



# Reusing a chopping board after preparing meat, fish and poultry

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**Author:** Basis Social

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# Introduction

Kitchen Life 2 (KL2) is a study that used motion-sensitive cameras in household and business kitchens to observe real-life behaviour (preparing food, cooking, and cleaning). This observational data was supplemented with data from surveys, interviews, and food diaries. The COM-B behavioural framework was used to understand the influences on behaviour. The resulting analysis provides fresh insight for risk assessment, policy development, and behavioural intervention design in relation to food safety and food waste behaviours in household and business settings.

KL2, which was commissioned by the FSA in February 2021 and completed in June 2023, was delivered by Basis Social, with support from Leeds University Business School. This unique and innovative research project won the Analysis in Government 'Innovative Methods' award in 2022.

## Aims and Objectives

The aims of the study were to identify:

- the key behaviours relating to food safety that occur in household and business kitchens
- where, when, how often, and with whom food safety behaviours occur, and the key factors that influence these behaviours

KL2 had two main objectives:

- to provide highly detailed, real-life data for risk assessment at the FSA
- to inform future behavioural interventions research

## Method

Overall, 101 kitchens participated in KL2, with 70 households and 31 food business operators (FBOs) taking part across England, Wales, and Northern Ireland.

After a literature review and a pilot, the main fieldwork design involved installing motion sensitive cameras to film participants in their kitchen over 5-7 days, with 3 days of footage analysed from this period.

The footage was coded, with labels applied to describe the behaviour (e.g., washing hands with soap), person (e.g., chef), and context (e.g., sink, utensils). In addition, fridge and freezer thermometers were used to monitor the temperature of the appliances during the fieldwork period. Photographs were also taken of the interior of

a fridge and, for households only, a food diary and shopping receipts were kept, to verify ingredients cooked.

After the filming period, survey, interviews, and observational methods were used to understand influences on food safety behaviours. The fieldwork took place over 5 waves between June 2021 and October 2022.

Behaviours were analysed using the COM-B behavioural model. The model enabled the research team to systematically explore the barriers and enablers of various food safety behaviours in relation to capability, opportunity, and motivation.

Experts in food safety policy, behavioural sciences, and communications were then involved in a workshop to discuss findings and consider behaviours to target for future interventions.

Further methodological details about this study are available in the [Technical Report](#), and a raw dataset can be downloaded via the [FSA's Data Catalogue](#).

## Research Reports

This is one of 7 chapters detailing the findings from this study. Each report focuses on a behaviour of interest to the FSA, exploring the behaviour in detail, using COM-B analysis to identify the factors influencing the behaviour, and discussing the behaviours that would need to change to achieve the desired practice. Each report also contains a case study, which explores a real scenario captured during the KL2 study, to illustrate the behaviour.

The other 6 chapters can be found here:

- [Not washing hands with soap after touching meat, fish and poultry](#)
- [Reusing a tea towel or cloth for multiple purposes](#)
- [Storing chilled foods at incorrect temperatures](#)
- [Not reheating leftovers until steaming hot throughout](#)
- [Not checking use-by dates and consuming foods past use-by dates](#)
- [The creation of food waste](#)

Key insights across all 7 reports are available via the main [Kitchen Life 2 webpage](#).

Further details about why these behaviours were selected as the focus for KL2 reports is provided in the [Technical Report](#).

## Summary

Kitchen Life 2 explored meal occasions that involved the preparation of both raw and cooked meat, fish and poultry (MFP). Where quantitative data from filming is reported (where video footage has been coded and counted), the results include both cooked and raw MFP. In qualitative elements of the study (case studies, behavioural analysis) the results focus purely on raw MFP. “Raw” or “raw/cooked” are clearly stated throughout this chapter.

In households, there were 140 meal occasions that involved the use of a chopping board to prepare meat, fish and poultry (MFP) (raw/cooked). Of these, a fifth (28) involved the chopping board being washed with detergent during the meal occasion, with the same number (28) involving the chopping board being washed with water only. There was often a considerable time gap (in certain instances overnight) between households preparing MFP (raw/cooked) on a chopping board and washing the chopping board. Consequently, it was not possible to always observe whether or when a chopping board was washed.

For food business operators (FBOs), there were 131 meal occasions that involved the use of a chopping board to prepare MFP (raw/cooked). Of these, a sixth (21) involved the chopping board being washed with detergent during the meal occasion, with a third (38) involving the chopping board being washed with water only. In interviews, FBOs claimed to remove chopping boards from the filming area after use and wash the chopping board in a dishwasher (though this could not be observed).

The reuse of an unclean chopping board that had been used to prepare MFP (raw/cooked) and then to chop any other food group was observed on 25 occasions in FBOs and 25 occasions in households. However, its reuse to prepare foods that do not require cooking (such as salads) were not commonly observed.

Additionally, a range of kitchen items were often placed on unclean chopping boards after their use. This included plates, saucepans and utensils. Cross-contamination risks may result from this contact.

Reusing the same chopping board for raw meat, fish and poultry (MFP) and other foods can present a significant risk of microbiological cross-contamination if the chopping board is not thoroughly washed between uses.

Overall, the key influences affecting whether households reused a chopping board after preparing raw MFP included:

- **whether the sink was cluttered** with other items, preventing the chopping board being washed. This was an enabler of reusing chopping board without

it being thoroughly cleaned (Physical Opportunity).

- having **permissive social norms** on leaving washing up until a later time, which enabled the reuse of the chopping board (Social Opportunity).

These were reinforced by the following contextual factors<sup>1</sup>:

- **beliefs about the consequences of foodborne illness** arising from not washing a chopping board. This was both an enabler and a barrier to reusing a chopping board (Reflective Motivation).
- **being distracted while cooking or tired when cleaning**, which enabled the reuse of a chopping board (Automatic motivation).

Overall, the key influences affecting whether FBOs reused chopping boards after preparing raw MFP included:

- **the use of chopping boards dedicated solely to the preparation of raw MFP**, which enabled their reuse (Physical opportunity).
- varied understanding of the need to **thoroughly wash and disinfect chopping boards before and after use** when preparing raw MFP, which was both a barrier and enabler to reusing a chopping board (Psychological capability).

These were reinforced by the following contextual factors<sup>2</sup>:

- **beliefs about cross-contamination risks** associated with chopping boards used only for raw MFP, which were commonly wiped down with cloths rather than washed between uses. This acted to enable the reuse of a chopping board without thorough washing (Reflective motivation).
- **staff not being conscious of how chopping boards were used after preparing raw MFP**. This increased the likelihood of other items being placed upon them, and was an enabler of reuse (Automatic motivation).

### **Behaviours to target for potential interventions**

In both households and FBOs, the desired practice (that is, the behaviour that households and FBOs should do to improve food safety) is to **immediately and thoroughly wash chopping boards after preparing raw MFP with a detergent**.

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<sup>1</sup> These factors are not in a hierarchy of importance.

<sup>2</sup> These factors are not in a hierarchy of importance.

In households, enabling the washing of a chopping board immediately after handwashing when preparing raw MFP could be an area of focus for future interventions research. Specifically, the intervention could reframe the preparation of raw MFP as a single task, with behaviours for effective handwashing and thoroughly washing a chopping board undertaken immediately after this. Clustering handwashing and chopping board cleaning behaviours makes them easier to remember and perform. Immediate cleaning also manages the risk and prevents reuse (by removing the chopping board from the worksurface).

In FBOs, enabling the washing of chopping boards in a dishwasher immediately after use would be an area of focus for behavioural interventions because dishwasher use was a common occurrence in FBOs. The use of the dishwasher is optimal for managing cross-contamination risk, as it prevents reuse (again by removing the chopping board from the worksurface) and promotes prompt washing. Enabling businesses to invest in more than one red or blue board would be needed to ensure chopping boards could be regularly washed. The use of dishwashers could also be considered in households, but as KL2 did not explore the barriers and enablers of dishwasher use in households, further research would be required as households were more likely than FBOs to use wooden chopping boards (which may not be suitable for dishwasher use).

# Background

Reusing the same chopping board for raw MFP and other foods can present significant risks for microbiological cross-contamination if the board is not thoroughly washed between uses<sup>3</sup>. The [literature review](#) conducted as part of the Kitchen Life 2 (KL2) project explored behaviours around the use of chopping boards in households and FBOs.

The literature review found that 50% of households reported that they did not use or rarely used a designated chopping board for the preparation of raw meat<sup>4</sup>. Where only one chopping board was used, it frequently was not properly decontaminated, in terms of washing with a detergent and drying<sup>5</sup>. In a study on microbial contamination in FBO kitchens, chopping boards were found to have the highest microbial load compared to other surfaces in the kitchen<sup>6</sup>. Additionally, this study identified that there was limited separation of chopping boards between meat and vegetable preparation.

