Research report

'I don't think I ever had food poisoning'. A practice-based approach to understanding foodborne disease that originates in the home ☆

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ABSTRACT

Food stored, prepared, cooked and eaten at home contributes to foodborne disease which, globally, presents a significant public health burden. The aim of the study reported here was to investigate, analyse and interpret domestic kitchen practices in order to provide fresh insight about how the domestic setting might influence food safety. Using current theories of practice meant the research, which drew on qualitative and ethnographic methods, could investigate people *and* material things in the domestic kitchen setting whilst taking account of people's actions, values, experiences and beliefs. Data from 20 UK households revealed the extent to which kitchens are used for a range of non-food related activities and the ways that foodwork extends beyond the boundaries of the kitchen. The youngest children, the oldest adults and the family pets all had agency in the kitchen, which has implications for preventing foodborne disease. What was observed, filmed and photographed was not a single practice but a series of entangled encounters and actions embedded and repeated, often inconsistently, by the individuals involved. Households derived logics and principles about foodwork that represented rules of thumb about 'how things are done' that included using the senses and experiential knowledge when judging whether food is safe to eat. Overall, food safety was subsumed within the practice of 'being' a household and living everyday life in the kitchen. Current theories of practice are an effective way of understanding foodborne disease and offer a novel approach to exploring food safety in the home.

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Introduction

Foodborne disease (FBD) represents a significant challenge for individuals, communities, the food supply chain and those tasked with protecting health at a national or global level (Kuchenmüller et al., 2009). Worldwide, the World Health Organization estimates that 2.2 million people die annually from foodborne and waterborne diseases combined (Food Standards Agency, 2011). In the UK alone it is estimated that there are a million cases of FBD each year, resulting in 200,000 hospital admissions and 500 deaths (Food Standards Agency, 2011). Similarly, in the US, one in six of the population is thought to suffer from FBD annually with 3000 deaths attributed to this cause (Painter et al., 2013). Whilst there are no known estimates of the global economic burden from FBD, in the UK it is reported to be £1.8 billion per annum (Food Standards Agency, 2013). Individuals aged over 60 years, pregnant women, children under five years and others with a compromised immune system are thought to be particularly vulnerable to the effects of FBD (ACMSF, 2009).

Strategies to address the burden of FBD need to take account of the potential for the contamination and spread of bacteria and viruses to develop during different phases of food handling – from chilling, cooking, cleaning or via cross contamination, all of which can occur across the food chain, from farm, factory, markets and supermarkets through to restaurants and the domestic setting. It is difficult to determine what proportion of FBD originates in the home, because of the known under-reporting of mild illness and the difficulty in determining where illness originates when food is consumed from a variety of sources and across multiple settings (Griffith, Worsfold, & Mitchell, 1998; Scott, 1997; Worsfold & Griffith, 1997). There are statistics which suggest that 12–17 per cent of general outbreaks of foodborne illness in England and Wales are reported to have originated in the home (Redmond, Griffith, Slader, & Humphrey, 2004) whilst others report (Eves et al., 2006) that figures linking *Salmonella* and *Campylobacter* infections

to the domestic kitchen are perhaps closer to between 50 and 80 per cent.

Individuals preparing, storing and cooking food at home are often considered to be the weakest link in the overall food chain (Brennan, McCarthy, & Ritson, 2007; Terpstra, Steenbekkers, deMaertelaere, & Nijhuis, 2005). Despite this, most studies are limited in scope as they concentrate only on behaviour/action, in isolation from the meaning, value and cumulative history that might help shape this.

Some studies have used an experimental design to assess people's behaviour when undertaking tasks specified by researchers to determine whether kitchen behaviour is 'compliant' or 'deviant' in relation to food safety recommendations (Griffith et al., 1998; Worsfold & Griffith, 1997); this work is limited in interpretation not least because an experimental design cannot by definition reflect the real-world setting of a person's home. Further, rather than assessing the 'good' reasons behind 'poor' practices, such research often takes a deficit approach by viewing non-compliance with food safety recommendations as problematic (Meah, 2014). There is also a paucity of detailed evidence about actual rather than reported behaviours in the home, and particularly in relation to those groups vulnerable to foodborne disease such as older people and pregnant women (Greenstreet Berman, 2011).

