Feeding knowledge, cutting waste

The influence of food literacy on household food wasting in Canada

May 4, 2026

FoodMesh

Give food a second chance

Acknowledgments

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Contents

1.0 Executive Summary

This resource document, commissioned by Environment and Climate Change Canada, aimed to determine if and how food literacy and food skills knowledge influence household food waste generation and management practices in Canada. To inform this work, a literature review situated within the Canadian geographical context was undertaken to identify the most up-to-date literature published on this topic. To complement the literature review, subject matter experts — from varying sectors and Canadian geographies — were interviewed to gather further insights and perspectives on the drivers, barriers, and trends influencing household food waste generation. Overall, the literature review yielded 23 results and ten interviews were conducted.

The findings of this study suggest that food literacy is a complex and multidimensional determinant of household food wasting. These relationships are further complicated by knowledge-behaviour gaps as well as systemic barriers related to time and money. Additionally, household food provisioning behaviours are likely influenced by a retail environment that incentivizes overconsumption and often works against household food waste reduction. Future research should continue to explore determinants related to key pillars of food literacy and food skills, such as food systems knowledge, planning, shopping, preparation, and storage.

Evaluations of household food waste reduction interventions yielded inconsistent results. While one intervention achieved a sustained, 30% reduction in avoidable food waste generation, other interventions did not result in significant reductions or only achieved short-term behavioural changes. As current research is limited by a lack of longitudinal studies, our collective understanding of intervention efficacy would benefit from a transition toward longitudinal study designs capable of measuring and monitoring behavioural changes over extended periods. This research also confirms the need to move beyond interventions that simply raise awareness of food waste, and instead aim to empower households through food agency — the functional ability and self-efficacy to act within the food system, navigate systemic barriers, and manage food effectively.

Wasting food is the result of multiple behaviours and broader systemic determinants. As such, knowledge of how food literacy and food skills influence household food wasting contributes to our understanding of the complex, intersecting factors that result in wasted food. A stronger understanding of these factors can be used to inform the development of policies, programs, and initiatives that aim to improve collective food literacy levels and reduce household-level food wasting.

2.0 Introduction

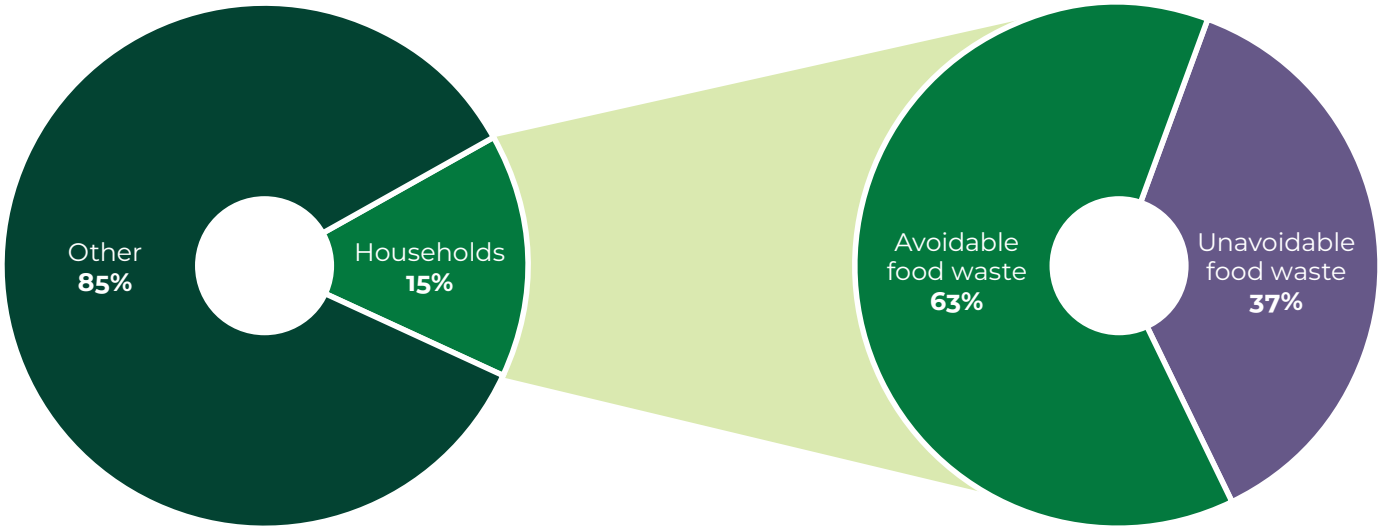
2.1 Household food waste generation and impacts

In Canada, an estimated 47% of all food is wasted each year [1]. While food waste is generated across the food supply chain, from farm to fork, approximately 15% of wasted food is generated at the household level [1]. It is estimated that 63% of household food waste is avoidable (i.e., food that was at one time edible), as opposed to unavoidable (i.e., food that was never considered to be edible, such as coffee grounds) [2] (Figure 1). This means that most food wasted at the household-level was intended for consumption and, at some point, could have been eaten. Despite efforts to divert wasted food through residential source separated organics programs, nationally, 28% of landfilled and incinerated residential waste is food [3].

Wasting food contributes to climate change. When food decomposes in an anaerobic landfill environment (i.e., an environment with little to no oxygen), methane, a greenhouse gas more potent than carbon dioxide, is released. However, the environmental consequences of wasting food are felt far beyond landfill emissions. When food is wasted, all the embedded energy used to grow, harvest, transport, prepare, and store that food is also wasted. Eliminating food waste and achieving an equitable food distribution system has the ability to divert additional agricultural production and minimize the conversion of land for agricultural purposes, thus protecting ecosystems and their carbon sequestration capabilities. Due to the unique ability of food waste reduction to minimize greenhouse gas emissions across the entire food system, Project Drawdown — an independent, non-profit organization advancing science-based climate action — has identified global food waste reduction as one of the most effective climate change solutions [4].

Mismanaging and wasting food also perpetuates food insecurity [5] and is expensive. At municipal and regional levels, food waste places logistical and financial burdens on waste management infrastructure. At the household level, wasting food results in unnecessary, and often preventable, increased personal expenses. It is estimated that households in Canada waste approximately $1,300 worth of food each year [2]. In response to the environmental, social, and economic impacts of wasting food, the United Nations' Sustainable Development Goal 12.3 aims to halve per capita global food waste by 2030 [6].

Figure 1.
The generation of household-level food waste in Canada.



2.2 Measuring household-level food waste

Generally, one of two methodologies are used to measure household-level food waste generation: (1) measurements collected through self-reported, recall data; or (2) the direct measurement of waste composition.

Self-reported, recall data are typically collected through surveys, interviews, or food diaries (i.e., participants document food prior to disposal in a 'diary'). These approaches involve asking participants to recall and report on the quantity and/or composition of the food waste they, and possibly the people they live with, have generated. While food diary participants are sometimes provided a kitchen scale to manually weigh wasted food, survey and interview participants are often asked to provide estimates of waste generation in abstract volumes (e.g., handfuls, portions, or servings) which are susceptible to independent interpretation and recall bias (i.e., when participants do not accurately remember past experiences). Because wasting food is associated with feelings of guilt, disgust, and shame [7, 8, 9, 10], participants may deliberately underreport the amount of food they waste due to social desirability bias (i.e., participants provide responses that they perceive others will view favourably) [11, 12]. The act of reporting in itself could also influence food diary participants to change their behaviours as individuals who are more conscious of the materials they are throwing away are more likely to reduce their waste generation [11, 12, 13, 14].

The direct measurement of waste composition is achieved through waste composition studies (also called 'waste audits'), which involve collecting, sorting, and weighing household waste samples to determine the quantity and composition of wasted food. This methodology mitigates recall bias as it is not participant-led and requires researchers to directly interact with waste samples. In communities with curbside waste collection, household curbside waste samples (which may include garbage, organics, and/or recycling streams) are typically collected on each household's municipally or regionally designated waste collection day. This allows for the occurrence of the sample collection to remain unknown to participants and mitigates social desirability bias. Data collected through waste composition studies are limited by the chosen sampling period, and external factors, such as seasonality and weather, may also impact results. Additionally, waste composition studies do not allow for the measurement of food waste discarded through alternative methods, such as backyard composters, drain disposal, or feeding pets.

There is considerable agreement among researchers that measurements of household-level food waste collected through self-reported, recall data substantially underestimate generation [11, 12, 13, 14, 15, 16, 17]. Survey-based, self-reported food wasting has been found to underestimate food waste generation by as much as 53% [13] when compared to food diary studies. Food diaries have been shown to underreport food waste generation by 20% [13] to 40% [18] in comparison to waste composition studies. Thus, the use of these self-reported methodologies should be reserved to determine when, why, and how food wasting occurs, rather than serving as a tool to measure the quantity and composition of wasted food. Ideally, researchers should consider mixed-methods study designs that pair the direct measurement of waste composition with surveys, interviews, or other methodologies to determine both how much food is wasted and why that waste was generated.