In the KL2 study, using the same chopping boards for MFP and other foods was one of the highest risks identified by the FSA risk assessment team. During KL2 observations, chopping boards were used in a variety of ways that could increase the risk of cross-contamination (beyond using them for other foods). Consequently, the reuse of a chopping board without washing after preparing MFP was selected as a priority behaviour to explore in depth.

This chapter uses the KL2 data to understand practices around the reuse of chopping boards after preparing MFP, the factors affecting this and identifies behaviours that could be the focus of future behavioural interventions research.

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<sup>3</sup> Mylius SD, Nauta MJ and Havelaar AH. 'Cross-contamination during food preparation: a mechanistic model applied to chicken-borne campylobacter' Risk Analysis 2007: volume 27(4), pages 803–813

<sup>4</sup> Ammann J, Siegrist M and Hartmann C. 'The influence of disgust sensitivity on self-reported food hygiene behaviour' Food Control 2019: volume 102, pages 131–138

<sup>5</sup> Evans EW and Redmond EC. 'Behavioral observation and microbiological analysis of older adult consumers' cross-contamination practices in a model domestic kitchen' Journal of Food Protection 2018: volume 81(4), pages 569–581

<sup>6</sup> Duthoo E, Krings S, Daube G, Leroy F, Taminiiau B, Heyndrickx M and De Reu K. 'Monitoring of hygiene in institutional kitchens in Belgium' Journal of Food Protection: volume 83(2), pages 305–314

# FSA guidance on using chopping boards

FSA guidance on the [safe use of chopping boards for households](#) highlights the need to use different chopping boards for raw and cooked food and to wash chopping boards thoroughly between tasks. [Guidance for households on cleaning chopping boards](#) explains the need to wash the board with warm, soapy water; with the lather and physical motion used to detach the bacteria from the surface of the board.

FSA [guidance for FBOs on avoiding cross-contamination](#) from chopping boards includes the need to clean and disinfect chopping boards before and after raw food preparation. Additionally, guidance in '[Safer Food, Better Business](#)' (separate guidance is available to [FBOs in Northern Ireland](#)) highlights the need to use dedicated colour-coded chopping boards and utensils for raw versus other foods. Additionally, it is advised to prepare raw foods in separate areas of the kitchen where possible, and where not possible, to separate them by preparing them at different times.



# Kitchen Life 2: Findings for households

This section of the report presents quantitative and qualitative findings from households during the KL2 study. Where “MFP” is referred to in quantitative findings from filming (where behaviours have been coded and counted, based on video footage) this includes both raw and cooked MFP, and this is stated clearly. Qualitative findings, based on reviewing individual sections of footage for behavioural analysis (such as case studies) and interviews are specific to raw MFP only, and “raw” is clearly stated. Findings from a survey conducted with households are also included.

Further information about the coding of raw and cooked MFP is available in [the KL2 technical report](#).

## Quantitative observations from filming

In the sample of 70 households, the vast majority (69 households) prepared MFP (raw/cooked) on at least one meal occasion. Specifically, there were 308 meal occasions that involved using MFP (raw/cooked), of which 140 involved a chopping board<sup>7 8</sup>.

Of the 140 meal occasions that involved the use of a chopping board to prepare MFP (raw/cooked)<sup>9</sup>:

- 20% (28 occasions) involved the board being washed with detergent at some point during the meal occasion<sup>10</sup>
- 20% (28 occasions) involved the board being washed with water only at some

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<sup>7</sup> Several households had more than one chopping board.

<sup>8</sup> While a detailed analysis of factors affecting the use of different chopping boards is not the subject of this chapter, their use is noted where it provides relevant context.

<sup>9</sup> Where a chopping board was not involved, participants cooked the cuts of MFP whole. This included the cooking of pre-prepared raw meats, such as breaded chicken. On a small number of occasions, some participants also reported chopping MFP in the food packaging or directly in their hand, rather than use a chopping board; some of these occasions are explored in this chapter.

<sup>10</sup> It was not possible to establish the duration of washing. Coded data only shows the duration of the whole washing up event, rather than the duration of washing a chopping board specifically.

point during the meal occasion

- 14% (20 occasions) involved no kitchen item (including a chopping board) being washed within 45 minutes from the beginning of the meal occasion<sup>11</sup>.

There was often a considerable time gap (in certain instances overnight) between households preparing MFP (raw/cooked) on a chopping board and the chopping board being washed. As analysis of filmed footage was not always undertaken on consecutive days, it was not possible to track whether or when all chopping boards were washed.

While the reuse of the same chopping board for raw and foods that do not require cooking (such as salads) without washing the chopping board was not often observed, placing other items on the board without the chopping board being cleaned was more common – this included kitchen utensils, pots and pans, and plates. This reuse of a chopping board presented a risk of cross-contamination.

A statistical analysis was undertaken of occasions where a chopping board was used but not observed to be washed with or without detergent. In households, this was:

- most likely to occur on a Sunday from 2–8pm, as meat was more likely to be prepared and cooked on this day
- correlated<sup>12</sup> with not washing hands after preparing MFP (raw/cooked) ( $r=0.489$ ). This means that participants who did not wash chopping boards, were significantly more likely to also not wash their hands after preparing MFP (raw/cooked).

## Factors influencing reusing a chopping board after preparing raw MFP in households

### Summary

Overall, the factors that influenced whether households reused a chopping board after prepping raw MFP without washing it included whether the sink was cluttered, being distracted while cooking, or tired when cleaning, and having permissive social

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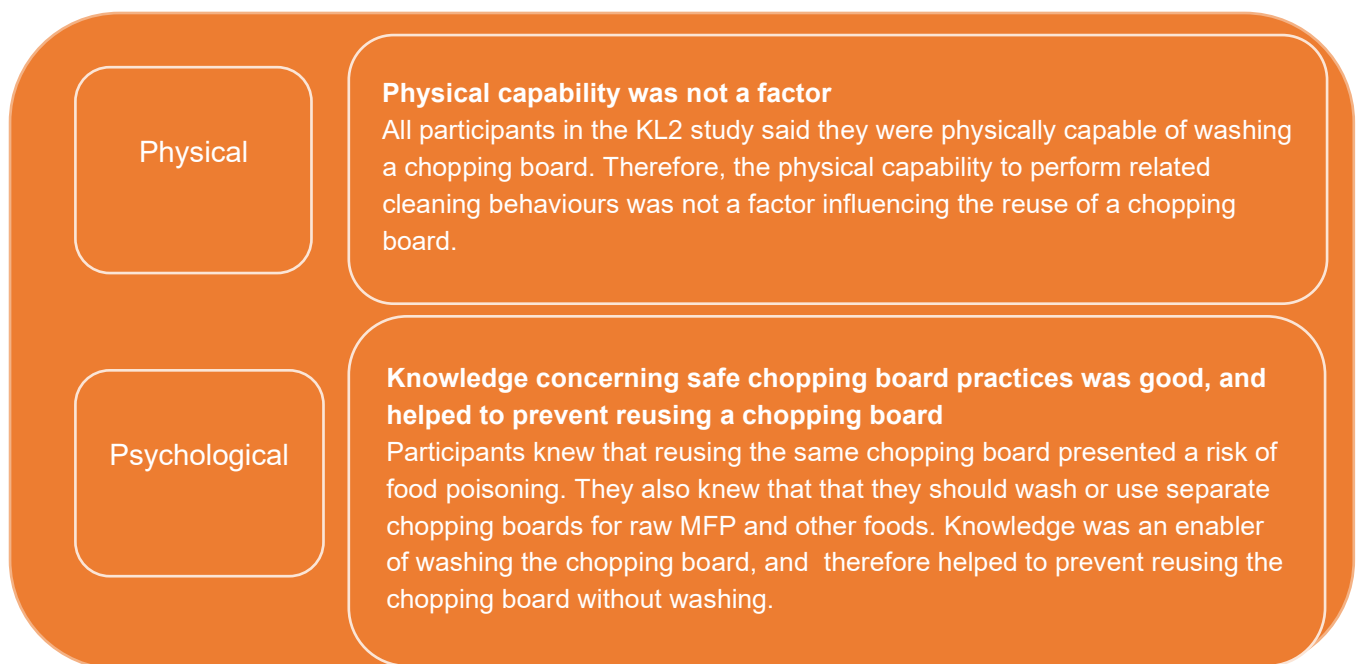
<sup>11</sup> It was not possible to establish the duration between a chopping board being used and washed.

