

Food Safety Perceptions and Practices of Parents Regarding Children's School Lunchboxes.

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Introduction

Children are at an increased risk of foodborne disease as their immune and digestive systems are not fully developed¹, furthermore it takes a smaller quantity of pathogen to cause illness in a child than it would in an adult². Given that 40% of the foodborne disease burden is among children³, implementation of domestic food safety practices are critical to reduce the risk of illness to children.

As many children take lunchboxes to school, there is also a need to ensure the safety of such food. Although parents have a responsibility to ensure food safety recommendations are adhered to during preparation and storage in the home, there is also responsibility within schools to ensure safe storage.

Although the majority of Governmental schemes focus on the nutritional standards of children's lunchboxes, the Welsh Government guidance for parents on "Healthy lunchboxes"⁴ does not refer to any hygiene related practices, but does promote the importance of safe storage temperatures in the home and at school, suggesting:

- "Leftovers can be kept in the fridge and used for children's lunchboxes the next day."
- "When using any foods that are normally kept in the fridge, an insulated lunchbox should be used with an ice pack or a frozen drink to help keep a lunchbox cool."
- "If the lunchbox is prepared the night before, it should always be stored in the fridge overnight."

Currently, data detailing the food safety perceptions and practices of parents regarding children's lunchboxes are lacking.

Purpose

The purpose of this study was to explore parents' self-reported practices regarding children's lunchbox preparation and to pilot a method to establish lunchbox storage temperatures in schools.

Methods

- An online questionnaire was completed by parents ($n=130$) of children (aged 4 – 7 years) who take lunchboxes to infant/primary school, to establish their perceptions and practices regarding food safety.
- A method was developed and piloted utilising dataloggers to record internal temperatures of lunchboxes and storage areas during a school week (5 days).
- Ethical approval was obtained from the Health Care and Food Ethics Committee at Cardiff Metropolitan University (Ethics Approval Reference Number PGT-2453).

References

1. Sockett, P.N. & Rodgers, F.G. (2001) Enteric and foodborne disease in children: A review of the influence of food- and environment-related risk factors. *Paediatrics & Child Health*. 6: 203-209.
2. Buzby, J.C. (2001) Children and Microbial Foodborne Illness. *Food Review*. 24: 32 - 37.
3. World Health Organization (2015) WHO estimates of the global burden of foodborne diseases. Available from: http://www.who.int/foodsafety/areas_work/foodborne-diseases/ferg/en/
4. Welsh Government (2019) Healthy lunchboxes: leaflet. Suggestions for parents and carers on what foods to include in a healthy packed lunch., <https://gov.wales/healthy-lunchboxes-leaflet>

Results

Parents' perceptions and self-reported food safety practices ($n=130$)

Food safety concerns of parents:

Nearly two-thirds (64%) of parents reported being concerned about food safety when preparing children's lunchboxes. In relation to this, a number of positive practices were self-reported by parents relating to hand hygiene and storage temperature of children's lunchboxes:

Hand hygiene:

Hand hygiene was perceived to be an important practice among parents in relation to ensuring the safety of children's lunchboxes with:

- 87% reporting to wash their hands before preparing their children's packed lunch.
- 75% reporting to encourage their child/children to wash hands before eating their packed lunch at school.

Temperature control:

Although more than half of the parents that completed the questionnaire (62%) reported using insulated lunchboxes for their children's packed lunch, however, only 26% of parents reported using icepacks.

Four parent stated that they used frozen foods such as yoghurts and fruit juice, a parent stated that they implemented the practices because "it keeps their lunch cold and defrosts by lunch time".

Contents of lunchboxes:

Two-thirds of parents (66%) self-reported that they 'always avoided including perishable food products when preparing their children's lunchboxes'.

However, when asked 'what does your child's lunchbox usually contain?', 89% of parents listed perishable food products, suggesting that parents may not be aware of high-risk food products that require refrigeration to ensure food safety.

Storage of children's lunchboxes in schools:

The majority of parents that participated in this study (52%) reported not knowing where their children's lunchboxes would be stored whilst in school. Of the 61 parents that were aware of storage location of children's lunchboxes in schools:

- 97% reported lunchboxes would be stored on trolleys in corridors, cloakrooms and classrooms.
- Only two parents (2%) reported that lunchboxes would be stored in refrigerators.
- Only 45% of parent perceived there to be any risks associated with storing children's lunchboxes out of the refrigerator.

The findings from questionnaire identified the need to determine the storage temperature of children's lunchboxes in schools. Therefore a method was developed and piloted with a parent of a child attending a local primary school.

Pilot study: Storage temperature of children's lunchboxes in a school

Preparation and storage of the lunchbox for datalogging:

Dataloggers (Signatrol SL52T self-contained, temperature loggers) were placed on the inside and outside of a child's lunchbox (as illustrated in figure 1) to record the temperatures at a frequency of 1 per minute, with a range of -40 to +85°C and accuracy of $\pm 0.5^\circ\text{C}$ during a five day school week.

The insulated lunchbox was packed with a sandwich, yoghurt, and a piece of fruit and an ice-pack each morning, 20 – 30 minutes before leaving for school. On arrival at the school the lunchbox was stored in the classroom until lunchtime (09.00 – 12.30).