The study drawn on in this paper, the Kitchen Life study, was commissioned in the light of these gaps in knowledge and understanding about what people do, what they say about what they do and what they know about food safety and preventing FBD in the home. The rationale for Kitchen Life was to move away from focusing simply on individuals and their behaviour to take a practices-approach in order to investigate the meanings and context of everyday kitchen life (Shove, Watson, Hand, & Ingram, 2007). Earlier work, whilst providing information useful to policy and regulatory bodies like the UK's Food Standards Agency, has tended to consider individuals as rational actors who live and make decisions about how to act in a social vacuum. This contributes towards a singular understanding of behaviour as simply being 'right' or wrong' and tends to position individuals at the bottom of a hierarchical knowledge pyramid, with experts being perceived as higher up the hierarchy (Shackley & Wynne, 1995). Such an approach has been critiqued within the public understanding of science literature as quite limited in scope (Wynne, 1992). Kitchen Life was designed to take a broader perspective, to consider people as one part of the jigsaw puzzle of factors that might influence FBD, alongside the resources, technologies, things and non-human actors in individual homes. The approach was also designed to explore people's behaviour (their actions) in the context of their history, values, beliefs and relationships with others inside and outside the home, factors that many other studies of foodborne illness in the domestic setting have overlooked.

Using current theories of practice

It is argued that much of what we do in everyday life is mundane and taken-for-granted (Bourdieu, 1984; Giddens, 1984). Routines are performed repetitively, without the need for constant reflection or discussion; such is our 'feel for the game' (Bourdieu, 1984). Building on established social theories about structure and agency, civility and regulation, current theories of practice draw on the social and material milieu that shapes and is shaped by 'what we do' (Halkier & Jensen, 2011; Reckwitz, 2002; Schatzki, 2011; Schatzki, Knorr Cetina, & Von Savigny, 2001; Southerton, 2013; Warde, 2005). The 'first wave' of practice theory concentrated on people and the historical trajectory and accumulative inventory of values, experiences, attitudes and beliefs that surround an individual's actions. Whilst sometimes criticised for ignoring shifts in attitude or behaviour (Archer, 2007), practice theory centres on situating people within social boundaries in order to make sense of their lives. Current

theories of practice, the second wave, de-prioritise people to some extent – individuals are viewed as being carriers of practices (Warde, 2005) but are not necessarily central to a practice itself. This allows greater account to be taken of material objects and physical, geographical and temporal social settings (Southerton, 2013). In addition current theories of practice acknowledge the socio-specific performances and intersections between people, objects and settings (Halkier & Jensen, 2011). As Halkier and Jensen (2011) argue, recent theories of practice aim to uncover the *normativity of regulation* in everyday life. Importantly, such theories appreciate that practices are not fixed or unchangeable (Shove, Pantzar, & Watson, 2012). However, changes to, for example, material items, knowledge or temporal settings may, or may not, result in a shift in practice as each of these elements are just one piece of an overall jigsaw puzzle; a more dynamic shift in the interaction of the 'pieces' of a practice might be needed before change occurs. This is important to consider in terms of addressing the complexity of reducing the burden of foodborne disease.

Other studies have used ethnographic approaches to investigate a range of domestic kitchen practices (Martens, 2012; Martens & Scott, 2004), including cooking (Hernandez & Sutton, 2003; Meah & Watson, 2011; Sutton, 2009), provisioning (Meah & Watson, 2013), food safety (Meah, 2014) and food waste (Evans, 2012; Watson & Meah, 2013). A practice-based approach has not previously been used exclusively, however, to situate everyday kitchen life in context, in order to shed light onto the potential pathways between practice and foodborne disease.

Study design and participating households

A qualitative and ethnographic approach using a range of methods was used to investigate domestic kitchen practices in 20 UK households, with the age of householders and whether they were pregnant being key selection criteria. Involving 10 households with individuals aged over 60 years of age and two women who were pregnant was important, given the vulnerability of such populations to foodborne disease and the lack of evidence about practices that might put such groups at risk. Involving households with individuals aged less than 60 years and who were not pregnant meant we could more easily compare and contrast the practices of vulnerable and less vulnerable households. Typically in a study drawing on an ethnographic approach, the number of participants (households) needed to be balanced against the desire to collect in-depth data, requiring many hours of fieldwork; we were aiming for theoretical rather than empirical generalisation. Twenty households were therefore considered sufficient to address the study's objectives and the underlying research questions, whilst maximising the variation across the households, in the time available for fieldwork (seven months). Ethics approval for the study was obtained from the University of Hertfordshire Health and Human Sciences Ethics Committee with Designated Authority.

In May 2012 we wrote to 800 people randomly selected from a database of individuals who had taken part in the UK's 2010 Food and You survey and who had agreed to being re-contacted about taking part in future research commissioned by the Food Standards Agency (n = 2402). Individuals were sent a letter from the research team, a study information leaflet and a short screening questionnaire with a reply-paid envelope. People were asked to indicate their willingness to take part, to supply their contact details and to respond to eight screening questions designed to maximise variation within the sample households (Patton, 2002). The questions included: who respondents lived with; whether anyone in the household was pregnant; received help with cleaning, washing up, preparing food; owned pets; any appliances (e.g. freezers) located outside the kitchen; sat and ate in the kitchen; and the type of dwelling they lived in.