<sup>12</sup> Pearson correlation, whether a behaviour is ever observed. Correlations only focus on the seven behaviours explored in depth in this study.

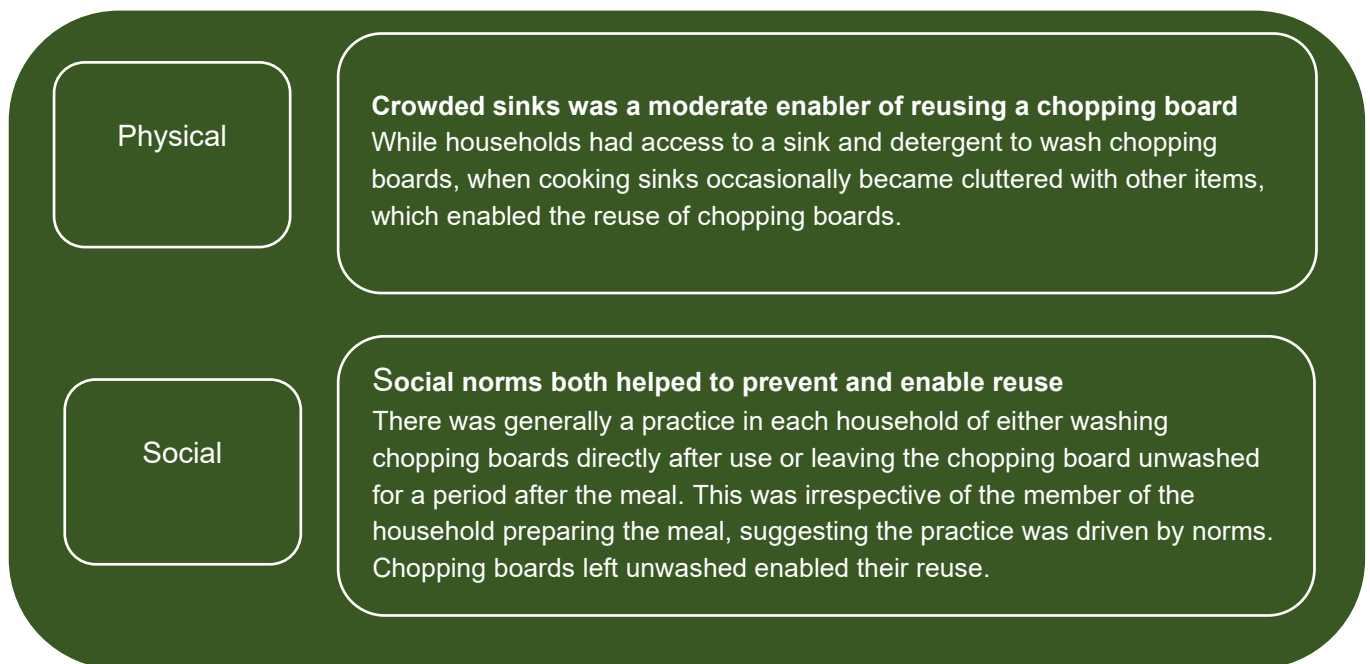
norms around leaving washing up until a later time. The behaviour was enabled in a few households by beliefs about the limited consequences of foodborne illness arising from not washing a chopping board. A summary of COM-B factors is shown in figure 1.

**Figure 1. Summary of COM-B factors influencing the reuse of a chopping board after preparing raw MFP in households**

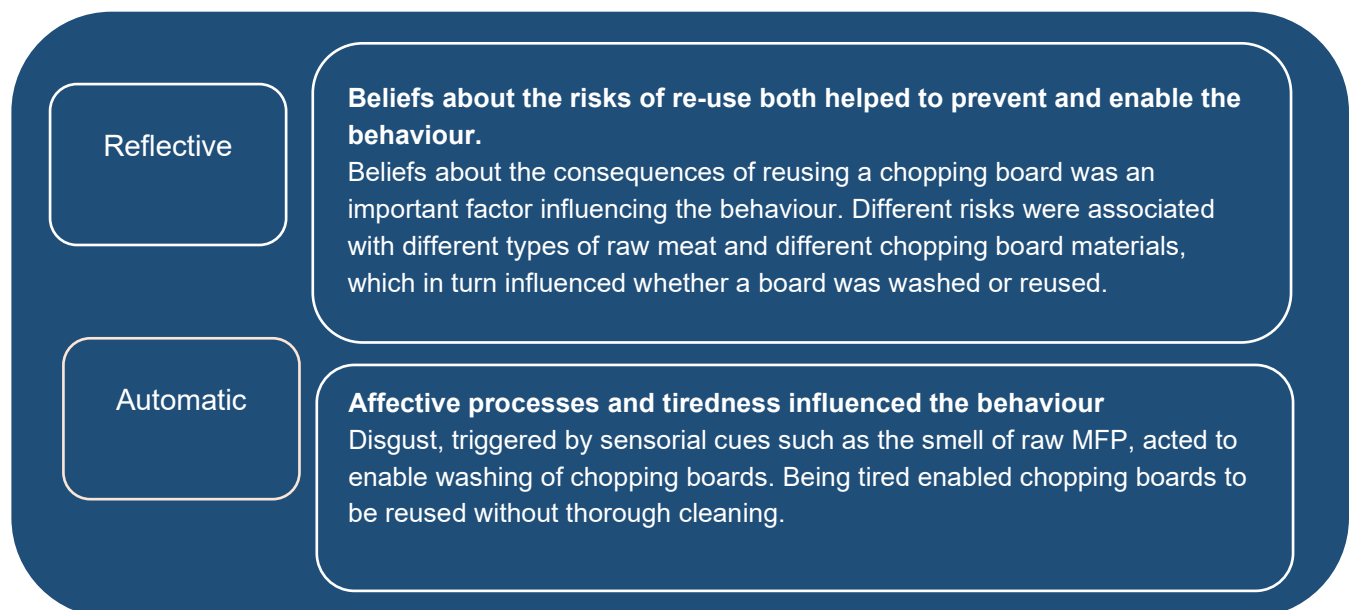
### Capability



## Opportunity



## Motivation



## Detailed findings

### Physical capability

The physical capability to perform cleaning or related behaviours such as changing a dirty chopping board were not factors influencing the reuse of a chopping board. All participants in the KL2 study said they were physically capable of washing a

chopping board or replacing a board. While skin conditions were noted as an issue for certain participants in terms of washing hands with soap, this was not specifically raised as a barrier to washing chopping boards.

### **Psychological capability**

Household participants had a good understanding of the risks of reusing a chopping board after preparing raw MFP, and how to clean a chopping board. Consequently, psychological capability was an enabler of washing chopping boards, and therefore helped to prevent reusing the chopping board without washing.

Interview participants noted the need to clean chopping boards using hot water and detergent and to scrub the board. While dishwashers were present in several households (see physical opportunity) most chopping boards were washed by hand.

### **Physical opportunity**

Physical opportunity had a moderate influence on when households washed a chopping board after preparing raw MFP, which in turn enabled their reuse.

All household kitchens had sinks and washing-up liquid and, while many households also had dishwashers, most participants washed chopping boards by hand.

Sinks were observed to become cluttered with pans and utensils during cooking, which may have influenced the ability to wash a chopping board after use, as there was physically less space in the sink to wash the chopping boards effectively. Therefore, unwashed chopping boards were either left in the sink, or left on the countertop. For chopping boards left out, it was common for other items (such as saucepans, plates or cutlery) to be placed on the chopping board during the cooking process, presenting a risk of cross-contamination.

While several households reported having more than one chopping board, the practice of using a dedicated board to only prepare raw MFP was very limited. In interviews, one of the main reasons given for not using different chopping boards for specific purposes was related to convenience and ease. In short, it was easier to wash and/or reuse the same board rather than fetch another.

‘So I try and use, you know, the separate chopping boards. Though if I’m being perfectly honest... Like, I’m chopping a lot of stuff. I used the chopping board... I’ll chop the chicken, you know, and I’ll do it. And I’ll just wash that chopping board. And then just use it again. Say for the vegetables.’

Male, 26–40 years, Black, socio-economic group C2DE, lives alone

### **Social opportunity**

Social opportunity was both a barrier and an enabler of chopping board reuse. Social norms around cleaning were particularly influential. Households were observed to fall into two groups: those that commonly washed chopping boards after use (either while the meal was cooking or immediately after the meal) and those that would leave the washing up until a later time. This was irrespective of the individual household member preparing the meal, suggesting a social influence. In interviews, the group of households who left washing up until a later time were less concerned about the 'hygienic look' of the kitchen.