2.3 Food literacy and food skills knowledge

Wasting food is not a single behaviour, but the result of multiple behaviours [10]. There is a growing understanding that food literacy and food skills knowledge may contribute to the generation of household-level food waste. For example, Canada's Food Guide states: "improving food skills may make it easier for Canadians to reduce household food waste [as] … developing skills related to meal planning, storing perishable foods properly, and using up leftovers may help minimise waste" [19, "Food skills and food waste", para. 1].

Food literacy is broadly understood as the set of knowledge, skills, and behaviours that enable individuals and households to plan, select, prepare, manage, and consume food [20]. Truman et al. [21] analyzed 38 distinct definitions of food literacy across 67 studies, highlighting the absence of a single, standardized definition. Across these definitions, critical knowledge (i.e., information and understanding) is often emphasized over functional knowledge (i.e., skills, abilities, and choices), and six prevalent themes were identified: (1) skills and behaviours, (2) food/health choices, (3) culture, (4) knowledge, (5) emotions, and (6) food systems. Consistent with many of these themes, Canada's Food Guide indicates that food literacy incorporates food skills as well as the broader social and physical environmental contexts in which food decisions are made [19]. According to Health Canada [19]: "a person with food skills has the information, abilities, and practices to acquire nutritious foods and prepare meals and snacks that are safe, nutritious, and culturally acceptable" ("Food skills and food literacy", para. 1). Key pillars of food literacy and food skills knowledge include: food planning, food selection and provisioning, food preparation, food storage, and the application of nutritional information [19, 21, 22].

2.4 Measuring food literacy and food skills knowledge

Reflecting both the breadth of the construct and the absence of a standardized definition, food literacy is often not assessed as a unified concept [21]. Instead, researchers typically evaluate select components of food literacy, such as food shopping behaviours, food safety knowledge, understanding of 'best before' dates, and self-confidence with various cooking skills. Evaluations of food literacy often prioritize nutrition knowledge and food skills, rather than broader food systems knowledge. To address these gaps, the Canadian Food Literacy Measure was recently created to assess multiple dimensions of food literacy, including food systems knowledge and socio-environmental aspects [23]. Surveys and interviews are commonly used to assess food literacy and food skills knowledge. These methodologies involve asking participants to recall and report on relevant knowledge, attitudes, and behaviours. Some researchers assume that survey and interview participants represent entire households or use proxy-reporting (i.e., participants are asked to report on behalf of their entire household), which can lead to inaccurate and biased data. Beyond assessing core competencies, researchers may incorporate outcome-based measures, such as diet quality, to bridge 'knowledge-behaviour' or 'value-action' gaps (i.e., discrepancies between knowledge and real-world application, such as when an individual understands that best before dates do not indicate food safety, but they refuse to eat food past its best before date). One example of an outcome-based measure is the Healthy Eating Index (i.e., "HEI"), a validated framework that evaluates how well an individual adheres to government-based dietary guidelines [24, 25]. By analyzing diet quality, researchers can investigate how an individual may be implementing food literacy and food skills knowledge within their daily dietary practices. Overall, the lack of a standardized methodology presents a challenge to the broader assessment of food literacy and food skills knowledge. When food literacy is defined and evaluated differently across studies, results can be difficult to compare across various Canadian geographies and household demographics. These challenges also result in a limited ability to identify changes over time, evaluate interventions, and draw consistent conclusions about food literacy levels and their broader impacts.

2.5 Household food waste reduction interventions

Interventions that aim to reduce the generation of food waste can be loosely grouped into three categories:

> **(1)** Knowledge-based interventions (i.e., providing households with information, such as how to interpret best before dates, to change behaviour);
>
> **(2)** Technological interventions (i.e., providing households with access to technology, such as an AI-powered 'smart fridge', to modify behaviour); and
>
> **(3)** System interventions (i.e., an existing system is altered and/or a new system is introduced, such as a curbside organics collection program, to encourage community-level behaviour change).

Within the field of household food wasting and within pro-environmental behaviour research more broadly [26], knowledge-based interventions are the most commonly implemented and studied. Despite this prevalence, knowledge-based household food waste reduction interventions have yielded inconsistent results. Technological and system interventions remain under-researched within the context of household-level food wasting. As such, the effectiveness of these approaches has yet to be verified. Overall, the efficacy of household food waste reduction interventions is hindered by a heavy reliance on studies of self-reported, recall data and a lack of longitudinal research [27]. To address this gap, Reynolds et al. [27] proposed a standardized evaluation framework. This guideline advocates for monitoring and measuring intervention outcomes with food waste composition studies, reporting results in a replicable and repeatable format, and considering the broader, systemic implications of these interventions. Applying this framework within the Canadian context contributes to building the empirical foundation necessary to identify and scale the interventions most capable of reducing household food wasting.

2.6 Research objectives

The purpose of this research is to determine if and how food literacy and food skills knowledge influence household food waste generation and management practices in Canada. As such, the objectives of this research are to:

1. Discuss how food literacy and food skills knowledge influence household food waste generation;
2. Identify food literacy and food skills behaviour change interventions that have had measurable impacts;
3. Discuss where Canadians generally learn about food literacy and proper food skills;
4. Identify trends in food literacy levels and food skills knowledge in Canada; and
5. Identify barriers and opportunities to improve collective food literacy levels and food skills in Canada, and to households implementing these learnings.

3.0 Methodology

3.1 Literature review

To meet these objectives, a review was undertaken to identify relationships between food literacy and household food waste generation and management practices. The review considered academic publications and grey literature that reported on both food literacy and household-level food wasting (Appendix A). To capture and report on the most up-to-date research, studies published between January 2021 and January 2026 were included.

This review is situated within the Canadian geographical context. As such, research situated outside of Canada was excluded. The search was limited to articles published in English or French. Both quantitative and qualitative studies were included. No inclusion or exclusion criteria were set for the food waste measurement methodology utilized, nor for the type of wasted food generated. Thus, studies that reported on household-level generation of total food waste, avoidable food waste, unavoidable food waste, and/or possibly avoidable food waste (i.e., food that some people consider edible while others do not, such as potato peels) were included. Publications that exclusively reported on food literacy, food skills knowledge, and/or household food wasting within the context of the global COVID-19 pandemic with no applicability to non-pandemic circumstances were excluded.

3.2 Interviews

To complement the literature review, subject matter experts were interviewed to gather further insights and perspectives on the drivers, barriers, and trends influencing household food waste generation. The study's engagement plan prioritized recruiting a diverse sample of participants from varying sectors and Canadian geographies. The participant sample (n = 10) included representation from academia (n = 5), various levels of government (n = 4), and the non-profit sector (n = 1). Geographically, the participant sample included representation from British Columbia (n = 3), Ontario (n = 3), Quebec (n = 1), Nova Scotia (n = 2), and Newfoundland and Labrador (n = 1). Despite efforts to recruit a diverse sample of participants, the study is not representative of all sectors nor of all Canadian geographies. This study is also limited due to its small sample size.

Participants were recruited through email and snowball sampling (i.e., participants recommended additional subject matter experts from their own networks). Participants were sent a letter of information and, if they were interested in participating, a one-hour virtual interview was scheduled. An interview guide (Appendix B), containing the list of interview questions, was emailed to participants prior to their interview. Semi-structured interviews were conducted in English or French and verbal consent was obtained from all participants at the beginning of each interview. All participants were given the opportunity to choose their own identifiers and to review the direct quotations that we anticipated publishing in this report.

4.0 Results and Discussion

4.1 Quantity and composition of household food waste

Eight studies, or 53% of the unique studies included in this literature review that reported on household food waste generation, directly measured the quantity and composition of wasted food through waste auditing (Appendix C and D). All direct measurement studies were Ontario-based, with one study conducted in Toronto, three in the Guelph-Wellington region, and four in London. In Toronto, households generated an average of 1.20 kilograms of avoidable food waste per person per week [28]. In Guelph, households wasted between 1.08 [29] and 1.64 [30] kilograms of food per person per week. In Laila et al. [29], 43% of this wasted food was classified as avoidable and the remaining 57% as unavoidable, whereas in Parizeau et al. [30], 64% of food waste was categorized as avoidable and 26% as unavoidable. Households in Wellington County wasted an average of 4.37 kilograms of food per household per week, of which 51% was avoidable and 49% was unavoidable [31, 32]. In London, households wasted between 2.59 and 5.31 kilograms of food per household per week [33, 34, 35, 36, 37]. Most (46% to 68%) of this wasted food was classified as avoidable, as opposed to unavoidable (32% to 44%). Consistent with previous research [38, 39], when reported, fruit and vegetables were found to be the most wasted type of food across these studies [30, 31, 32, 33, 34, 35, 36]. Differences in household food waste generation within southern Ontario could be due to seasonality, geographical contexts, changes in food wasting behaviours over time, and/or be methodological in nature (e.g., varying sample sizes, study recruitment procedures, etc.).