Research methods

It was considered important to use a range of methods that were appropriate for the domestic, multi-participant setting and to remain flexible 'in the field' to maximise what we could see, hear and experience (Hammersley & Atkinson, 1995). As so many kitchen practices are mundane or taken-for-granted they are often difficult to make explicit (Power, 2003); we therefore drew on multiple methods to avoid an over reliance on interviews and the articulation of thoughts or reasoning (O'Connell, 2012; Power, 2003; Sweetman, 2009; Wills, 2012).

The following methods were used:

- A kitchen tour and mapping exercise
- Photography and photo-elicitation
- Observation and video-observation
- Informal interviews
- Other techniques for participant engagement, including the use of diaries and scrap books.

The participant-led kitchen tour was a way of building rapport with participants and also became a 'way in' to their kitchen and kitchen life, to begin to understand the kitchen as a *place* – a space with meaning. Sketches were made by the research team and maps subsequently drawn to indicate the layout of the space and its material objects and resources. Extensive photographs were taken of the layout, work surfaces, products and resources – both outside and inside refrigerators, freezers, cupboards and drawers. Households had the opportunity to use disposable cameras, notebooks and pencils provided by the research team. This helped individuals to participate according to their own preferences and competencies and at a time convenient to them (Ison, 2009; Monrouxe, 2009). Discussing the contents of photographs and notebooks created an opportunity to examine what was important to participants in ways which might not be immediately obvious, or captured, via other means. The study generated 2200 photographs, of which participants took 300.

As well as direct observation of a household's kitchen practices, the research team also used video to record everyday kitchen life. One unanticipated aspect of using this method was that many participants were willing to use the video recording equipment themselves, in between our visits. We discussed with participants the range of things we were interested in, based on our prior observations and the kitchen tour, and we stressed our interest in both the mundane aspects of kitchen life and things that were not necessarily food related. Beyond these instructions, participants made their own decisions about what to record and when. Between 18 minutes and 4 hours of video footage was generated from each study household; of those households that filmed themselves, 18–120 minutes of footage was produced.

Rather than being conducted as one or more 'standalone' or formal interviews, talking to participants was continuous and informal. Informal interviews were intended to give participants an opportunity to account for events and stories relating to kitchen life and the factors that they believed shaped them over the life course (Czarniawska, 2004; Meah & Watson, 2011; Wills, Backett-Milburn, Gregory, & Lawton, 2008; Wills, Backett-Milburn, Roberts, & Lawton, 2011). Informal interviews gave both the participating households and the research team opportunities to question and 'make sense' of the ways in which practices develop and to reveal some of the embedded factors that shaped these experiences.

At the final fieldwork visit we drew on the 'key' household member's responses from the 2010 Food and You survey (Prior, Hall, Morris, & Draper, 2011) to elicit further information about some topics. For example, the Food and You responses were used to enquire about experiences of food poisoning, if this had not previously been raised by participants.

Three to four visits of between one and four hours were made to each household. It is impossible to know the full effect our presence and the presence of the technologies we took with us (digital recorders; cameras; video cameras; tripods) had on household practices (Paterson, Bottorff, & Hewat, 2003). Our presence could have reasonably provoked a change to a person's usual 'presentation of self' (Goffman, 1959), warranting a certain level of formality or circumspection. A minority of participants told us they had cleaned or tidied up before the first fieldwork visit. Whilst we must remain aware of the potential impact our presence or aims to explore kitchen life had on participants, the study design allowed for greater insight to be gleaned than if we had relied on interviews alone. Observation and video footage clearly showed the entangled nature of 'what goes on' in the kitchen, for example (as we go on to discuss later in the paper), in ways that a verbal account simply could not do.

A detailed study protocol was developed and followed as well as a topic guide. The topics covered with participants included: use of the kitchen (by whom, for what, when); the spatial dynamics of the kitchen (space/design/boundaries); shopping and storage practices; food preparation practices; and cleaning practices. Informed consent was obtained in writing from all participants aged seven years and above. The parents of three younger children gave consent for their involvement.

Analysis

The analysis was approached from 'the bottom up', with the aim of limiting the imposition of a view of what we might find or look for, as far as possible (Seale, 1999). It would be misleading to claim the analysis was truly inductive, however, (i.e. that the analysis was fully data-led). We could not ignore, for example, our knowledge of the relevant literature on practices, the study's research questions and objectives or our own experiences of engaging in kitchen life. In addition, a practice-based approach does not easily translate into empirical work – social theories are rarely easy to apply – but our approach was to keep an 'open mind' about what we were seeing and reading in the data, within the realms of our research questions (Strauss, 1987).