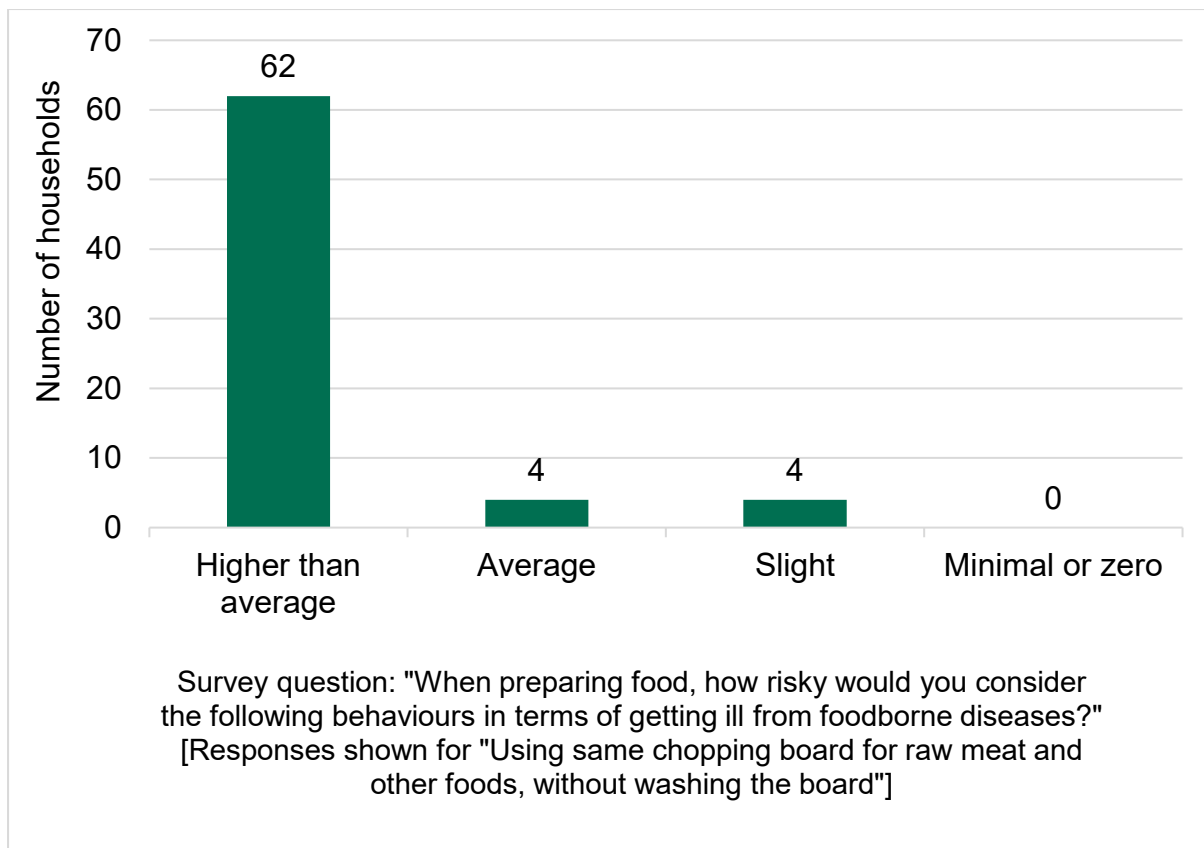
Despite these broad social norms, participants were not observed to discuss chopping board reuse. Most raw MFP preparation was undertaken by someone alone in the kitchen, limiting the scope for discussion. Where another person was present in the kitchen, such discussions were not observed. Similarly, discussions concerning the washing of a chopping board, or the use of separate chopping boards, were also not observed.

### **Reflective motivation**

Reflective motivation was an important influence on the reuse of chopping boards, acting both as an enabler of the behaviour and also discouraging the reuse of chopping boards.

In the survey, 9 in 10 household participants (62 out of 70) identified a higher-than-average risk of getting a foodborne disease from reusing chopping boards after preparing raw MFP, whilst 4 said there was an 'average risk' and 4 said there was a 'slight' risk (see figure 2).

**Figure 2. Understanding of risks concerning the reuse of a chopping board in households (base size =70)**



Overall from the interviews, chopping boards were commonly identified by participants as one of the main kitchen items that posed a risk of microbiological cross-contamination – with chopping boards associated with being a ‘breeding ground for germs’.

‘Chopping boards are hotbeds of germs if not cleaned.’

Male, 41–60 years, White, socio-economic group ABC1, lives alone

However, specifically from the interviews, participants broadly fell into one of 3 groups:

- participants who were very concerned about risks arising from not thoroughly cleaning a board after preparing raw MFP.
- participants who were moderately concerned, with greater concern expressed about the risk to children rather than themselves.
- participants who saw little risk of getting ill from reusing a chopping board without thorough cleaning.

The beliefs about the consequences of not thoroughly cleaning a chopping board

were especially influential to the way participants were categorised.

One reason the survey results are notably different from the interview results is that often in self-report questionnaires response bias is present, in which participants have a tendency to answer questions in a way that presents themselves as knowledgeable or sociably acceptable, even if this does not match their behaviour.

In the interviews participants who were very concerned about the consequences of foodborne illness arising from not cleaning a chopping board after preparing raw MFP were a small but notable group in the sample. In interviews, these participants claimed they would very thoroughly clean a board immediately after use. Participants were observed to clean and disinfect the chopping boards, including by using antibacterial sprays and boiling water. This group were not observed to reuse the chopping board. Additionally, a few participants also mentioned avoiding the use of chopping boards altogether when preparing raw meat, due to cross-contamination concerns. Rather, participants would chop MFP in the food packaging or directly in their hand, rather than use a chopping board.

‘I don’t chop meat on the chopping board. I just kind of hold it and cut it. I’ve only got one board.’

Female, 41–60 years, Black, socio-economic group C2DE, lives with friends

Participants who were moderately concerned often expressed beliefs about the likelihood of illness for children (especially) or others in the household arising from the reuse of chopping boards, rather than themselves. This risk was seen to emerge from poor cleaning practices, and in interviews these participants said they made a conscious effort to wash the board after use (though this was not always observed, due to factors such as tiredness, discussed below). This group would occasionally reuse a chopping board.

Participants who saw less risk of getting ill from not thoroughly cleaning chopping boards were a small but notable group in the sample. Specifically, they believed the risk was minor compared with consuming undercooked meats, meaning it was ‘not vital’ to wash the board. In a few instances, participants believed that they were unlikely to get ill as they had a ‘strong constitution’ or that ‘germs’ on chopping boards were a good way of building immunity. This group would commonly reuse a chopping board.

‘I would chop the veg on the same chopping board as the meat, I’ve got absolutely no qualms about it. I have an extremely strong constitution.’



Female, 26–40 years, White, socio-economic group ABC1, lives with friends

In addition to beliefs about the need to thoroughly wash a chopping board, there were different beliefs about risks resulting from preparing different meats, which influenced the reuse of a chopping board. White meats (especially chicken) were thought to pose the highest risk, followed by red meats and then fish. In a few instances, the perceived need to clean the chopping board was seen as proportionate to this risk from different foods.

‘Chicken and turkey and pork are the scary meats – if any of them touched a chopping board, I would wash it more vigorously than if it had touched other meat.’

Male, 41–60 years, White, socio-economic group C2DE, lives with partner

There were also different beliefs about the consequences of foodborne illness arising from chopping boards made of different materials. Generally, wooden chopping boards were seen as posing a greater risk for cross-contamination (‘as they are porous to meat juices’). Whereas plastic chopping boards were cited by participants as being relatively hygienic compared to wooden chopping boards. One participant mentioned that scratches on the surface of glass chopping boards were a potential area for germs to harbour on. Due to limitations in how observational data was coded (which did not include the material of the board) it was not possible to establish the influence of these beliefs on chopping board reuse.

### **Automatic motivation**

Automatic motivation, specifically affective processes such as disgust, encouraged washing and acted as a barrier to the reuse of chopping boards without cleaning. Whereas emotional factors such as tiredness prevented chopping boards being cleaned immediately or effectively, and acted as an enabler of chopping board reuse.

In terms of affective processes such as disgust, visual signs such as blood and gristle or sensorial cues such as the smell of fish on a chopping board were claimed in interviews to prompt the boards to be washed. Visible stains also prevented the reuse of chopping boards. Such sensorial cues were cited less frequently than the ‘ickiness and hand feel’ that prompted [handwashing behaviour](#).

