ("they put you in food safety classes"), as well as the use of timers and beep systems to remind workers to pause and wash hands.

Training

A couple of workers suggested that insufficient training may promote unsafe health and hygiene behaviors. One participant defined this issue as

instruction that fails to inform workers regarding the reasons for a particular food safety practice. Another participant suggested that trainers should do a better job to impress upon workers the importance of “keeping stuff clean.”

Community-level factors

A number of participants identified various characteristics of their community as factors that supported unsafe health and hygiene practice. Limited access to affordable and geographically convenient services and businesses, such as health care facilities, clothing stores, and cleaning services, were perceived to impact workers' ability to meet requirements to not work while ill and to maintain clean work clothes. To try and meet these requirements, participants described using free clinics or the emergency room to postpone payment; acquiring extra uniforms at second-hand stores, in out-of-season styles, or through temporary agencies; and using friends' washers and dryers, washing clothes in tubs and sinks, and hanging clothes on a line to dry.

Some workers mentioned limited access to private transportation and a reliance on public transportation as additional barriers to health and hygiene practices. These factors were related to clean clothing requirements through the burden of accessing Laundromats, and doctor's note and other illness requirements through the time and energy required to get to a hospital or wasted by going home following an extended trip to work.

A few participants suggested that some community-level factors, such as working in food service jobs far from home and other community organizations, were the product of communities that had few opportunities for employment, and even fewer “good jobs.”

Public policy-level factors

Some informants expressed the view that poor national economic conditions, policies regarding reporting-time pay laws and a lack of policies regarding paid sick days, and changes to federal health insurance requirements impacted workers' adherence to proper health and hygiene requirements.

Participants also mentioned that a weak national economy placed pressure on workers to show up and keep up with responsibilities, which including rushing or skipping food safety practices and working when ill. One explained,

I definitely feel pressure to go to work unless I'm dying, unless I feel like I can't move, and I can't go ten minutes without puking, I'm gonna go to work. And I think that's probably true for a lot of places, especially now with the economy, you know, any job is a godsend, so people feel like if they lose this job they might not get another one...

A few people mentioned food safety impacts associated with reporting-time pay (or show-up pay) policies (i.e., laws that establish a minimum payment to workers that present to work when required or requested, where there may end up being little or no work available).²⁸ These participants, who worked on a shift schedule and were paid hourly, described a guaranteed pay of only two hours, which they indicated then encouraged working whenever possible, including when ill. A few workers also identified a lack of policies regarding paid sick days as an additional barrier to safe practice. Recent changes to federal health insurance requirements were also suggested to impact worker hours and pay. In discussing the Affordable Care Act Employer Mandate, which requires that all small businesses (those with 50–99 full-time equivalent employees) provide workers with health insurance, one worker explained:

Everybody at the restaurant where I work is 28 hours or less a week now, because of ObamaCare. [The restaurant] had 90 something employees; they let 30 go before the 31st of last year, doubled up on some shifts, and moved things around. [They] cut just below so they don't have to offer anything.

Participants suggested that as a result of these changes, and employers' response, workers must work regardless of whether or not they are sick.

Discussion

This study analyzed food worker perceptions of factors that influence workers as a common source of foodborne outbreaks in restaurants. In response to scenarios about worker deviations from health and hygiene requirements, participants identified a variety of factors, across the five levels of the social ecological framework, that were perceived to impact proper practice. These findings are consistent with previous research that identifies an important role for factors beyond food safety knowledge and training in shaping food workers' ability to handle food safely.^{16–20}

Using a qualitative approach that prioritized food workers' perceptions, however, additional influences were revealed, many of which emphasized workers' social and structural context in shaping proper health and improper hygiene practice. These additional factors related to the workers' personal resources, food service positions and work environments, family and friend networks, and issues related to workers' communities and policy context. For example, at the individual level, in addition to workers' knowledge, attitudes, and beliefs, limited financial and hygiene-related resources, such as a low income and no personal washer and dryer, were perceived to complicate workers' ability to ensure clean uniforms and not

work when ill. Outside of work, participants connected their ability to ensure safe food to relationships with family and friends. Specifically, participants found that low pay and a lack of benefits like paid sick days challenged their ability to provide for families and encouraged many to work while ill.

In line with previous research, participants also described a role for relationships with co-workers and management.¹⁶ Adding to our understanding of these social factors, however, participants emphasized that managers' leadership style, including an ability to make workers feel seen by their employer and valued as a member of a team, served as important motivators of proper practice. In many cases, participants felt these relationships were achieved by managers who modeled proper food safety practices and made time to listen to and engage with workers, and by food service establishments that provided good working conditions, including decent pay, access to benefits, preferred schedules, and clean working environments.