We did not analyse the data only to look for common patterns and data generated by one method (e.g. video) were not privileged over data generated by another (e.g. informal interviews) during the analytic phase (Moran-Ellis et al., 2006). Instead, data were used to corroborate, elaborate, contradict and complement other data in order to interpret the meaning of kitchen practices (Brannen, 2005). For example, if a participant said that they did something (washed their hands prior to preparing food, for example) but we observed something contradictory or revealing (washing hands before food preparation, for example, but not re-washing hands after emptying the bin or feeding the dog and then going on to prepare more food), we aimed to further observe and question participants and to interrogate all the data to ascertain the conditions when hand-washing did, and did not, take place.

We worked across the data sources, drawing on techniques common to Grounded Theory (Charmaz, 2006), moving from analysis of the particular – the specific nature of each household in the study – to the general – looking for patterns within and across households (Hammersley & Atkinson, 1995). The analysis involved repeatedly reading, viewing, listening to and discussing data from each household, paying equal attention to the visual and textual data sources. Categories were identified from interview transcripts and a coding framework was developed. Data in the form of photographs and video were not transcribed but were repeatedly viewed and extensive analytic notes written and discussed by the team to ensure that the 'doings' as well as 'sayings' relating to kitchen

practices were given equal weight during the analytic phase of the project. Summaries were written for each household only after extensive analysis of the written and visual data. The analysis moved from the descriptive to the conceptual level and four themes were defined and tested by further engagement with the data.

We have paid attention, below, to avoid revealing 'too much' about individual households (Muir & Mason, 2012), which is a challenge when presenting data from multiple related people and from multiple data sources. This challenge also means that the spoken word can be directly presented, through quotes taken from interview transcripts and video data, whereas the visual data itself cannot be directly presented here due to issues of anonymity and copyright. The equal weight given to the data during the analytic phase is therefore masked in the presentation of the findings, though the robust interrogation procedures we adopted underpin all that is presented and themes are drawn from across the dataset. Pseudonyms are used throughout and direct quotes from individuals are shown in italic text.

Findings

Twenty households were selected from the 105 who responded. We recruited 10 households with people aged under 60 years (two with women who were pregnant) and 10 households with people aged 60 and older (five with people aged 60–79 years; five with people aged 80–87 years). Of the 20 households, nine had at least one person in employment; six had children under 18 years; nine had pets and four had help with domestic tasks. Four of the dwellings included were detached houses; eight were semi-detached; four were terraced; one was a bungalow and three were apartments. The households were located across the UK and included a mix of social and private housing. Table 1 provides further details about the participating households.

The study findings are organised around four themes that broadly relate to where, exactly, kitchen life takes place, how, by whom and why.

Where? The boundaries of the kitchen

The data reveal that the kitchen is not a neatly bounded space or room, physically or symbolically, nor is it reserved exclusively for practices relating to foodwork. The kitchen was a space with multiple meanings in which the physical boundaries were also blurred. This blurring incorporated both outdoor as well as indoor spaces and this could have implications for how issues of food safety and cross-contamination can be understood. Kitchens in the study were spaces in which different aspects of domestic life took place: laundry, cleaning, child care, pet care, social life, school and office work, art and craft activities, music practice, reading, gardening and bicycle repairs. Objects and appliances were routinely found that might be deemed 'out of place', in a food-focused view of the kitchen. These included fixed items such as washing machines, dryers, boilers and utility meters, along with others which were moveable including pets, plants, bins, items for recycling, coats, mail, magazines, newspapers, bags, laptops, keys and phones. In the households studied, foodwork was not confined to the kitchen; it took place in other internal and external spaces within the home. For example, a lack of available storage space meant that some participants stored items such as drinks, tinned and dried goods and vegetables in garages, utility rooms, bedrooms, a downstairs shower cubicle or even a relative's home. It was not uncommon for larger appliances, such as fridges and freezers, to be located in adjacent rooms, or a garage.

Kitchens were sometimes ineffective in terms of design, size and layout – particularly for participants living in social housing and for those households with younger children or older adults; this could influence food safety in a number of ways. The kitchens in our

Table 1
Details of participating households.