In terms of emotional factors, participants were often tired and ‘running on autopilot’ when doing the cleaning up, and in such instances participants were observed to

wash chopping boards quickly and not very thoroughly, if at all. This implies tiredness is a barrier to washing the chopping board thoroughly with detergent. Tiredness also meant that washing up was left until the following day. Tiredness enabled the reuse of chopping boards without thorough washing.

‘If I’m rushing with the dishes, sometimes I wash it. But sometimes I don’t. I know I should wash the board when it’s had chicken on it and stuff. But I don’t.’

Female, 26–40 years, White, socio-economic group C2DE, lives family

## Case study

### Reusing a chopping board after preparing raw MFP in households

**Name:** Stephen

**Age group:** 18–25 years

**Household composition:** Lives with a friend, no children

Stephen lives in London with his flatmate Sam. Stephen has several jobs, is quite busy and doesn’t have many set routines. He describes himself as ‘loyal, entertaining and loud’ and his life as a ‘madness wagon’. Stephen and Sam like to entertain and often have friends around to the house. Stephen likes to have variety in his diet and will generally plan a few different meals. He is particularly fond of a traditional Sunday roast and will try to cook one at least a couple of times a month.

Stephen tries to keep on top of cleaning the kitchen and says both he and Sam are generally ‘pretty good’ at cleaning up quickly after a meal. They also have ‘cleaning days’ where the kitchen is given a more thorough scrub. Stephen has a good understanding of food hygiene and says that it is important to wash hands, as well as to wash chopping boards and knives, when preparing raw meats.

Stephen’s kitchen is small and rectangular. There is easy access to a sink and washing-up liquid, and there is a small area of counter space where food is chopped.

On one occasion, Stephen is entertaining friends and preparing a meal for them. He chops raw chicken on a wooden chopping board. After he finishes chopping the chicken, he puts it into a dish and places the dish in the oven. He then places the chopping board and spatula into the sink but does not clean them. Although others are not in the kitchen, Stephen talks to people through the door. He then

washes his hands with hand soap and leaves the kitchen while the chicken cooks in the oven.

About 20 minutes later, he comes back into the kitchen and removes the unwashed board from the sink, placing it onto the drainage area. He then places a clean pan on top of the chopping board. After using the pan to cook, he moves the board across to the other side of the kitchen, putting dinner plates for serving onto the unwashed board.

About 40 minutes after finishing the meal, Sam comes in to do the washing up. He washes the wooden board for less than a minute with hot water, detergent and a sponge (which is also used to clean plates). He first uses a sponge before selecting a small scourer to remove the chicken flesh from the wooden board. The sponge and scourer used to clean the chopping board are also used to wash other items. They are not observed to be cleaned after use.

### **Analysis of Stephen's behaviour**

The influences on Stephen's behaviour primarily concern automatic motivation and physical opportunity, with both factors enabling the reuse of the board. While Stephen understands it is very important to clean chopping boards thoroughly after preparing raw meats due to the risk of food poisoning (psychological capability), he is distracted by friends when cooking, does not seem conscious of this risk in the moment, or attentive to the previous uses of the chopping board (automatic motivation). A lack of counter space results in placing items on top of the unwashed chopping board (physical opportunity). Cleaning is undertaken by Stephen's flatmate (social opportunity), which is a barrier to Stephen washing the board immediately after use.

## **Identifying behaviours for interventions (households)**

In reviewing the KL2 findings, generally participants were not reusing a board to chop vegetables or other foods that do not require cooking (such as salads) after preparing meat (though this was occasionally observed). Instead, a notable risk of cross-contamination in households was from chopping boards not being cleaned thoroughly after use, and having a variety of other non-food items placed upon them.

After KL2 fieldwork was completed, a workshop was held with experts in food hygiene and the behavioural sciences to discuss the COM-B influences on each of the KL2 priority behaviours. In the workshop, experts discussed the findings from KL2 to explore the 'problem behaviours' that occurred in kitchens and then

considered the 'desired practice'; that is, the behaviour that households and FBOs should do to improve food safety. In this case, the desired practice is for individuals in households to **immediately and thoroughly wash chopping boards after preparing raw MFP**.

Once the 'desired practice' was established, the workshop then explored the specific behaviours to target, in order to encourage the desired practice. Each of these specific behaviours is explored in more detail below. It should be noted that the workshop was not designed to explore behavioural interventions, as this was outside of the scope of KL2. These specific target behaviours could be used in future research, for the development of behavioural interventions.

### **Specific behaviours to target to achieve the desired practice:**

#### **1) Enabling people to immediately and thoroughly wash chopping boards after preparing raw MFP**

- KL2 observations show participants were commonly distracted when preparing a meal, and (when attentive) were more focused on cooking, rather than cleaning behaviours. These automatic motivation factors make new cleaning behaviours hard to establish.
- The potential to reuse an unwashed chopping board results from it not being washed immediately after use. Interventions therefore need to focus on the timing, as well as the practice of washing.
- Experts in the workshop believed that linking the washing of a chopping board to interventions that enable handwashing behaviours after the preparation of raw MFP could be effective. Specifically, undertaking these cleaning behaviours at the same time makes them easier to remember and perform as one task.
- The intervention would also benefit from leveraging sensorial cues associated with the need to wash hands after prepping raw MFP, which were motivating and salient for participants.
- Consequently, interventions that reframe the preparation of raw MFP as a single task, with behaviours for effective handwashing and thoroughly washing a chopping board undertaken immediately afterwards, should be a focus for the FSA.

#### **2) Placing chopping boards into a dishwasher immediately after use**

- Due to limitations in how data was coded, it was not possible to verify how frequently households used a dishwasher to wash a chopping board. However, many observations involved the washing of chopping boards by hand, even where dishwashers were present in the household.
- While interventions to enable the placing of chopping boards into a dishwasher immediately after use potentially could be effective, there is no evidence from the KL2 data concerning potential barriers to this practice. One hypothesis is that participants may believe wooden chopping boards, which were commonly used by households, may not be seen as suitable to clean in a dishwasher, as the heat and water will damage the board.
- It is recommended the FSA undertakes more research to understand barriers and enablers to cleaning chopping boards in a dishwasher.

### 3) **Using different chopping boards for MFP and other foods**

- While several households in the sample had more than one chopping board, KL2 observations showed that they were seldom used for a dedicated purpose. This was due to participants being busy and distracted, and the convenience of reusing the same board.
- Moreover, observations showed that cross-contamination risks emerged from participants placing items on an unwashed chopping board, rather than using a chopping board for raw MFP and other foods.
- Based on this evidence, enabling the use of different boards was not only a challenging behaviour to maintain, but also ineffective at managing the risk from an unwashed board.
- As a result, the FSA should not consider this behaviour as a priority for future interventions research.

### 4) **Chopping vegetables and foods that do not require cooking (such as salads) before raw MFP**

- Several participants claimed (during KL2 interviews) to prepare vegetables and foods that do not require cooking (such as salads) on a chopping board before preparing raw MFP.

- In practice, KL2 evidence showed preparation to be less organised, comprising multiple preparation behaviours, with participants often distracted during these moments. This could occasionally lead to participants chopping other ingredients after raw MFP was prepared.
- As noted above, cross-contamination risks also emerged from participants placing items on an unwashed chopping board, rather than using a chopping board for raw MFP and other foods.
- Based on this evidence, enabling the use of the same chopping board at separate times was a challenging behaviour to maintain, and ineffective at managing the risk from an unwashed chopping board.
- As a result, the FSA should not consider this behaviour a priority for future intervention research.

## Kitchen Life 2: Findings for FBOs

This section of the report presents quantitative and qualitative findings from filming in FBOs during the KL2 study. Where “MFP” is referred to in quantitative findings from filming (where behaviours have been coded and counted, based on video footage) this includes both raw and cooked MFP, and this is stated clearly. Qualitative findings, based on reviewing individual sections of footage for behavioural analysis (such as case studies) and interviews are specific to raw MFP only, and “raw” is clearly stated. Findings from a survey conducted with FBOs are also included.

Further information about the coding of raw and cooked MFP is available in [the KL2 technical report](#).

### Quantitative observations from filming

In the sample of 31 FBOs, the vast majority (29 FBOs) prepared MFP (raw/cooked) on at least one meal occasion. Specifically, there were 180 meal occasions that involved using MFP (raw/cooked), of which 131 involved a chopping board<sup>13</sup>.

Of the 131 occasions that involved the use of a chopping board to chop MFP (raw/cooked):

- 16% (21 occasions) involved the board being washed with detergent at some point during the occasion<sup>14</sup>
- 29% (38 occasions) involved the board being washed with water only at some point during the occasion.
- 7% (10 occasions) involved no kitchen item (including a chopping board) being washed within 45 minutes from the beginning of the meal occasion<sup>15</sup>.