These individual and interpersonal factors were interrelated with factors related to food service jobs. These job-related barriers included formal and informal policies for resources (e.g., uniform distribution, purchase, and cleaning), worker absenteeism and illness (e.g., points systems and doctor's note requirements), and staffing, which participants associated with strenuous work schedules that prolonged sickness. Participants also emphasized the food safety impacts of wages and benefits, including a lack of access to paid sick days and health insurance. These factors were described as especially prohibitive in relation to meeting requirements to stay home when ill. This finding contrasts with limited previous research that identifies a role for workers' concerns about pay, yet suggests that this factor may not be a primary source of influence in decisions about working sick.¹⁷

At the community level, participants described barriers to proper practice through a lack of good jobs, long distances to work, and issues with transportation as well as health and hygiene-related services, such as primary care, clothing stores, and cleaning services. Beyond the community, some participants revealed additional structural barriers to food safety within the policy environment. These barriers related broadly to poor economic conditions while also accounting for state and federal laws for reporting-time pay, benefits, and health insurance. While previous food worker research does not account for workers' community or political milieu as related to safe food, study findings suggest that these contexts shape workers' ability to ensure food safety and should be considered by food safety strategies in the service sector.

In some cases, identified factors were perceived to impact certain health and hygiene requirements more than others. For example, workplace policies, procedures, and issues with pay and lack of access to benefits were most commonly described as barriers to ensuring clean uniforms and requirements to not work when ill. By contrast, barriers such as time pressure, high customer volume, design of the physical environment, and issues with resources were largely related to improper hand washing and glove use. Barriers to proper practice also differed by type of restaurant (e.g., fine dining vs. fast food), food service position (e.g., server vs. cook), and establishment size (e.g., large vs. small facility and staff size). These factors suggest that interventions to promote proper practice should consider the unique needs and characteristics of different food service establishments and positions. Involving workers in the development of these interventions may allow for these nuances to be more effectively identified and considered within facility food safety plans.

According to social ecological theory, food safety interventions will be most effective if they account for the range of factors that impact workers' health and hygiene practice. Workers were able to articulate factors on each level of the social ecological model and conceptualize the relationship between food workers and food safety. Complementing a current industry focus on food safety knowledge and training, we recommend additional interventions to comprehensively promote food service workers' ability to ensure safe food that are based on workers' identification of factors that promote or impede proper practice. For proper handwashing and glove use, food facilities should develop strategies to prevent understaffing (including through hiring additional staff to fill in during busy customer hours) and stock sufficient quantities of glove types (latex and single use) and sizes. Food facilities should also order gloves to reflect the composition and preferences of staff, such as smaller sizes for some women or enough latex for workers who desire this option. Food facilities should also use soap that is less harsh and abrasive on workers' hands, especially after repeated use.

To promote clean uniform requirements, food service staff should have regular on-the-job access to washers and dryers and/or have the opportunity to clean uniforms via a free workplace cleaning service (which may already be in place for aprons and towels in many food service settings). Food service facilities should complement these resources with uniform distribution policies that provide at least as many uniforms (all components – pants, shirts, jackets, etc.) as the number of days that staff work in a week. Extra uniforms should also be available, in a range of sizes, to support cleanliness amid demanding schedules where

workers may not have the ability to clean garments before returning to work. Finally, to support requirements to not work when ill and that workers report illness to a supervisor, food facilities should provide affordable health insurance and paid sick days as well as higher pay. Food facilities should also change staffing policies so that workers do not face pressure to find their own replacement when out sick.

Strategies that may support the range of workers' health and hygiene requirements include replacing penal-based systems (e.g., strikes and points) with reward-based systems, where workers are positively reinforced for proper food safety practice, including through new job titles and resources like advanced health/safety training. Manager training should emphasize the importance of including workers in food safety planning and implementation, showing care and respect for staff (including through meetings that welcome worker input), and in working alongside workers to achieve food safety procedures, especially during periods of high customer volume and not only when health and safety inspectors are present. To reflect a food safety priority, the food service facility should be clean. Management should also reflect and maintain food safety standards through proper food safety practice, reminders, and enforcement. Finally, development and implementation of food safety interventions should be conducted with input from worker health and safety regulators. These stakeholders should work together to ensure that standards to protect food do not inadvertently put workers at risk, including glove requirements that protect against contamination but also impact workers' ability to handle knives safely.

Altogether, these findings expand what is currently documented as to the range and complex interplay among multi-level factors that influence food workers' food safety practice. Future research is needed, however, to clarify these interactions across restaurant types and food work positions and to identify which of these interactions may be most important for the control of foodborne outbreaks.²¹ Further, this study has some limitations. First, findings are limited to English-speaking food service workers in and around Baltimore, MD, USA who utilize Craigslist. This recruitment strategy restricts participants to those who have access to and use the Internet and who have a phone or email to respond to postings.²⁹ Further, the study relies on self-reported data on a potentially sensitive topic, which may have encouraged participants to share what they believed were socially desirable perceptions. However, the study design employed a variety of behavioral science techniques to limit these issues and to enhance the validity of these data, which builds on previous work.²⁵

Using in-depth interviews with food service workers in Baltimore, Maryland, this study prioritized worker perceptions of barriers to proper food safety practice. The findings broaden the scope of factors identified as barriers to proper practice, and highlight the role of food workers' social and structural context in shaping proper health and hygiene behavior. By using a social ecological approach, barriers were accounted for in relation to more commonly identified influences, such as those related to worker characteristics and the food work environment (including time pressure, understaffing, high customer volume, and issues with facilities and resources). In combination with this model, the use of an exploratory, qualitative approach also made apparent the complex interaction among factors at different levels, and revealed the value in an ecological orientation in understanding food workers' health and hygiene behavior. The results from this study may be used to guide the development of more comprehensive food safety programs in restaurants, as well as to better support food workers in ensuring food safety.

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