Household category	Participants	Other key variables
<60 years	Brenda and Greg Fisher; Pickles (cat)	Married couple; semi-detached house; grow own fruit/veg; freezer kept outside kitchen; food stored in bedroom
<60 years	Sue Heely; Barney and Wilma (dogs)	Single female; terraced house/Local Authority
<60 years	Bernie, Pete and Hannah (<10 yrs) Green; Lucy (goldfish)	Married couple and child; terraced house; goldfish lives in kitchen; food stored in under-stairs cupboard
<60 years	Carol, Gemma (<18 yrs) and Lee (<18 yrs) Stockwell; Toby (cat)	Single woman and teenaged children; terraced house/Local Authority; grow own fruit/veg
<60 years	Liz Sargent	Single female; flat; eats in kitchen
<60 years	Ann, Andy and Edward (<18 yrs) Spencer; Charlotte (dog)	Married couple and teenaged son; detached house; open plan kitchen/diner/conservatory; TV in kitchen; keep chickens; grow own fruit/veg
<60 years	Charles May	Single male; detached house; grows own fruit/veg
<60 years	Rachel, Stuart, Jack (<7 yrs) and Billy (<4 yrs) Jenner; Snoop and Bounce (dogs)	Couple and 2 young sons; semi-detached house; utility room; grow own fruit/veg; keep bees/make honey
60–79 years	Julia and James Jacobs	Retired couple; flat; 2 kitchens over 2 floors; appliances kept outside kitchens; Julia has had a life changing illness
60–79 years	Joe and Ben (adult son <60 yrs) Murphy	Retired single male and adult son; flat/Housing Association; Joe has carer due to long-term condition
60–79 years	Jim and Shirley North	Semi-retired couple; detached house; utility room; grow own fruit/veg; eat in kitchen
60–79 years	Leah and Hakan Osman	Retired couple; semi-detached house; open plan kitchen/diner/living room; food stored in under stairs cupboard
60–79 years	Vera and Bob Jones; Elvis and Jerry (dogs)	Semi-retired couple; detached house; freezer and other food items stored in garage
80+ years	Fiona and Meg (mother, 80+) Gilmour; Dotty (dog)	Single female caring for mother who has a life limiting illness; freezer stored in back porch
80+ years	Geoffrey Smith and Alice Jones (friend)	Widower; semi-detached house
80+ years	Harry McDonald	Widower; terraced bungalow/Local Authority; has cleaner; eats in kitchen
80+ years	Helen Benn	Widow; detached house; has cleaners; freezer in garage
80+ years	Marion and Bill Scargill	Retired couple; semi-detached house; freezer and other food items stored in garage; grow own fruit/veg; eat in kitchen
Pregnant	Gilly Faulkner, Dave Windsor and Seth (<4 yrs)	Cohabiting couple and preschool child; terraced house; have allotment; cleaner; food stored outside the kitchen
Pregnant	Claire and Sam Thorpe (<10 yrs); Misty (hamster)	Single female and son; semi-detached house; eat in kitchen; TV in kitchen; hamster lives in kitchen

sample varied in size and shape, for example, and whilst a number of participants were content with their kitchens, others reflected on spatial constraints that they felt inhibited what they could do. In the Jenner family, for example, with two young children, they recorded video footage that showed how challenging it was to involve both children in baking activities in a small kitchen; the two boys had to stand on a single stool and could sometimes be seen trying to sit on the work surface. Their mother said, about the lack of space:

'. . .it makes you feel kind of, it's quite claustrophobic in some respects and there's no place for everything at the same time 'cos there's always something out. . .' (Rachel Jenner, <60 years)

Participants who lived in social or former social housing were particularly likely to express dissatisfaction with the layout of their kitchens: '*absolutely dreadful*' (Fiona Gilmour, 80+ household). Smaller kitchens were sometimes, however, experienced as advantageous in households with older people with additional health, mobility or care needs. Several older participants commented that a small kitchen meant everything was within 'easy reach'. Feeling comfortable with their kitchen surroundings was reported as important by many households and this cannot be ignored when planning effective campaigns to prevent foodborne disease. One participant said, for example, that although her kitchen was small:

'I'm happy with it as it is. . . If I had anything different I might feel uncomfortable or it might not look right' (Vera Jones, 60–79 years)

How? The entanglement of kitchen practices

Kitchen life was clearly a complex business. When households were doing things in the kitchen it often involved a whole range of actions and interactions; frequently these had little to do with food preparation or eating, but they were embedded in practices that did involve food. Rearranging a bin liner, petting a dog or answering the phone were not discrete practices, but were unknowingly carried out and, often, unlikely to be perceived as having implications for food safety. Seen in this light, what we saw was not a single practice – cooking; cleaning; feeding the dog – but a complex entanglement of practices set in the context of everyday life. So, whilst some households took particular care in cleaning chopping boards and spraying work surfaces, for example, they did not always wash their hands in between petting animals and handling food, or separate pets' dishes from their own. Pet-owners in this study did not generally see encounters with their cats, dogs, hamster and goldfish as problematic or as potential pathways to illness. Their care was entangled with other things that occurred in the kitchen.