Businesses often removed chopping boards from the filming area after use and reported they were sent for washing in a dishwasher. It was not possible to verify this.

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<sup>13</sup> Other occasions involved cuts of the meat or fish being prepared whole without chopping.

<sup>14</sup> Coded data only shows the duration of the whole washing up event, rather than the duration of washing a chopping board specifically.

<sup>15</sup> It was not possible to establish the duration between a chopping board being used and washed.

While reuse of the chopping board to prepare foods that do not require cooking (such as salads) after chopping raw MFP was infrequently observed, placing clean items such as saucepans and utensils on an unwashed chopping board was more common.

A statistical analysis was undertaken of occasions where a chopping board was used but not observed to be washed with or without detergent. These occasions were not statistically correlated to a time of day or firmographic characteristics.

However, the occasions were correlated<sup>16</sup> with:

- not washing hands with soap after preparing MFP (raw/cooked) ( $r=0.628$ ),
- storing food at an incorrect temperature ( $r=0.354$ ) – it is unclear why this may be the case, and the correlation may be an artefact, or there may be clusters of unhygienic behaviour occurrences of which these are two.

## Factors influencing reusing a chopping board after preparing raw MFP in FBOs

### Summary

Overall, the factors affecting the reuse of a chopping board in FBOs concerned the presence of chopping boards used solely for preparing raw MFP, and the risks associated with these chopping boards, which were commonly wiped down with a cloth rather than washed between uses. Additionally, participants were commonly distracted or busy after using the chopping board, which also increased the likelihood of items being placed upon them.

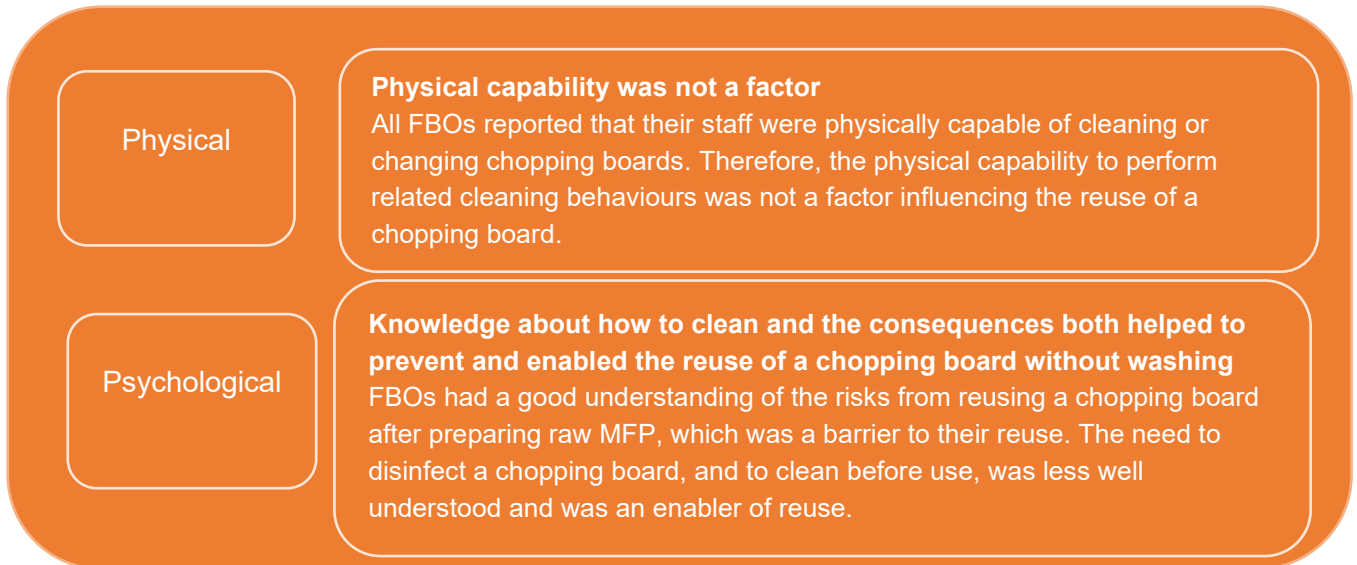
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<sup>16</sup> Pearson correlation, whether a behaviour is ever observed. Correlations only focus on the seven behaviours explored in depth in this study.



**Figure 3. Summary of COM-B factors influencing the reuse of a chopping board after preparing raw MFP in FBOs**

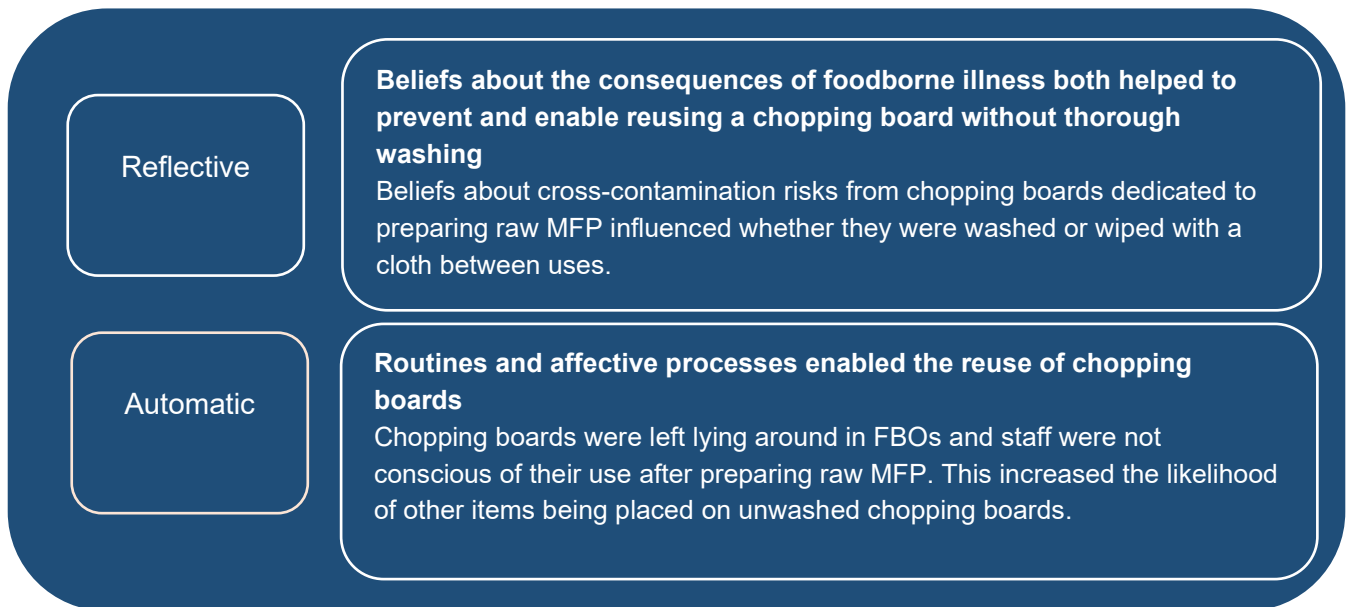
**Capability**



**Opportunity**



## Motivation



## Detailed findings

### Physical capability

All FBOs reported that their staff were physically capable of cleaning or changing chopping boards, so this was not a factor driving their reuse. Many businesses reported in interviews that chopping boards were washed at high temperatures in dishwashers so there was no need for staff to wash chopping boards by hand (the use of dishwashers often took place out of the field of view of the camera, so it is not possible to verify this claim). Skin conditions were not cited as a factor preventing the washing of chopping boards.

### Psychological capability

Interviews conducted during KL2 indicate that FBO participants had a good understanding of the risks from reusing a chopping board after preparing raw MFP. However, there were gaps in knowledge concerning the need to disinfect a chopping board between uses, plus the need to clean and disinfect before use (as per [FSA guidance](#)). Consequently, when knowledge was high it helped to prevent chopping board reuse but gaps in knowledge enabled the behaviour.

In terms of cleaning and separation behaviours, KL2 interviews indicated that FBOs also had a good understanding of the need to use separate chopping boards and/or to clean the chopping board between uses to reduce the risk of cross-contamination and foodborne disease. However, knowledge about the need to clean a chopping

board before it was used to prepare raw MFP was not mentioned in interviews or observed in practice. Participants also did not routinely mention the need to disinfect a chopping board before starting preparation. These mixed levels of knowledge about effective cleaning practices had the potential to enable the reuse of a chopping board without thorough washing.

While not common, one FBO that used the same board for both raw and other foods did not understand the need to prepare raw MFP after other foods. A lack of knowledge about how to prepare food safely enabled chopping board reuse in this instance.