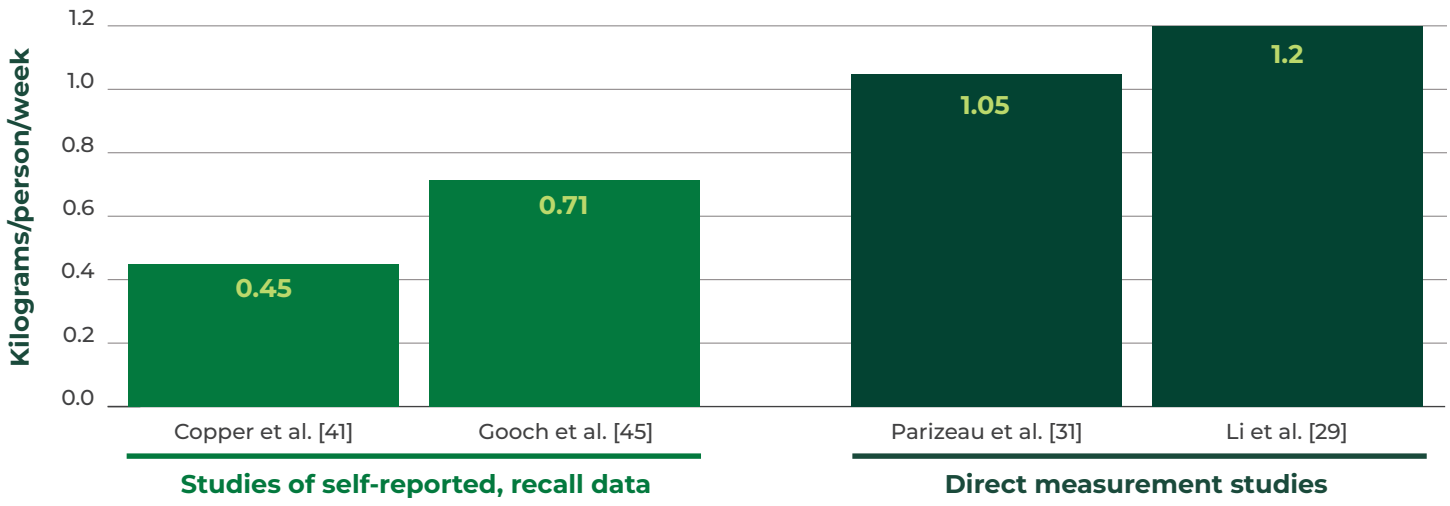
Five studies, or 33% of the unique studies included in this review that reported on household food waste generation, relied on self-reported measurement methodologies to determine the quantity and composition of wasted food. Two of these five studies were survey-based and national in scope. In Cooper et al. [40], survey participants self-reported generating an average of 0.45 kilograms of avoidable food waste per person per week. Survey participants in Natali et al. [41] self-reported generating an average of 0.88 litres of avoidable food waste per household per week. The remaining three studies used food diaries to measure household food waste generation. Quebec households self-reported wasting an average of 3.85 litres of food per household per week, in which 72% was classified as avoidable and 28% as unavoidable [42]. In an Ontario-wide study, households self-reported generating an average of 2.15 kilograms of avoidable and possibly avoidable food waste per household per week [43]. Households in Oakville, Ontario self-reported wasting 1.70 kilograms of food per person per week, in which 42% was classified as avoidable and the remaining 58% as unavoidable [44]. Surveys are generally considered to be the most feasible methodology, as large samples can be obtained without considerable participant

impact and for a relatively low cost. Food diary studies, on the other hand, are generally limited to smaller sample sizes because they may be perceived as invasive, effortful, and/or time-consuming for participants, and they are typically more expensive to implement compared to surveys. The sample sizes obtained in these studies are consistent with these feasibility considerations. The comparability of these results is limited by methodological differences (i.e., weight- versus volume-based measurements, and per household versus per person reporting) — a prevalent challenge in the absence of a widely-accepted, standardized food waste quantification methodology.

Two grey literature resources, or 13% of the unique studies included in this review that reported on household food waste generation, used mixed-methods study designs as well as secondary data to quantify wasted food. According to Love Food Hate Waste Canada [2], households in Canada generate an average of 2.69 kilograms of avoidable food waste per week. In Second Harvest's [1] broader food waste report, it is estimated that 17% of all avoidable food waste in Canada is generated at the household-level.

While it is possible that differences in food waste generation across these studies are a result of varying demographic and/or geographic contexts, consistent with previous research [12, 13, 14, 15, 16, 17, 18], it appears that the quantities of wasted food self-reported in the survey-based studies may be underestimated (Figure 2). When comparing volume-based food waste measurements, survey participants in Natali et al. [41] self-reported generating 68% less avoidable food waste per week than participants in Cloutier & Roy's [42] food diary study. Similarly, when comparing weight-based food waste measurements, survey participants in Cooper et al. [40] self-reported generating 36% less avoidable food waste per week than participants in Gooch et al.'s [44] food diary study, 57% less than participants in Parizeau et al.'s [30] direct measurement study, and nearly 63% less than participants in Li et al.'s [28] direct measurement study. Further, self-reported food waste generation may be underestimated in some food diary studies included in this review. Food diary participants in Gooch et al. [44] self-reported generating 32% less avoidable food waste per week than participants in Parizeau et al.'s [30] direct measurement study, and nearly 41% less than participants in Li et al.'s [28] direct measurement study. These findings reinforce the notion that self-reported methodologies should generally be reserved to explore contextual and behavioural drivers of food wasting — such as the 'when, why, and how' — rather than serving as a tool to measure the quantity and composition of wasted food.

Figure 2. A comparison of self-reported versus directly measured avoidable food waste generation (kilograms/person/week).



4.2 Determinants of household food wasting: Food systems knowledge

Rather than a mere collection of individual competencies, food literacy incorporates the complex relationships between an individual or household and the broader food system. Increased urbanization and the privatization of food access in Canada have created a culture of convenience that has eroded food literacy and food skills knowledge [45]. As one example, children across southwestern Ontario have been found to have limited knowledge of where food is grown, despite living in an agriculturally rich region [46]. This widespread decline of food skills — often referred to as 'deskilling' in the public health sector — has been driven, at least in part, by the increased prevalence of ultra-processed, pre-prepared, and packaged foods. Designed for convenience, minimal food skills are needed to prepare and consume these foods, thereby contributing to this erosion of knowledge. Generally, interviewees did not comment on food literacy levels in Canada. However, several interviewees described how the role of food systems knowledge and changes to food provisioning over time have influenced household food literacy and food skills knowledge:

> As we've become urbanized, we've really lost touch with where our food comes from. We don't know who grows our food, who supplies it [...] We don't have direct links to our farms anymore. So, the [level of food] literacy is undermined. (Circular food system policy advisor, P3)

> I would say we've been quite divorced from our food systems at large and then we're divorced from our food itself and we're divorced from our own bodies. So there's a lot of gaps in understanding the role of food and its importance in our society and in our own well-being. (Sustainable diet specialist, P5)

> The privatization or the push for people to become increasingly more dependent upon businesses and corporations to be a source of their food access versus food sovereignty and autonomy and capacity to feed oneself [...] Speaking with many Indigenous communities who said 'those who have the power over food have the power over everything' [...] Having access to land taken away, having access to waterways taken away, and therefore completely having to be dependent on grocery stores is one example. If you're dependent on grocery stores, the level of knowledge that you need is not going to be as much as if you actually have to grow the food yourself or have to hunt it or fish it yourself and then process the entire animal. (Professor, P5)

Within Indigenous communities, the erosion of Indigenous food knowledges is also a consequence of colonial forces, such as the loss of traditional food environments [47, 48] and systemic disruptions in the intergenerational transfer of traditional knowledges due to residential schools and forcible relocation [49]. An interviewee reflected on how this erosion represents a profound loss of cultural continuity:

> There is a real challenge around preserving Indigenous foodways. [...] Elders who are the holders of this knowledge are two generations removed from the people who are trying to sustain that knowledge now and there has been a break in that chain. (Leader of a non-profit organization, P8)

As a result of widespread 'deskilling' and the erosion of food literacy in Canada, interviewees discussed the importance of improving food systems knowledge, restoring meaningful connections to food and food systems, and cultivating food agency:

When people are involved in applying what they've learned, they retain it better. [...] When people have a sense of where their food is coming from and why it matters to do something, when they feel invested in the food system, then they're going to care more about how they interact with their food. (Academic, P1)

We really do need a culture shift in terms of our relationship with food. It's not just the technical aspect of food literacy. It is actually a cultural value shift around how important food is. And that is harder. (Circular food system policy advisor, P3)

Food literacy is a matter of national food security because when all of the different wars happened and people said, 'Okay, victory gardens, we need to start growing food,' people knew what they had to do. Now you tell Canadians, 'okay, war or whatever is happening, we need to start growing food.' Many of us will be like, 'but we have no access to land, we don't know how to grow food.' [...] [Food literacy] needs to be ramped up more than just the small number of non-profits that are doing it. (Professor, P9)

4.3 Determinants of household food wasting: Food planning

Despite the prevalence of food planning in household food waste reduction narratives, few studies included in this literature review reported on the influence of food planning on household food waste generation. When these variables were investigated, food planning was not found to be a determinant of food wasting. Before food shopping, 70% of participants in a Toronto-based study checked what food they already had at home, 46% planned meals, 44% made a shopping list, and 43% estimated how much of each item they needed to purchase [28]. However, no statistically significant relationships were identified between these food planning strategies and the generation of household food waste. Similarly, no statistically significant associations were found between meal planning and food wasting in a Guelph-Wellington-based study; however, a negative relationship was identified between involving children in meal planning and the generation of unavoidable food waste [50]. The limited findings of this review suggest that further research is needed to determine if and how food planning influences food wasting within Canadian households.