This complex entanglement also meant that many household practices were unevenly carried out, changing according to the context or circumstances – including pregnancy, illness or what else was going on in the householders' lives. The data revealed how practices were, in the face of changing circumstances, 'un-entangled' and then 're-entangled' to accommodate new situations, knowledge or values. One participant, for example, had changed her practices regarding cleaning work surfaces and drying dishes, in the light of her mother, who lived with her, developing a life threatening illness which affected her immune system. Despite feeling she had 'improved' her practices to reduce risks to her mother's health, Fiona Gilmour continued to place the pet dog's bowl on the work surface and sink draining board. This was not considered a problematic practice that needed to change, given that the dog was considered an important member of the family.

A further participant, Gilly Faulkner, who was pregnant during the study, had persuaded her partner, Dave, to change his practice of cooling and storing leftover rice as, after seeking out information online, she considered this a significant risk for all members of the family. She argued that this was necessary because she was

uncertain if she had previously been ill as a consequence of consuming rice and therefore did not want to take the risk:

'I don't think I ever have had food poisoning from rice. I've probably had indeterminate 'not feeling very well' after having a takeaway or something and not really been quite sure, you know, what it was down to' (Gilly Faulkner, pregnant)

Gilly had not, however, stopped eating 'runny' egg yolks, despite knowing about the risks to pregnant women; she felt she would know if she had experienced *Salmonella* in the past. The data highlight that knowledge does not always lead to a change in behaviour. This is an important insight into the complex entanglement between different elements of a practice and how food safety knowledge is used and negotiated in practice.

In the context of the domestic kitchens we studied, 'cleaning' was often unevenly entangled within practices relating to a range of sites, surfaces and things, including food and utensils. Some participants appeared to base their assessments about cleanliness against self-defined levels of social acceptability. What might be 'normal' for one household, in terms of when dishcloths need changing or when a work surface was 'clean', for example, was completely unacceptable for other households. Further, what constituted 'cleaning' ranged from the 'aesthetic' tidying or clearing of surfaces – perhaps involving the removal of debris by brushing crumbs from a worktop with one's hand, for example – to a concern with 'microbial' cleaning or '*infection control. . .using froth and friction*' (Ann Spencer, <60 years), as one participant described it, and the perceived removal of potentially harmful bacteria. Given that bacteria are invisible to the human eye, it is impossible for individuals to assess how clean their kitchen actually is. In the absence of special devices to indicate dangerous or unhealthy levels of bacteria, our participants appeared to base their assessments against self-defined levels of social acceptability. Being 'clean' in the context of kitchen life was conceptualised by a number of participants as trying to be the opposite of those deemed 'dirty', which may not relate to reducing potential pathways to foodborne illness at all. Cleaning – either of hands or things – was not something that generally took place as a discrete practice. More often than not, cleaning was something which was entangled within the 'gaps' in between waiting for the kettle to boil, or for something to cook. This perhaps makes it difficult to communicate to households about using cleaning practices to reduce the risk of foodborne disease.

With whom? Encounters in the kitchen

We analysed the ways in which practices were shared, reproduced, resisted and negotiated through encounters between the people in and external to study households. We use the term encounters because this encompasses not just the people involved, but also the setting and activities which might be undertaken (Goffman, 1959). All the encounters observed and reported could potentially affect food safety outcomes, though these issues were generally subsumed within broader concerns about learning how to act in the kitchen, either in a safe or responsible manner (for children), or in a harmonious or a contested manner (for children and adults). Involving children in kitchen practices enabled them to be incorporated into family life. However, even the youngest children in the study exhibited their own agency and attempted to resist adult authority to help shape the kitchen encounter. Parents of younger children had concerns about the safety of their children but this was usually about perceived 'real' dangers such as boiling water and sharp knives rather than threats from lack of hand washing or licking spoons during baking that might be covered in a mixture containing raw egg. Older children (aged up to around 10 years) could be seen assisting with kitchen activities such as drying dishes and preparing packed lunches for school and we observed a melding

of parent and child beliefs about the 'best' way to do things. In households with teenagers, rather than a merging of practices, different ways of doing things sometimes led to conflict between siblings or between parent and child, with no party wishing to give in to the practices of the other party. These encounters demonstrate that it is not just the actions of one individual which creates or mitigates risk in terms of food safety and this has implications for policy intervention.

This factor was also highlighted in households in which more than one adult lived, where one person in a household was sometimes 'in charge' of the everyday choreography or organisation of kitchen life, though this was not always the case and the role was often shared. When one adult's role seemed to be minor, in terms of the amount of activity they performed in the kitchen, it was still often complementary to and therefore entangled with the practices of others in the household. Even in lone person households kitchen life was influenced and shaped by carers, cleaners, delivery people, friends and non-cohabiting relatives. Central to these findings was the matter of one person's autonomy to do things and how this was either negotiated or undermined by others. One man in his eighties, for example, Harry McDonald, felt he was capable of running his own domestic life and yet his daughter insisted on sending her cleaner round to clean his house, following the death of his wife:

'I don't think I need help, but I let it go... it keeps [her] happy... She thinks I'm an old dodderer, three-quarters of the way to senility [laughs]. I might be three-quarters, but I'm not there yet!' (Harry McDonald, 80+ household)

The findings suggest that practices are affected by both the requirements and restrictions of the specific social encounters in which they are embedded.