‘You have to do the jobs one by one. But I try to plan my prep days to either get all my meat done first and then the veg, or I’ll do it the other way around, so I would prepare the veg, then my next job would be chicken. So it’s either the first or last job but never in between.’

Catering business, fewer than 5 staff, FHRS rating: 0–3

### **Physical opportunity**

Most businesses said they had dedicated chopping boards for preparing raw MFP (with separate boards for preparing other foods). Colour-coding was common, with red coloured chopping boards typically used for meat/poultry, blue chopping boards typically used for fish, and a range of other colours for other foods.

The availability of chopping boards dedicated for specific food groups, such as raw MFP, minimised the risk of cross-contamination as staff has access to different boards for different food types.

‘We have different coloured chopping boards. If I’m cutting meat, I also have a separate workspace for doing meat work. We have got a separate knife, separate chopping board. So there’s no chance of contamination or anything.’

Indian restaurant, fewer than 5 staff, FHRS rating: 0–3

However, as there were lots of chopping boards available in the kitchen, they were often left on countertops, increasing the likelihood of reuse in terms of utensils being placed on an unwashed board. It was common for chopping boards dedicated to preparing raw MFP to be wiped with a cloth between uses, rather than thoroughly washed and disinfected. This increased the physical opportunity for unwashed chopping boards to have other items placed upon them.

In terms of washing opportunities, all businesses had easy access to a sink with detergent or a dishwasher, and these were generally not limiting factors, though the distance to the sink varied and the route could be obstructed by large items such as a table.

Time to clean the chopping boards was generally not cited as a barrier by FBOs during interviews. However, for smaller businesses, especially where one or two individuals would be responsible for all kitchen tasks, chopping boards would only get cleaned during lulls in busy periods and would occasionally be left until the following day.

‘We don’t have a cleaning routine to be honest. If you saw Fridays you’d see just how crazy busy they are. So it just gets done as and when we have a breather.’

Café, fewer than 5 staff, FHRS rating: 4–5

More commonly, preparing meats and fish was done earlier in the day rather than during the busiest periods, and it was claimed that chopping boards were washed at this time (in observations, chopping boards were most commonly washed from 10–11am, which supports this claim). Having financial resources to buy separate chopping boards was not cited as a barrier by FBOs.

### **Social opportunity**

The culture in FBOs was an important factor shaping how and whether chopping boards were reused without washing after preparing raw MFP.

During interviews, many businesses said they had clear food hygiene protocols in place for chopping boards. This was intended to set expectations for kitchen practice and reinforce the importance of not reusing chopping boards for raw versus other foods. Several businesses mentioned ‘hazard analysis and critical control point’ (HACCP) plans in this context. The increasing importance of managing allergen cross-contact in kitchens was also mentioned as influencing the dedicated use of chopping boards and the need to clean the board thoroughly afterwards, limiting their reuse.

FBOs without protocols for the use and cleaning of chopping boards included businesses that did not commonly prepare raw MFP and businesses that had multiple wooden chopping boards that were not colour-coded. These businesses tended to have less strict rules on chopping-board reuse.

‘So we’ve obviously got the coloured chopping boards for, you know, legally speaking, for the fish and the meat and the

vegetables. But to be honest, we don't really use raw meats, and we don't use raw fish. And so really, the chopping boards are used for buttering the bread. And then when they become too crummy they go in the dishwasher. And I use them as a protection on top of the sandwich station so that you can chop things without damaging the surface too much. So we don't stick to the colours. We just use them as we need them.'

Café, fewer than 5 staff, FHRs rating: 4–5

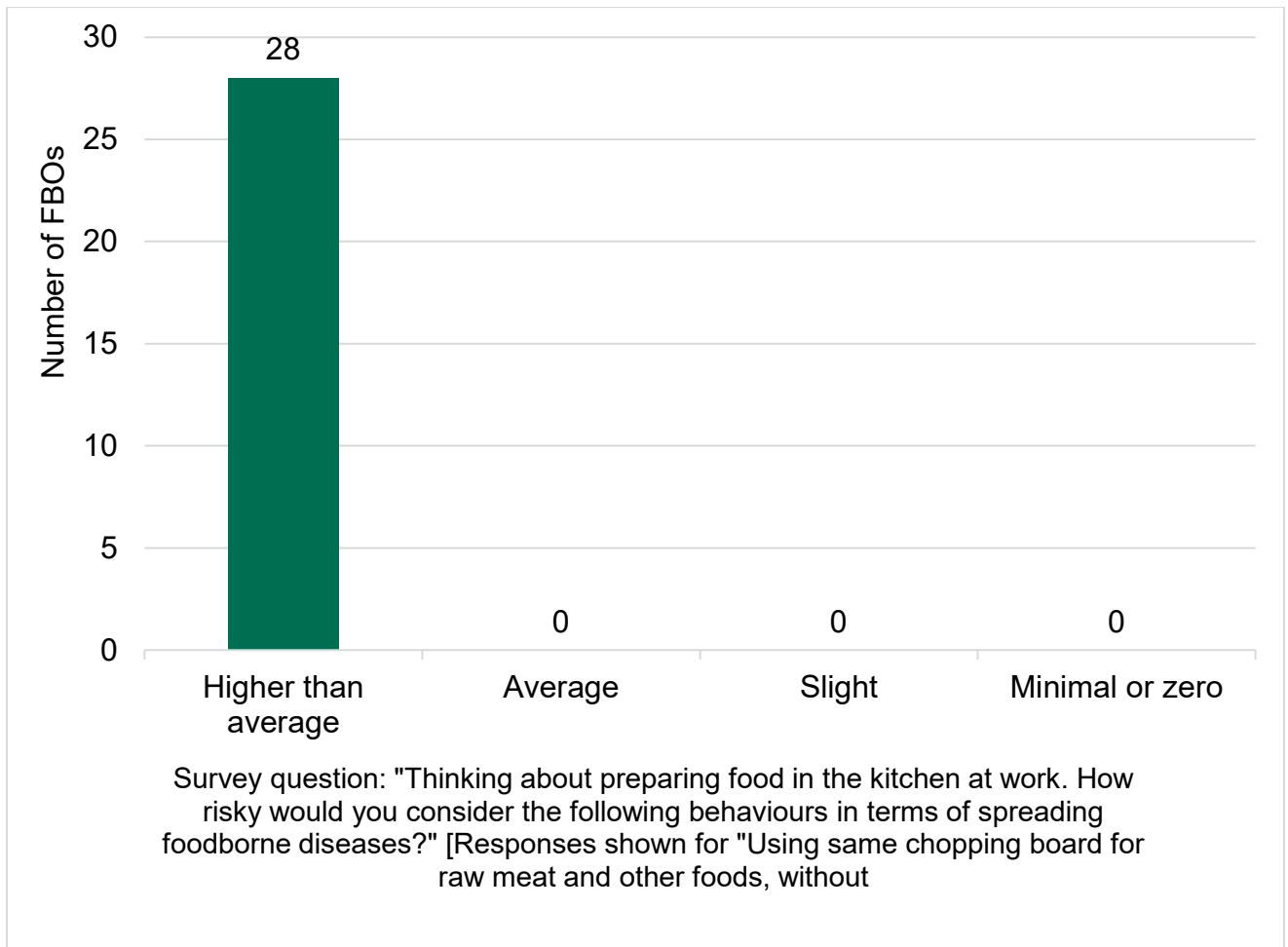
Overall, while most businesses had protocols about the dedicated use of chopping boards for prepping raw meat (even if these weren't always followed in practice), protocols for cleaning chopping boards appear to be less well established. For example, few businesses mandated a set approach to washing the chopping boards, and trusted staff to wash the items appropriately.

### **Reflective motivation**

Beliefs about consequences were a significant factor influencing whether chopping boards were reused without washing after preparing raw MFP.

In the survey, all FBOs said that there was a higher-than-average risk of getting a foodborne disease when using the same chopping board for raw meat and other foods without washing the board, compared to a range of other food preparation behaviours (see figure 4). Additionally, 9 in 10 businesses said raw MFP presented a higher-than-average risk of food poisoning compared with other foods. Overall, knowledge about risks discouraged the reuse of a chopping board.

**Figure 4. Understanding of risks concerning the reuse of a chopping board in FBOs. (Note: 28 FBOs responded to this question)**



In the Interviews most FBO participants understood the risks from raw MFP in terms of food poisoning – with raw chicken highlighted as a particular concern. This was claimed to promote the cleaning of chopping boards. However, FBOs had different beliefs about how this risk could be managed. As risks from cross-contamination from chopping boards with dedicated uses were seen as minor (as the same foods would only be chopped on them), wiping a chopping board between uses (either with a cloth or cloth and antibacterial product) was commonly observed. This substitute for washing had the potential to create cross-contamination risk. Moreover, these unwashed chopping boards were often left on a countertop and had other items placed on top of them.