4.4 Determinants of household food wasting: Food shopping

While disposed of in the home, household food waste generation may be rooted further up the food supply chain, such as in the retail sector, where food shopping routines and purchasing decisions may influence subsequent wasting behaviours. Few studies have investigated how food access and the neighbourhood food environment (i.e., the proximity, density, and availability of food vendors within a neighbourhood [51]) may influence the generation of household food waste. In this review, proximity to the nearest grocery store was found to be a predictor of unavoidable food waste generation, suggesting that further distance to a grocery store may lead to a greater generation of unavoidable food waste [33]. Additionally, a negative correlation was identified between unavoidable food waste and the density of food vendors (e.g., grocery stores, restaurants, etc.) within 1,200 metres of a household, suggesting that the higher the density of food vendors, the less unavoidable food waste generated [33]. Access to a high-density of food vendors within a 15-minute walk of a household may increase the frequency of consuming meals prepared outside the home (e.g., take-out, dining at restaurants, etc.) and decrease the frequency of at-home meal preparation — a process that typically results in the generation of unavoidable food waste [36, 50]. However, food vendor proximity should not be exclusively used to evaluate food access, as people are not necessarily customers at the food vendors closest to their homes [52, 53].

Many participants in a Toronto-based study reported that they complete their food shopping at large chain grocery or department stores (96%), followed by wholesale retailers (49%), and local grocery or specialty retail stores (42%) [28]. Forty-nine percent of these participants stated that they go food shopping once per week, 40% reported that they food shop a few times each week and/or buy food as needed, and 11% indicated that they do not have a consistent food shopping routine. No statistically significant relationships were identified in this study between where or how often food shopping occurred and household food wasting. Nonetheless, household food waste generation may be associated with behaviours performed while food shopping. Half of the participants in this Toronto-based study reported often or always buying items that they did not plan to purchase before beginning to shop. Unplanned, impulse, and bulk food purchases were found to be statistically significant determinants of avoidable food waste generation, with fewer unintentional, impulse, and bulk food purchases associated with less food waste [28, 30, 36]. More frequent impulse purchases were specifically found to be associated with significantly more avoidable fruit and vegetable waste per capita in a Guelph-based study [30]. Buying too much was also identified as the primary reason for wasting bread and baked goods, dairy products, and fruit and vegetables in a London-based study [37]. Unplanned purchases appear to be primarily driven by advertisements and/or in-store promotions [28]. Similarly, buying items in larger quantities or bulk packages appear to be largely attributed to financial motivators, as these products are typically priced at a lower cost per unit [28]. Participants in two qualitative studies also highlighted the role of food packaging in household food waste generation and discussed examples of food items, such as romaine lettuce, that are typically only available and/or affordable in large quantities suitable for larger households [44, 54]. Consistent with previous research, the difficulties of provisioning food in small portions likely contributes to household food waste generation as multi-person households generally waste less food per capita than smaller and single-person households [10, 13, 15, 55]. A professor (P9) further highlighted the systemic influence of the retail environment on household food wasting:

> I think a misconception in terms of the driver is not understanding that the whole food landscape pushes for overconsumption. You can try to train the person as much as you want, but psychologically, we're driven to do things because of our environment as well. And that's a really hard battle to fight when it comes to what we're being offered in our limited, monopoly-type supermarket landscape.

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Due to the retail food environment's role in food waste generation at the household-level, some participants called for broader system changes and increased participation from food retailers in programs, policies, and initiatives to reduce household food wasting [55]. Interviewees shared similar calls to action:

> We definitely see, from the food waste perspective, an opportunity for retailers to be a little bit more engaged in discussions about how people shop for food and the options they have, especially single families or seniors who maybe don't need the bigger packaging. The two-for-one sales don't always help them to make the right food choices in terms of food waste reduction. (Waste management policy specialist, P7)

> I think food retailers could be part of the people that do that [contribute to food waste reduction]. And quite frankly, they're a natural part of how to do that. Helping people use the products that they're buying from their store better. I think people would really appreciate that. (Environmental consultant and academic, P10)

While further research is needed to determine how current socioeconomic and political contexts may be influencing household food literacy and/or food wasting, local foods are important to Canadian consumers [56]. According to the Bank of Canada, Canadian households have spent proportionately more on Canadian food since March 2025, shifting food spending away from American products [57]. Interviewees provided anecdotal observations around how the 'Buy Canadian' movement has influenced food shopping behaviours and has perhaps increased food systems engagement:

> 'Buy Canadian' has really galvanized people's imagination. I know many people who are actively reading labels which they wouldn't have done before. The source country wouldn't have been top of mind. Global context and political drivers have enabled households now to pay more attention to sourcing. (Sustainable diet specialist, P5)

> I think it's quite interesting just in terms of seeing an example of how people can, on mass, really change the way that they shop [...] Sometimes it feels like the idea that we could, as a group, come together and make changes in a measurable, impactful way, it seems like a very difficult, almost impossible, thing to do. But to see the way that the 'Buy Canadian' movement has really driven changes in what we see available at the grocery store and what people are doing... (Waste management policy specialist, P7)

4.5 Determinants of household food wasting: Food preparation

Few studies included in this review reported on how food preparation knowledge and skills may influence household food waste generation. In this review, statistically significant, positive relationships were identified between self-confidence in conceptualizing food (e.g., modifying a recipe to enhance its nutritional value) and avoidable and unavoidable food waste [50]. Basic cooking skills were also found to be positively associated with both avoidable and unavoidable food waste [40, 50]. These findings suggest that individuals with greater confidence in their food preparation skills may prepare more meals at home than people who are less confident in their abilities to prepare food. Individuals who frequently prepare meals at home likely purchase more ingredients to cook with and therefore have more food in their homes to manage. Frequent at-home meal preparation is likely associated with a greater generation of avoidable food waste because these households may over-purchase and/or improperly store food that they intended to prepare meals with [50]. As unavoidable food waste is often generated as a by-product of preparing some types of food (e.g., fresh fruit and vegetables with inedible cores, pits, and peels), it is also likely to be associated with frequent at-home meal preparation [36]. While these findings provide preliminary insights into how food preparation knowledge and skills may influence household food wasting, they are limited to two studies. To validate the relationships identified by these two research teams, further evidence is needed to determine whether these findings remain consistent across varying Canadian geographies and household demographics.

4.6 Determinants of household food wasting: 'Best before' dates

Participants across multiple studies reported that they throw away food solely because a product's best before date has passed [28, 40, 44]. Households with children appear to be more wary of best before dates and are more likely to waste food once that date passes compared to child-free households [28]. Households with seniors also appear to be more cautious, reflecting possible changes to behaviour around vulnerable populations [41].

A 'best before' date is not an 'expiration' date. In Canada, 'expiry' dates only appear on five types of food products with strict compositional and nutritional criteria: (1) infant formula, (2) meal replacements, (3) nutritional supplements, (4) formulated liquid diets used for oral or tube feeding, and (5) low-energy diet food products ordered by a physician and sold by a pharmacist [58]. Best before dates indicate the length of time a properly stored, sealed food product will maintain its freshness, taste, and nutritional value [58]. According to the Canadian Food Inspection Agency [58]: "best before dates are not indicators of food safety, neither before nor after the date" (food safety section, para. 1). While it is not uncommon to find a best before date on almost every food product sold by grocery stores, best before dates in Canada are only required on foods with a shelf life of 90 days or less [58]. Thus, most shelf stable products, such as canned, dry, and frozen foods, do not require a best before date.