Figure 1. Example of a datalogger on a child's insulated lunchbox

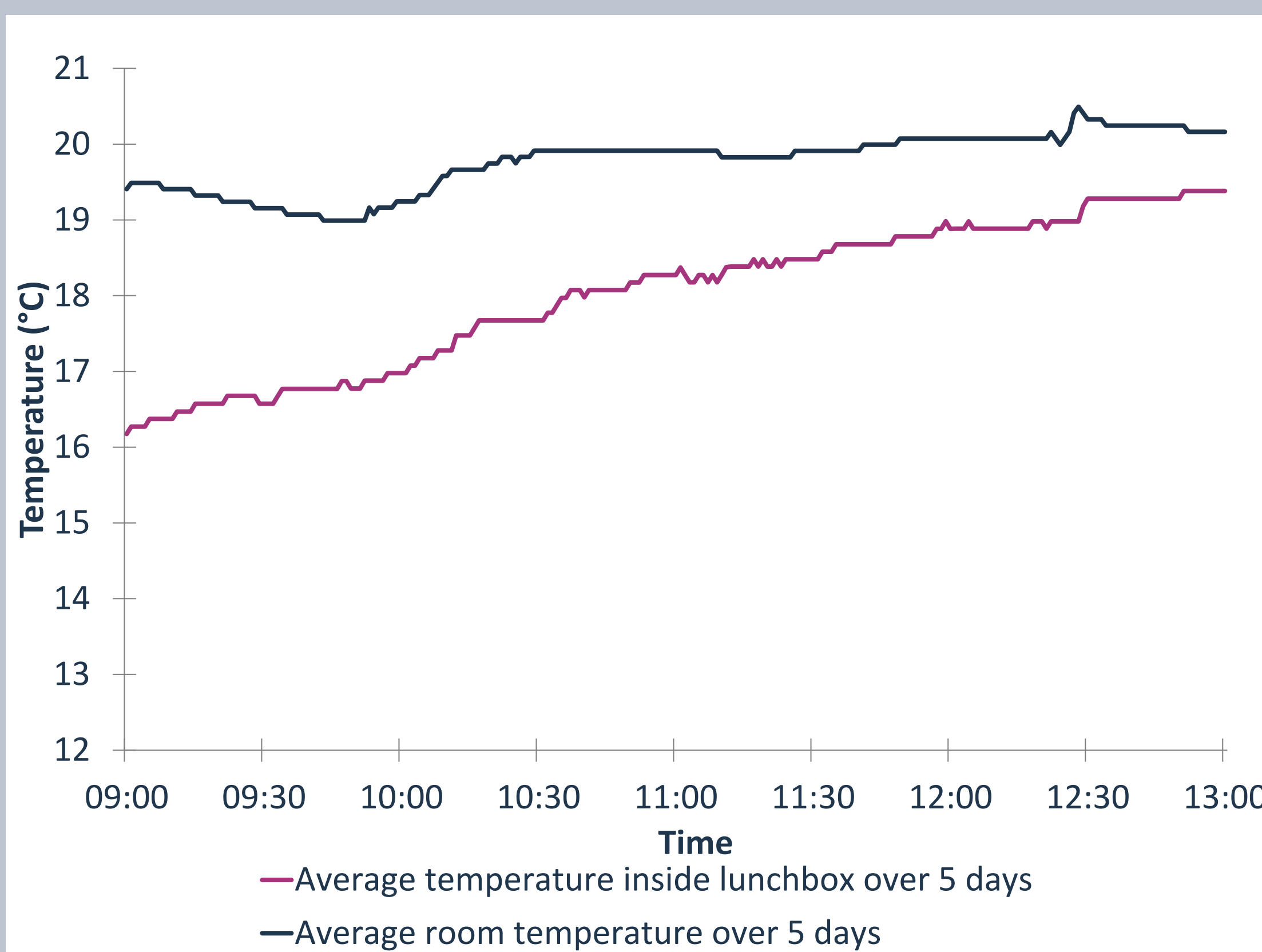


Figure 2. Average internal temperature of the lunchbox and of the classroom where the lunchbox was stored

Temperature profiling of lunchbox storage in school:

Figure 2 illustrates the average internal temperature of the lunchbox and the classroom over the five day school week.

Between arrival at school and lunchtime the average temperature in the classroom was 20.0°C. This ranged from a minimum temperature of 13.4°C at 09:43 on the Wednesday to a maximum temperature of 25.4°C at 12:28 on the Tuesday. On average the temperature of the classroom increased by 2.2°C during the morning.

The internal temperature of the lunchbox was at an unsafe range each day, with an average temperature of 17.7°C. The lunchbox temperature ranged from 12.5°C at 09:00 on the Wednesday to 21.0°C at 12:31 Thursday. On average, the internal temperature of the lunchbox increased by 4.2°C between arrival at school and lunchtime.

A Pearson product-moment correlation coefficient identified a strong positive correlation between lunchbox and classroom temperatures ($r=0.526$, $n=1205$, $p<0.0005$). The perfect positive correlation (+1.0) indicates that the warmer the classroom the warmer the temperature of the lunchbox.

Significance of study

- This study has addressed a research gap detailing parent's food safety perceptions and practice regarding children's lunchboxes.
- Although the pilot study only presents data from one lunchbox over five days; it has established a method to assess the storage temperature of children's lunchboxes in schools and the impact on the internal temperature of lunchboxes.
- Further research with schools is required to explore storage locations and temperatures.
- Although the study does not report on the core temperature of food products, it does demonstrate that children's lunchboxes are stored at unsafe temperatures that can dramatically increase the growth rate of foodborne pathogens.