### **Automatic motivation**

Automatic motivation influenced how chopping boards were used after MFP preparation.

Specifically, once the preparation of raw MFP was done, unless chopping boards were removed and cleaned immediately, they appeared to no longer have the attention from chefs working in the kitchen. In observations, these ‘forgotten’ chopping boards would often have other items placed upon them – including other

kitchen utensils, delivery boxes, other chopping boards and occasionally plates of foods that do not require cooking (such as salads). During busy periods, especially in smaller kitchens, chopping boards effectively became an extension of the work surface.

Sensorial cues (such as blood) to prompt the washing of chopping boards appeared to be less dominant for businesses than for households, mainly as each board was generally only used for a dedicated task or food type.

## Case study

### Using a chopping board after preparing raw MFP in FBOs

**Name:** Anthony

**Role:** Owner

**Type of business:** Restaurant

**Number of staff:** 5–10 staff

**FHRS rating:** 4–5

Anthony has 'spent his life in food', working in various businesses for many years. Just before the COVID-19 pandemic hit, he decided to set up his own restaurant cooking Mediterranean dishes. Government lockdowns (because of the COVID-19 pandemic) were hard on the new venture, but despite a tough trading period the business survived and is starting to flourish.

Five people work in the restaurant, including Anthony, who manages the business, a chef and an assistant chef. The menu is based on high-quality ingredients and simple dishes. There are 5 meat and 4 fish dishes on the menu, and each meal is prepared from scratch.

The kitchen is rectangular in shape. At the very far end is a pantry where ingredients are stored, as well as a sink for washing utensils and a separate hand basin. The kitchen looks clean and is observed to be cleaned daily.

There are 3 chopping boards in the kitchen – a red chopping board for meat, a blue chopping board for fish and a yellow chopping board for vegetables. The red and yellow chopping boards are most commonly used and kept adjacent to one another on the countertop. While Anthony claims the chopping boards are strictly used for specific foods, the red chopping board (for meat) is seen to have several uses – for example, cutting bread. Vegetables are also placed on the red chopping board while being prepped on the correct yellow chopping board. However, prior to these uses, the red chopping board is cleaned in the sink with detergent.

More generally, when the kitchen gets busy, a range of items are placed on the chopping boards including serving plates, delivery boxes, tongs and spatulas for serving food.

During one session, the assistant chef is chopping a whole raw chicken in half on the designated red chopping board. She puts the chicken on the grill and returns the other half to a container in the fridge. The main chef wipes down the chopping



board with disposable blue roll but does not wash it. While wiping, no spray or detergent is used. The chopping board looks visually clean. Not long afterwards, the same chef chops tomatoes on the red chopping board and places them in a salad. A plated dish of cooked food is also placed on the red chopping board.

Anthony is unaware of this practice, and in the interview he repeatedly states how clean the kitchen is, how 'brilliant and experienced' the staff are and how important food hygiene is to them.

### **Analysis of the chefs' behaviour**

The reuse of chopping boards is enabled by physical and social opportunity factors, and reinforced by reflective and automatic motivation. The business has a range of different coloured chopping boards for dedicated purposes, however, raw and foods that do not require cooking (such as vegetables) are prepared in the same area and the chopping boards are kept adjacent to one another. These factors respectively enable the availability of boards for reuse and the risk of cross-contamination between raw and other foods.

While there is a strong culture of food hygiene in the business, significant trust is placed in the chef to run the kitchen appropriately, and checks on behaviour are not undertaken. These social opportunity factors enable chopping board reuse.

The main chef's behaviour is evidence to suggest that he believes that wiping down the chopping board with disposable blue roll is a good enough way to clean after use (reflective motivation). This enables the potential for their reuse. When moving on to the next task, the chef is less focussed on the risks associated with foodborne illness (automatic motivation) – this enables the chopping boards to be reused, with other foods and items placed upon them.

## **Identifying behaviours for interventions (FBOs)**

As found in household kitchens, one of the key observations was that generally FBOs were not reusing a board to chop vegetables or other foods that do not require cooking (such as salads) after preparing meat (though this was occasionally observed). This practice was enabled by the availability of different coloured chopping boards for raw MFP and other foods. Instead, as noted in household kitchens, a notable risk of cross-contamination in FBOs was from chopping boards not being cleaned thoroughly after use, and having a variety of other non-food items placed upon them.

After KL2 fieldwork completed, a workshop was held with experts in food hygiene and the behavioural sciences to discuss the COM-B influences on each of the KL2

priority behaviours, including reusing a chopping board after preparing raw MFP. In the workshop, experts discussed the findings from KL2 to explore the 'problem behaviours' that occurred in kitchens and then considered the 'desired practice'; that is, the behaviour that households and FBOs should do to improve food safety. In this case the desired practice is for FBO staff to **immediately and thoroughly wash chopping boards after preparing raw MFP**.

Once the 'desired practice' was established, the workshop then explored the specific behaviours to target, in order to enable the desired practice. Each of these specific behaviours is explored in more detail below. It should be noted that the workshop was not designed to explore behavioural interventions, as this was outside of the scope of KL2, and could be continued later, once the 'desired practice' and 'specific target behaviours' had been identified. These specific target behaviours could be used in future research, for the development of behavioural interventions.

### **Specific behaviours to target to achieve the desired practice:**

#### **1) Placing chopping boards into a dishwasher immediately after use**

- Findings from the KL2 study indicate that washing chopping boards in a dishwasher was claimed to be common in FBOs and many chopping boards observed were plastic (allowing dishwasher use).
- As dishwasher use was already common in FBOs, changing the frequency and timing of this behaviour is a key area to focus on. Enabling businesses to invest in more than one red or blue chopping board would be needed to ensure chopping boards dedicated to the preparation of raw MFP could be regularly washed.
- The use of the dishwasher is optimal for managing cross-contamination risk, as it prevents reuse (by removing the chopping board from the worksurface) and promotes prompt washing. While a barrier to changing chopping boards immediately after use could have an impact on the speed of service, it should be noted that MFP was often prepared slightly earlier in the day and was not statistically correlated with peak service hours.
- For the reasons outlined, this behaviour should be a key focus for any future intervention research.

#### **2) Preparing raw foods in separate areas of the kitchen**

- Findings from the KL2 study indicate that when kitchen staff are close in proximity to chopping boards used for raw MFP, they are more likely

to use these chopping boards for other things, including placing other items (such as delivery boxes, pans or plates) onto the chopping boards.

- Where possible, the focus could be to enable FBOs to keep a designated area of the kitchen for preparing raw foods exclusively, which is not used for other activities.
- This may work to prevent cross-contamination risk, but in many FBOs this approach may not be practical due to physical restrictions of space in the kitchen. It should be noted that the FSA already recommend this practice to FBOs in their [business guidance](#).

### 3) Reducing the extent of 'wiping chopping boards' in between uses

- KL2 indicates that FBO staff regularly used cloths or disposable roll to wipe chopping boards that had been used to prepare raw MFP, instead of washing them. Occasionally antibacterial sprays were used alongside the cloth or roll, but not often.
- Workshop attendees discussed this issue and determined that this behaviour would be difficult to address because it appeared to be habitual and made easy by the physical availability of cloths or disposable roll.
- As a result, this behaviour should not be considered a priority for future interventions research.

### 4) Washing chopping boards before use

- Findings from the KL2 study indicate that despite FSA guidance to wash chopping boards before use, FBOs did not observe this practice, although some FBOs did wipe chopping boards with a cloth or disposable roll prior to use.
- Workshop attendees determined that focusing on this behaviour would be less fruitful for the FSA, as this poses less risk than the reuse of chopping board post-use.

# Conclusion

This chapter provided in-depth analysis on reusing a chopping board and the factors that influence this behaviour, including illustrative case studies of these factors in practice. The findings presented in this report allow the FSA to better understand this behaviour, and the risks involved.

Understanding the specific influences on these behaviours provides the foundation for future work on designing effective interventions to enable behaviour change. Future research should focus on designing interventions which can enable the positive target behaviours outlined in this report. Following on from the use of COM-B to understand behaviours, The Behaviour Change Wheel<sup>17</sup> can be used to identify effective interventions and behaviour change techniques.

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<sup>17</sup> Michie, S., van Stralen, M.M. & West, R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Sci* 6, 42 (2011). <https://doi.org/10.1186/1748-5908-6-42>