Best before dates contribute to the generation of food waste across the food system, from processing to purchasing. Second Harvest [1] has estimated that 23% of avoidable food waste generation in Canada is due to best before dates, with the greatest quantity of waste generated from bread and bakery items, followed by dairy products, and then fruit and vegetables. At the household-level, meat and fish are commonly thrown away due to best before dates [37, 41]. Some interviewees shared concerns around the widespread use and impacts of best before dates:

> There are some gaps — and I'm reluctant to call them food literacy gaps because it's not the individual's fault — but misunderstandings around best before dates that drive food waste. And I think it's kind of on purpose. People think a best before date is an expiry date and there are food companies that put best before dates [on their products] that are not actually connected to food safety concerns, but rather about generating turnover in their product. (Academic, P1)

Aligned with these insights, the food system stakeholders who contributed to Second Harvest's [1] study suggested that:

> Best before dates have created a culture where consumers do not make decisions based on their own knowledge and common sense. Instead, they defer to dates determined by risk-averse food processors and manufacturers whose primary concern is the profitability of their businesses. (p. 38)

Highlighting a prominent knowledge-behaviour gap at the household-level, Carroll et al. [50] identified a statistically significant, positive relationship between food safety knowledge regarding best before dates and avoidable food waste. Despite demonstrating an understanding that best before dates do not indicate food safety, this knowledge was ironically associated

These findings suggest a complex relationship between date labelling literacy and household food waste and likely validates the need for programs, policies, and/or initiatives aimed at minimizing this knowledge-behaviour gap.

with a greater generation of avoidable food waste [50]. In another study, 63% of participants self-reported that, when determining if food is safe to eat, they always or often rely solely on a product's best before date [41]. Contradicting this finding, 73% of participants in the same study self-reported that they always or often rely on sensory cues (i.e., sight, smell, taste) to assess food safety once a product's best before date has passed. These findings suggest a complex relationship between date labelling literacy and household food waste and likely validates the need for programs, policies, and/or initiatives aimed at minimizing this knowledge-behaviour gap.

4.7 Determinants of household food wasting: Food storage

Knowledge, attitudes, and behaviours associated with food storage were not often reported on in the studies included in this review, despite the prevalence of food storage strategies in household food waste reduction narratives. While 60% of participants in a Canada-wide survey reported that they always or often freeze food to extend its shelf life, what impact, if any, this has on household food waste generation is unknown [41]. Leftover management, a critical component of food storage at the household-level, was found to be associated with food wasting in this review. Households that self-reported that they never or rarely throw away leftovers generated significantly less avoidable food waste than households that waste leftovers more frequently [28]. When asked how leftovers are managed, 70% of these participants reported that they usually eat leftover meals without alteration, while 35% often use leftovers to create new meals. Many household food waste publications do not report on sub-categories of food waste composition based on food groups (e.g., fruit and vegetables, bread and bakery, meat and fish, etc.), and even amongst the publications that do, not all studies follow the same classification scheme. As such, it is challenging to determine how much avoidable food waste is generated in Canadian households as a result of poor leftover management. Love Food Hate Waste Canada [2] reports that leftovers are the third most wasted category of food in Canadian households and leftover management has received considerable attention across international household food wasting literature. Leftovers are wasted for a variety of reasons, from perceived health risks [14, 59] to inadequate storage [60, 61, 62] to negative perceptions around a loss of quality and freshness [63, 64, 65, 66]. While the findings in this review are limited, the volume of international literature that addresses this topic justifies the continued exploration of this potential food waste driver within a Canadian context.

4.8 Determinants of household food wasting: Food waste disposal

Beyond food planning, shopping, preparation, and storage, waste management practices may also influence household-level food wasting. Contamination (i.e., when materials are placed in the wrong disposal stream, such as a plastic container full of spinach disposed of in a 'blue bin' recycling program) is a prominent issue within Canada's waste management sector. The 'ick factor' may drive some of the food-related contamination in curbside waste streams. Parizeau et al. [30] observed that when households disposed of food in their curbside garbage or recycling streams — rather than in their organics bin — the food was often in its original packaging. Households also reported that they were more likely to dispose of food in the garbage or recycling stream when they determined that the food should be thrown away after smelling or tasting it. Thus, experiences of disgust may discourage individuals from performing the manual tasks required for proper waste diversion, such as removing food from its original packaging.

While residential source separated organics programs have been found to increase food waste diversion, these programs have not been found to be associated with increased food waste reduction [67]. Because composting is often perceived as a positive environmental action, there is some concern that organics programs may even increase food waste generation in some households [68]. Consistent with this concern, residents in a community with a curbside organics collection program were found to be less concerned about the generation of food waste and more concerned about the impacts of wasted food on the environment [69]. Many interviewees also discussed how residential source separated organics programs can inadvertently lead to increased food wasting:

> We found that if people had a green bin, and were properly using that green bin, that they just didn't think that there was an issue that the food was [being] wasted. I think you really need to take that into account and impart a 'food waste prevention-first' message to dispel that myth. (Circular economy policy advisor, P4)

One of the strongest predictors of an individual's support for curbside organics collection is the perception that participating in the program is convenient [69]. Once an organics program is established in a community, households are less likely to use a backyard composter [69]. This also appears to be the case when a municipality or region does not operate a curbside organics program, but residents gain access to a local- or neighbourhood-level organics diversion program [36]. As such, organics collection programs may make the act of throwing food away more convenient, which could also lead to increased food waste generation. As residential source separated organics programs continue to be established across the country, communities should consider implementing effective reduction strategies in conjunction with new diversion streams. Together, these efforts have the potential to result in a highly effective organics program — that is, one that results in zero food waste sent to landfill as well as a reduction in avoidable food waste generation.

"We found that if people had a green bin, and were properly using that green bin, that they just didn't think that there was an issue that the food was [being] wasted. I think you really need to take that into account and impart a 'food waste prevention-first' message to dispel that myth."

4.9 Determinants of household food wasting: Financial variables

Household income has inconsistently been identified as a determinant of food waste generation. In this review, household income was not identified as a strong predictor of food wasting [38, 33, 44]. However, some relationships were identified between food spending habits and the generation of avoidable food waste. Households that spent more money on groceries generated more avoidable food waste, and households that regularly followed a budget while food shopping generated less avoidable food waste [30]. These findings align with the conceptual thinking around food preparation determinants, which suggests that having more food in the home to manage may lead to more wasted food. While these relationships may indicate an economic driver of waste, food spending habits may also be a proxy variable for time. Multiple interviewees articulated how time scarcity functions as a determinant of food wasting:

> There might be a bottleneck around food skills, but then also if people don't have time, it doesn't matter if you gave them the food skills — they still would be buying groceries and then buying their lunch out and then throwing out the groceries when they got home. (Academic, P1)

> When you don't have much time and you come home at 5:30 p.m., you have to feed the children. You don't necessarily think about preparing your own meal. You don't necessarily think about planning all your meals for the week with all the quantities to avoid food waste. Instead, you think: "I don't want to waste time. I want it to be quick." I think that's a systemic issue, because if we worked harder to promote a better work-life balance [...] maybe people would take more time to plan their meals better. (Executive in a governmental organization, P2)

A leader of a non-profit organization (P8) also described the influence these determinants may have on children's and young people's food literacy and food skills knowledge: "The primary learning site is in the home and this has a lot to do with socioeconomic realities and whether parents have the time to be working on [food skills] with their kids." The development of food literacy and food skills knowledge is often deeply embedded in familial structures. Parents and/or guardians may provide the conceptual knowledge and procedural tools that later dictate behaviours around food shopping, preparation, and management [54]. Thus, children's development of food literacy and food skills knowledge may be influenced by parental capacity, as time scarcity and financial pressures can inhibit 'informal', at-home learning opportunities. Alongside roll backs to home economics and equivalent courses in Canadian classrooms [45, 70], there appear to be gaps in food knowledge and practical food skills amongst younger populations [71, 72]. Despite the integration of national

> The affordability crisis and cheap, processed food is like a feedback loop for decreasing food literacy."

dietary guidelines into some curricula (e.g., Ontario's elementary curriculum), children's understanding of Canada's Food Guide remains low [46], highlighting the continued importance of at-home learning.

It is not yet known if and how current socioeconomic circumstances — namely, the 'cost-of-living' or 'affordability' crisis — may be influencing household food literacy and/or food wasting. Since 2022, the cost of food in Canada has increased by 22%, which is nearly double the 13% increase observed across other categories of consumer goods [73]. While wasting food is often an 'out-of-sight, out-of-mind' type of behaviour, some interviewees suggested that current circumstances may lead to increased awareness of food wasting:

> I do think [food literacy] is at an all-time low, but I also think that awareness might be quite high and I think that's being driven by an affordability crisis. I think people are more aware of the notion of making food go as far as they can, but that doesn't necessarily mean that that's what's happening on the ground. (Circular economy policy advisor, P4)

In response to the rising cost of food, some households may purchase more low-cost, ultra-processed foods — prioritizing affordability over nutrition. Because ultra-processed foods are designed for convenience, minimal levels of food literacy are needed to prepare these foods. A circular food system policy advisor (P3) cited that the prevalence of low-cost, ultra-processed foods may contribute to diminishing food literacy and food skills knowledge over time: "The affordability crisis and cheap, processed food is like a feedback loop for decreasing food literacy."