Why? Household logics and principles

People in the study were likely to have been exposed to a range of official 'best practice' guidance about how to handle food throughout their lives, but official or 'expert' knowledge co-existed with other sources of information, gleaned from the television, the Internet, mobile phone applications, newspapers and magazines. Also incorporated were beliefs and experience that had been absorbed over a period of years from observing and interacting with family and friends. We use 'logics and principles' as a term relating to the rules of thumb derived from all of these sources; the common sense values and 'ways of doing things', as told to us by study participants.

Dimensions of trust in relation to the handling and packaging of food emerged as salient issues in some participants' explanations for why they did certain things and these were particularly apparent in the context of meat, poultry and fish, as well as in relation to vegetables and salad. A number conveyed a sense of unease, or mistrust concerning the purchase and cooking of meat. Whilst some participants did not see any value in washing meat, others felt that blood, bone fragments, dust and imagined handling processes prior to the point of purchase needed to be 'washed away'. Several participants said things such as '*I don't trust it*' (Joe Murphy, 60–70 years) in relation to a wariness about storing, preparing and cooking particular types of meat such as chicken. There was a great deal of unevenness in participants' practices concerning whether salad and vegetables, including 'prewashed' items, should be washed. Individuals who grew their own fruit or vegetables were more likely to wash this produce, to remove perceived grit, dirt or '*creepy crawlies*' (Leah Osman, 60–79 years) than fresh produce they purchased. Some, however, wanted '*peace of mind*' (Bernie Green, <60 years) and therefore washed all salad and vegetables though this was unevenly applied. One woman, for example, always washed pre-washed bagged salad leaves but did not wash cucumbers because they were covered in shrink-wrap and therefore perceived as 'clean'. Elements of practices such as these tend not to be consciously deliberated over or interrogated.

The ethnographic approach brought to the fore a number of uncertainties and confusions regarding production processes and current best-practice advice as well as a range of personal beliefs, values and logics which perhaps rubbed alongside 'expert' guidance. It was in these gaps – where conflict and ambivalence arose between expert and lay knowledge – that food safety practices were negotiated. Importantly, where there was doubt or a lack of knowledge concerning the perceived efficacy of guidance relating to recommended practice, this appeared to open up the potential for households to rely on 'tried and tested' logics based on personal experience. Attitudes to use-by dates, for example, ranged from ambivalence to uncertainty to cynicism and no participant reported consistent adherence to them. One participant said:

'use-by is for the people who produce food...to make sure they've done their bit basically, that they're not poisoning you...I think a lot of stuff has an extended date on because they have to careful' (Carol Stockman, <60 years)

Sensory logics were sometimes drawn on by participants particularly when it was felt that there was some doubt about either the science behind date labelling, or the trustworthiness of its application by manufacturers or retailers. One woman said, for example, '*I smell everything*' (Leah Osman, 60–79 years). Aside from smell, a range of other senses were relied on to assess food for freshness. Participants reported judging food by the presence of mould, for example, or whether food 'felt' cold in the refrigerator. Many participants, particularly but not exclusively older people, expressed the view that food was precious and not to be wasted and this view strongly informed their practices surrounding the disposal of food.

Discussion

By bringing to life contemporary kitchens, through a 'close-up' examination of practices, this study provides insights that could be useful to reduce the burden of foodborne disease that originates in the home, by revealing the relationships that exist (and why) between what people do and say and the kitchen space/place. The findings present an opportunity for fresh or renewed thinking about food safety policy, which has been called for by others (Greenstreet Berman, 2011, Milne, 2011, Meah, 2014) . In particular, the people who live in a household can much more clearly be understood as just one element of the jigsaw puzzle, which provides a potentially important conceptual shift in terms of using practices (rather than behaviour) to inform the development of policy and interventions to help reduce the burden of foodborne illness. Consumer messages could be developed, for example, using fictionalised accounts of 'real life' case studies (Busselle & Bilandzic, 2008) that incorporate the wider context and meaning of kitchen life, to promote food safety. This could be particularly effective at points in the life course when households might be more receptive to change (what we might call 'points of leverage') – during pregnancy or following illness, for example.