Consistent with previous research [16, 74], saving money was identified as a key motivator of household food waste reduction in this review [34, 37, 42]. For example, 66% of survey respondents in a Canada-wide study reported that they were likely to consider food prices when determining if they should eat food past its best before date [41]. An executive in a governmental organization (P2) highlighted how this motivational factor appeals to residents: "When we say you'll save $1,300 a year [...] if you reduce your food waste, that resonates — it really resonates." As such, this motivator has been used to inform the design and implementation of household food waste reduction interventions (see 4.10 below). However, the effectiveness of 'money-saving' as a rhetorical tool carries the risk of oversimplifying the lived experiences of food insecure households, potentially framing food literacy as a solution for a systemic crisis. An interviewee described the need to balance empowering households with food skills and acknowledging the necessity of improved incomes for low-income households:

> We support a lived and living experience [of food insecurity] advisory group. [...] Whenever we do work engaging with community members who are coming from that set of circumstances, they often talk about wanting to have more food skills and food literacy. I think it's a fine balance for organizations to walk to respect the input of people with lived experience, but be careful not to frame things as if food literacy is a solution for food insecurity. The primary issue is almost like a rhetorical one — how do we talk about the fact that people get a lot of value from food literacy and from the experience of connecting with each other around food skills development and not imply that that's a substitute for assisting people with their incomes. (Leader of non-profit organization, P8)

4.10 Interventions

All of the unique household food waste reduction interventions (n = 6) reported on in this review were knowledge-based interventions (Appendix D). Consistent with previous research, they have yielded inconsistent results. Despite the prevalence of using knowledge-based interventions to reduce household-level food wasting, some interviewees highlighted the limitations of this approach:

> I think the misconception is that food waste generation happens because people don't know better — that it's a lack of awareness. And if we just tell people that they're wasting food and that it's a problem, then they'll change their behaviour. [...] Just giving people information is not enough. You have to capacitate them as well. (Academic, P1)

In London, Ontario, a household food waste reduction intervention called "Reduce food waste, save money" was pilot-tested through a randomized controlled trial, where sample households were divided into two categories: treatment and control [34, 35, 37, 75]. Prior to the implementation of the intervention, waste audits were conducted to establish a pre-intervention baseline assessment of the quantity and composition of food waste sent to landfill by the sample households. Treatment households were then provided with an intervention package that aimed to improve food literacy and reduce avoidable food waste generation through financial motivation and greater perceived behavioural control (i.e., an individual's perception of the ease or difficulty of engaging in a behaviour). The intervention package included: printed, magnetic, and online informational materials and reduction tips; a reusable food storage container; freezer stickers; and a grocery list pad. Five email messages were also sent to treatment households within two weeks of receiving the intervention package. Control households did not receive intervention packages. To evaluate the short-term effectiveness of the intervention, post-intervention waste audits were conducted one month after implementation. At this time, a statistically significant, 30% reduction in avoidable food waste generation was observed in treatment households compared to control households. Further, the long-term effectiveness of this intervention was evaluated at a third time period, 31 months following the implementation of the intervention [34, 35]. Avoidable food waste generation remained consistent between the short-term (1 month) and long-term (31 months) post-intervention measurements. This indicates that the reduction in avoidable food waste generation was sustained and that treatment households did not revert to their pre-intervention food wasting behaviours. However, because no statistically significant differences were observed between treatment and control groups at this long-term measurement interval, it is unknown if this sustained reduction is exclusively a result of the intervention.

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A similar approach was taken to pilot-test an intervention in Wellington-County, Ontario [31, 32]. Treatment households in this randomized controlled trial were provided with an intervention package that aimed to change non-cognitive drivers (i.e., emotions, social norms, and habits) of household food wasting. The intervention package included: printed and online informational materials and reduction tips, a reusable shopping bag, a reusable meal planner, a low-waste cook book, a magnetic food storage guide, and a vegetable scrub brush. A reminder postcard was also delivered to treatment households two weeks after receiving the intervention package. Post-intervention waste audits were conducted two and four weeks after implementation. These results were compared to pre-intervention baseline audit data to evaluate the intervention's effectiveness. Unlike "Reduce food waste, save money", this intervention was not found to be effective, as no statistically significant reductions in food waste generation were observed between the pre- and post-intervention measurements. One potential explanation for this ineffectiveness could be a lack of engagement, as treatment households reported not using many of the materials and tools included in the intervention package and few households accessed the online resources provided. Despite this finding, interviewees suggested that online resources may be the new, prominent approach to food skills education — especially with roll backs to home economics and equivalent courses in Canadian classrooms [45, 50]. A circular economy policy advisor (P4) shared: "I think they're learning more online through influencers, through rapid, short bites of information. [...] I don't think they would immediately turn to friends and family the way that they perhaps might have done in the past." Additionally, a waste management policy specialist (P7) said:

> I think that younger generations of 18 to 30 year olds maybe don't have the same exposure to food literacy skills going through school, so they're kind of learning it as they go and maybe they're learning things from TikTok and from online resources.

Three approaches to delivering a household food waste reduction intervention were evaluated through a randomized controlled trial in Toronto, Ontario [68, 76] Alongside a control group, three treatment groups were created to assess each delivery approach: (1) information-only, (2) community engagement and information, and (3) gamification and information. The information package, which was delivered to all three treatment groups, included printed and online informational materials and reduction tips, as well as a magnetic food storage guide. After receiving the intervention package, four newsletters were also delivered to treatment households (one every three weeks). Additionally, the community engagement group was given the opportunity to attend a series of in-person food waste reduction learning workshops, whereas the gamification group was provided access to an online trivia game with financial incentives (i.e., grocery gift cards) for continued participation. Post-intervention waste audits were conducted at the end of the 12-week intervention. When compared to pre-intervention baseline audit data, 13% to 18% reductions

in avoidable food waste generation were observed post-intervention, with a statistically significant difference observed between the gamification group and the control group. Because the gamification group was the only treatment group that had the opportunity to obtain financial incentives by participating in the intervention, it is unknown if this finding is a result of the gamified approach or due to the inclusion of financial rewards. The research team acknowledged that the general food waste reduction tips often provided in knowledge-based interventions, may not be universally applicable or effective across diverse household demographics. An interviewee also described this limitation: "People might have all the food skills and not have the time or not have the money to be able to do something differently" (Academic, P1).

In Guelph, Ontario, a food waste reduction intervention called "Weeknight Supper Savers" was pilot-tested in households with children aged 9 to 12 [29]. The four-week intervention paired an intervention package with an online cooking class. The intervention package included: informational materials, a reusable meal planner, a low-waste cook book, fillable grocery lists, a food storage guide, a vegetable scrub brush, an 'eat first' container, baking soda, and a child-friendly knife. Reinforcement text messages were also sent to households four times per week during the intervention period. Unlike the interventions listed above, "Weeknight Supper Savers" was not evaluated through a randomized controlled trial and no control group was included in the study. To assess the intervention's effectiveness, post-intervention waste audits were conducted at the end of the four-week intervention period and compared to pre-intervention baseline audit data. Because avoidable food waste generation did not significantly change between the pre- and post-intervention measurements, "Weeknight Supper Savers" did not effectively reduce household-level food wasting.

The "Supper Heroes" intervention was pilot-tested in Ontario households with children aged 9 to 14 [43]. The 4-month intervention paired an intervention package with a seven-part learning module featuring educational infographics and videos, family-based activities, and a community board for sharing experiences and interacting with other participants. The intervention package included: cook books, kitchen utensils, food items, and tools for food planning, shopping, and storage. "Supper Heroes" was not evaluated through a randomized controlled trial and no control group was included in the study. To assess the intervention's effectiveness, households completed a 7-day weight-based food diary (i.e., households were provided with a kitchen scale) both pre- and post-intervention. Following the intervention, self-reported avoidable and possibly avoidable food waste generation significantly decreased by 53%. However, without a control group for comparison, it is unknown if this reduction is a result of this intervention or external factors. The research team acknowledged the multi-disciplinary expertises needed to design and implement this intervention — possibly a critical component of designing impactful interventions. An interviewee also described the value of using a collaborative, interdisciplinary approach to address household food wasting:

> When we first came to the area of food waste reduction, we immediately felt like, as waste managers, we didn't necessarily have the background to be advising people on food skills and food storage and food safety. That's where we connected with our public health folks and we immediately saw the value of working together. [...] Working together to develop messaging that we could both use amplifies it and reduces duplication and it makes it more efficient and fulsome. From the public health side, I think they really saw the opportunity to engage people in the food literacy practices that they promote with an environmental lens. It brings a different opportunity to get people excited about some of these practices in a way that doesn't just tie to public health, that really ties to the environmental piece too. So, they're reaching a different audience, we're also reaching a different audience. It's really worked well for us to collaborate. (Waste management policy specialist, P7)

> I'm a systems thinker, so I think everybody is part of the solution and there are opportunities in all sectors to contribute, but certainly education would be one of the primary opportunities."