Household logics and principles reveal unevenness in the way people account for what they do. Logics are developed over time from 'bits of information' gleaned from a range of almost indiscernible sources – 'it's just how things are done' (Warde, 2005). Some information is acted upon; some is 'mis'-interpreted and partially acted upon; and other information is acted upon, but only some of the time. Households in the study demonstrated what Giddens (1984) calls discursive and practical consciousness – households can only account for or explain the origin or relevance of *some* of the things that they *know* they do. Information might be 'known' by households but it will only be drawn upon within the context of

an existing practice (Reckwitz, 2002; Warde, 2005). This highlights the difficulty with interventions that provide households with 'more information' – it is not clear whether or how such information will be interpreted or assimilated into everyday practice. Whilst other research has been conducted on the logics of, for example, using food labelling, this has tended to remove the context – showing front of pack labelling to individuals and asking them to talk through their use of such information (Draper et al., 2011), for example, does not relate to how people go about the complex, entangled business of using (or forgetting or ignoring) labelling in 'real life'.

A key finding to emerge from this study is the extent and ways that kitchen practices are entangled and impossible to 'pull apart'. Simply being in the kitchen represents part of a practice that can incorporate a constant flow or sequence of 'small events'. 'Cleaning', for example, whether of hands, surfaces, floors or food, is part of this flow, an action often unconsciously enacted by different members of households within a sequence of activity (Schatzki, 2006), and not considered to be 'cleaning' by many participants. Individuals in all households in the study undertook cleaning tasks but often this was not connected to making an object or practice 'hygienic' or 'safe'. The spectrum of cleaning we found in the data illustrates that participating households frequently cleaned to make things tidy, or to look nice, or simply as part of the entangled way that 'things were done' as part of a routine. Such meanings can have emotional dimensions, for example, in producing a sense of 'satisfaction' (Pink, 2004) and this has largely been ignored in other work on food safety and in policy on preventing foodborne disease.

Foodborne disease prevention campaigns like the 4 Cs in the UK, which concentrates on guidance about cleaning, cooking, chilling food and cross-contamination (Food Standards Agency, 2006), 'pulls apart' and isolates behaviours. This risks specific action – like preventing cross-contamination through careful cleaning of chopping boards – being perceived by consumers as the *only* activity they need concern themselves with in relation to preventing cross-contamination.

Individuals aged 60+ and pregnant women are considered to be vulnerable or predisposed to harm from contracting foodborne illness because of their 'status' of being older or pregnant. Our findings suggest that being older or pregnant does not automatically, however, entail a greater risk of foodborne illness due to the practices such groups undertake in the kitchen. Being pregnant or getting older might, however, be linked with *shifts* in practices which increase the risk of illness to these populations. As we have already discussed, this study shows that shifts do occur, but they may not be permanent and may not be evenly applied across a practice. In households with pregnant women, awareness of, or knowledge about, guidance regarding 'eating safely' in pregnancy was apparent from what participating women said; such guidance was very often reported to be inconsistently applied, however.

Our findings suggest that older people, in particular, might be at risk of harm from foodborne illness because there are more factors working against them than in other household types. A cohort (or generation) effect might help to explain this (Keyes, Utz, Robinson, & Li, 2010). Older people who grew up in a time when, for example, there was a shorter production-supply chain, fewer processed foods eaten, date-labelling was not widespread and foods were often not refrigerated, might be more likely to have a perception that they are 'safe' from contemporary 'dangers' in the kitchen. Our findings seem to support this and age-related deterioration of the senses (being less likely to smell whether food is 'off', for example), could also point to older people being more at risk of foodborne illness (Boyce & Shone, 2006). Milne (2011) has pointed out, however, that changes in technology and practice precede the more recent rises seen in rates of foodborne disease. The risks to older people are also not straight-forward to interpret because changes in practice that occur, for example, as a result of bereavement, frailty or failing health,

might result in greater or fewer pathways to a risk of contracting foodborne illness. This suggests further attention is needed to consider how risk operates for older people; this will be the subject of further papers drawing on the study's findings (Dickinson, Wills, Meah, & Short, 2014).

In terms of the methodological approach taken, using multiple qualitative and ethnographic methods meant we could reveal more about kitchen life than if we had relied on one method alone, particularly a method such as an individual interview, which relies on the articulation of known behaviours. Whilst households may have intended to alter their practices for the benefit of the camera or the research team, the data suggest that practices and encounters are so embedded in everyday routines that it would be impossible to mask, to any great degree, 'what goes on' in the kitchen when it entails multiple people doing a variety of things with a myriad of material objects.

Conclusion

Using a practice-based approach and drawing on current theories of practice was an effective way of investigating everyday domestic kitchen practices in order to reveal the broad ways that such practices might influence foodborne disease originating in the home. The value of the approach we took to exploring kitchen life is that the intersection of participants' actions, accounts and kitchens – and more besides – were 'laid bare'. The benefit of observing as well as asking people to report on their everyday life means that we were able to consider the entangled web of encounters – to reveal the flow of kitchen life – underpinned by 'rules of thumb' about 'how things are done', which revealed that food safety is often not a priority.

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