A 5-week household food waste reduction intervention was pilot-tested across households in Canada with children aged 3 to 18 [40]. The intervention encouraged households to select one day a week to make a 'bonus meal' to use-up food in their homes following the '3+1 approach' that incorporates: (1) a base (e.g., pasta, rice), (2) fruit and/or vegetables, (3) a protein, and (+1) a condiment, sauce, seasoning, and/or herbs. The intervention was assessed through a randomized controlled trial with one control group and four treatment groups: (1) 'use-up only' (2) 'collect + use-up', (3) 'track + use-up', and (4) 'tag + use-up'. The intervention package, which was delivered to all treatment groups, included informational materials and flexible recipes. In addition to these core materials, the 'collect + use-up', 'track + use-up', and 'tag + use-up' treatment groups received the following tools, respectively: a collection basket to store food to be used up, a magnetic tracking board to document foods that need to be eaten, and tagging clips to label food that should be eaten first. Throughout the intervention, participants completed weekly surveys that the research team used to evaluate the intervention's effectiveness. A 33% reduction in self-reported food waste generation was observed across treatment households. While no statistically significant differences were identified between any of the treatment groups, significant reductions in self-reported food waste generation were observed in the treatment groups relative to the control group in weeks two, three, four, and five. However, eight weeks after the end of the intervention, differences between treatment and control groups were no longer statistically significant, implying that households likely reverted back to their pre-intervention behaviours at this time.

Given the inconsistent results of these interventions, additional approaches to improve food literacy and reduce household food wasting should be explored. The interviews highlighted a growing consensus that individual intent is insufficient without systemic support. For example, an environmental consultant and academic (P10) stated: "There needs to be some back-end drivers or policies that are sort of pushing the outcomes that we want to have rather than just waiting for everybody to volunteer to do it because it just doesn't work that way." Interviewees primarily proposed education-based and government-supported approaches. A sustainable diet specialist (P5) cited the education system as a pivotal site for instigating systemic change: "I'm a systems thinker, so I think everybody is part of the solution and there are opportunities in all sectors to contribute, but certainly education would be one of the primary opportunities." Aligned with this thinking, a number of non-profit organizations in Canada support the education sector with food literacy programming and resources, such as Growing Chefs, Farm to Cafeteria Canada, Agriculture in the Classroom Canada, and Nutrition and Food Literacy Canada. A professor (P9) also emphasized the value of school-based programs: "Food literacy in schools can definitely help because if it's institutionalized, it's available and accessible everywhere." These perspectives highlight a collective shift toward re-institutionalizing food literacy and food skills knowledge. School systems may be the most scalable and equitable venue, as embedding these competencies within formal curricula ensures that knowledge is made universally accessible and reaches diverse populations that might otherwise be missed by fragmented, localized programs.

A waste management policy specialist (P7) emphasized the necessity of a coordinated, national effort: “We would love to see, at a federal scale, more investment in food literacy and food waste reduction education campaigns to the general public to really drive that social norm around not wasting food.” While there is currently not a national, coordinated effort, many municipalities and regional districts lead initiatives in their respective jurisdictions, such as York Region’s “Good Food” project and Metro Vancouver’s food scraps recycling campaign. Increased forums and opportunities to discuss and share these types of initiatives with others contributing to household food waste reduction efforts in Canada may help accelerate progress in the absence of a national, coordinated effort. Another interviewee suggested that solving systemic food waste will require a strategic alignment between public and private sectors: “I believe collaboration between government and business is going to be really important” (Circular economy policy advisor, P4). A current example of this type of collaboration within the Canadian context is the Love Food Hate Waste [2] program, a globally recognized behaviour change program, originally created by the Waste and Resources Action Programme (i.e., “WRAP”), designed to encourage the reduction of household-level food waste generation. The program is currently active in 10 countries and has been active in Canada since 2018. Alongside national communication efforts that aim to increase awareness of household food wasting and increase food literacy and food skills knowledge, the program partners with municipalities and regional governments across Canada who amplify national efforts within their local communities. To move beyond awareness raising and information delivery, some government partners pair program content and campaigns with community-based, skills development opportunities, such as pickling workshops. This model illustrates how public and private sectors can effectively collaborate within a standardized national framework that can be localized to meet the specific cultural and practical needs of diverse Canadian communities.

5.0 Conclusion

This research aimed to determine if and how food literacy and food skills knowledge influence the generation and management of household food waste in Canada. The 23 studies included in this literature review and the ten interviews conducted with subject matter experts furthered a collective understanding of these relationships. The findings of this study suggest that food literacy is a complex and multidimensional determinant of household food wasting. The following food literacy and food skills variables were found to be associated with household-level food waste generation in Canada:

1. **Unplanned, impulse, and bulk food purchases**: Households generate more avoidable food waste when they make unplanned, impulse, and/or bulk food purchases.
2. **Budgeting at the grocery store**: Households that regularly follow a budget while food shopping generate less avoidable food waste than households that spend more money on groceries.
3. **Preparing meals at home:** When households prepare more meals at home, they also generate more avoidable and unavoidable food waste.
4. **Knowledge of best before dates:** Understanding that best before dates do not indicate food safety is ironically associated with increased avoidable food waste generation.
5. **Managing leftovers**: Households that infrequently throw away leftovers generate less avoidable food waste compared to households that frequently waste leftovers.

Knowledge-behaviour gaps, as well as systemic barriers related to time and money, may further complicate — and in some cases possibly negate — relationships between food literacy and food wasting. Additionally, food provisioning behaviours are likely influenced by a retail landscape that pushes for overconsumption and often works against household food waste reduction. This field of research would benefit from further exploration of determinants related to key pillars of food literacy and food skills, such as food systems knowledge, planning, shopping, preparation, and storage.

The results of the literature review present a methodological shift towards prioritizing the direct measurement of waste composition over self-reported, recall data. While surveys are often favoured for their feasibility, the findings in this study support the consensus among researchers that self-reported methodologies often lead to an underestimation of food waste generation [11, 12, 13, 14, 15, 16, 17]. Underestimating waste generation may impact residential curbside collection programs, lead to landfill capacity and planning issues, as well as work against the achievement of environmental goals, such as greenhouse gas emission reduction targets. Furthermore, reliable food waste measurements are

critical to accurately evaluate the effectiveness of household food waste reduction interventions. Because 53% of the unique studies included in this review that reported on food waste generation directly measured wasted food through waste auditing, this study offers a robust and accurate reflection of the actual quantity and composition of household food waste generated across the represented geographies.

The lack of an internationally recognized, standard food waste classification scheme has resulted in a growing, global body of literature that cannot easily be compared. Without a widely-accepted national standard, this issue is also present within the Canadian context and was identified as a limiting factor in this review. The development of a standardized food waste reporting guide would increase the feasibility of conducting longitudinal studies that aim to analyze food waste generation over time and across national and international geographies. Similarly, and consistent with previous research, this study also identified a lack of standardization across assessments of food literary and food skills knowledge. As such, the comparability of results was somewhat limited. In the absence of a widely-accepted framework, researchers should prioritize the transparent reporting of their methodologies, ensuring that study designs are sufficiently detailed to allow for replication or future expansion by the broader research community.

Current household food waste reduction intervention efficacy continues to be limited by a lack of longitudinal studies. To date, only one known study has evaluated the long-term effectiveness of a household food waste reduction intervention in Canada. The field of household food waste research would benefit from a transition toward longitudinal study designs capable of measuring and monitoring behavioural changes over extended periods. Moving forward, researchers and practitioners should also consider feasibility, scalability, and replicability when designing and implementing household food waste reduction interventions to enable the application of effective interventions in communities across the country. This research confirms the need to move beyond interventions that simply raise awareness of food waste, and instead aim to empower households through food agency — the functional ability and self-efficacy to act within the food system, navigate systemic barriers, and manage food effectively. As this study presents the most up-to-date literature published on this topic within a Canadian context, the findings can be used to inform the design and implementation of evidence-based household food waste reduction interventions that aim to strengthen food agency. The transition from passive awareness toward functional empowerment likely will not be realized through isolated efforts. A collaborative framework, underpinned by multi-sectoral support from public, private, and non-profit sectors, may enable Canada to shift away from fragmented awareness-raising campaigns to a sustained, culturally embedded reduction in household food waste.

6.0 References

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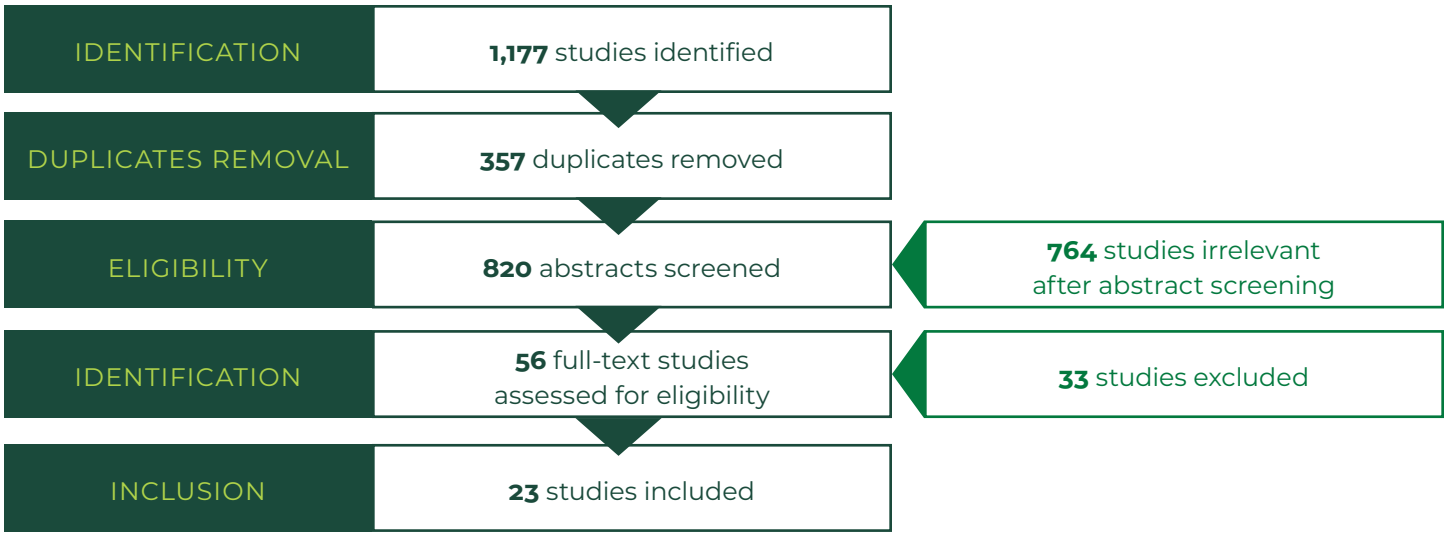
Appendices

Appendix A: PRISMA flow diagram of article identification and selection



Appendix B: Interview Guide

Introduction

1. What is your current role?
2. How does your work contribute to evaluating or addressing food literacy and/or household food waste in Canada?

Food literacy and food skills knowledge in Canada:

3. As there are many accepted definitions of 'food literacy', how do you define a 'food literate' household?
4. In your field of work, what are the primary metrics or indicators used to assess food literacy?
   - a) What are the benefits and limitations of these methodologies?
5. How would you describe the current 'status' of food literacy and food skills knowledge in Canada?
   - a) How does the current 'status' compare to levels of food literacy observed 5, 10, or even 20 years ago?
   - b) If there have been changes to food literacy levels, what factors have contributed to these changes?
   - c) Where and how are Canadians currently learning about food literacy and food skills? How has this changed over time?
6. Has the conversation around food literacy in Canada shifted over the last generation?
   - a) If so, how have conversations shifted and what factors have driven this shift?
7. What differences, if any, exist in food literacy levels across different Canadian demographics (e.g., urban vs. rural, children vs. adults, low vs. high income, etc.)?
8. Where do you think the greatest opportunities for improving food literacy lies (e.g., within education systems, the retail sector, government, etc.)?
9. What specific 'pillars' of food literacy and food skills management (e.g., nutritional knowledge, food preparation skills, food systems awareness, etc.) are the most critically underdeveloped in Canada?
   - a) What impact, if any, do these critically underdeveloped pillars have on food waste generation?

Household food wasting in Canada:

10. How does your work bridge gaps between food literacy and food wasting?
11. What are the primary systemic and/or behavioural drivers that lead to household food waste generation?
12. What is the most common food literacy gap in Canadian households that leads to the generation of food waste?
13. How do curbside green bin — or equivalent source separated organics — programs contribute (positively, negatively, or both) to household food waste generation?
14. What is the most substantial misconception about food waste drivers in Canada, and how is this misconception shaping or misdirecting programs, policies, and/or initiatives aimed at reducing household food waste?
    - a) What approach would you recommend to alleviate this misconception?

15. What effective household food waste reduction intervention(s) have you witnessed, if any?
    - a) What factors contributed to the intervention's effectiveness?
    - b) What role, if any, did food literacy and/or food skills knowledge have in the design of this intervention?
    - c) If you have not witnessed any effective household food waste reduction interventions, what lessons can we learn from the attempts that have been made?

Conclusion:

16. What impact, if any, has the current 'cost of living crisis' in Canada had on food literacy, food skills knowledge, and/or household food wasting?

17. What impact, if any, has the 'Buy Canadian' movement had on food literacy, food skills knowledge, and/or household food wasting?

18. Do you have any other insights or perspectives that you would like to share?

19. Is there anyone else that you would recommend we speak to for this research?

Appendix C: Table of non-intervention studies that reported on food literacy and household-level food wasting

Study	Geography	Time of data collection	Methodologies	Sample sizes	Quantity & composition of food waste
Peer-reviewed, academic literature					
Li et al. [29]	Toronto, Ontario	August 2018	Survey & waste audits	142 single-family households	Avoidable: 1.20 kg/person/ week
Parizeau et al. [31]	Guelph, Ontario	Summer 2014 & 2015	Survey & waste audits	115 single-family households	Total: 1.64 kg/ person/week (64% avoidable & 26% unavoidable)
Everitt et al. [34] & also reported in Everitt [36]	London, Ontario	June 2020	Neighbourhood food environment mapping & waste audits	100 single-family households	Total: 2.81 kg/ household/week (52% avoidable & 48% unavoidable)
Everitt et al. [37] & also reported in Everitt [36]	London, Ontario	May 2021 to April 2022	Survey & waste audits	Survey: 257 participants Audits: 159 households	Total: 2.59 to 5.31 kg/household/ week (46% to 68% avoidable & 32% to 54% unavoidable)
Natali et al. [42]	Canada	Not reported	Survey	954 participants	Avoidable: 0.88 L/household/ week
Gooch et al. [45]	Oakville, Ontario	November 2019 to February 2020	Interviews & food diaries	Interviews: 26 participants Dairies: 65 households	Total: 1.70 kg/ person/week (42% avoidable & 58% unavoidable)
Carroll et al. [47]	Guelph-Wellington, Ontario	August to September 2017 & 2018	Survey & waste audits	Survey: 130 participants Audits: 85 households	Not reported
Zeng [51]	Quebec	December 2022 to April 2023	Focus groups & interviews	22 participants	Not measured
Eckert et al. [53]	Canada	January to April 2024	Interviews	30 participants	Not measured
Ladele et al. [66]	London & Kitchener-Waterloo, Ontario	May 2020	Survey	517 participants	Not measured

Appendix C cont.

Non-intervention studies that reported on food literacy and household-level food wasting.

Study	Geography	Time of data collection	Methodologies	Sample sizes	Quantity & composition of food waste
Grey literature					
Second Harvest [1]	Canada	2022 to 2024	Mass balance modelling, secondary data analysis, survey, interviews, & focus groups	Survey: 801 participants Interviews: 83 participants Focus groups: 80+ participants	17% of avoidable food waste in Canada is generated by households
Love Food Hate Waste Canada [2]	Canada	2018 to 2022	Survey, food diaries, & waste audits	Not reported	Avoidable: 2.69 kg/ household/week
Cloutier & Roy [43]	Quebec	May to November 2020	Survey, focus groups, & food dairies	Survey: 1,061 participants Focus groups: 43 participants Dairies: 39 households	Total: 3.85 L/ household/week (72% avoidable & 28% unavoidable)

Appendix D: Table of household food waste reduction interventions

Intervention studies	Geography	Time of data collection	Methodologies	Sample size	Time of post-intervention measurement	Change in food waste post-intervention
Laila et al. [30]	Guelph, Ontario	October to December 2020	Pre-intervention: survey & waste audits Post-intervention: survey, waste audits, & interviews	Intervention: 19 households (all treatment, no control) Surveys: 48 participants Audits: 17 households Interviews: 25 participants	4 weeks (immediately following end of intervention period)	No significant reductions in food waste generation
Bain et al. [32] & also reported in Bain et al. [33]	Wellington Country, Ontario	June to November 2021	Pre-intervention: waste audits Post-intervention: survey & waste audits	Intervention: 52 households (32 treatment & 20 control) Survey: 7 participants (treatment) Audits: 52 households	2 weeks & 4 weeks after intervention implementation	No significant reductions in food waste generation and no differences observed between treatment and control groups
Everitt et. al [35] & also reported in Everitt [36] & van der Werf et al. [69]	London, Ontario	September 2017 to June 2020	Pre-intervention: waste audits Post-intervention: waste audits	99 single-family households (47 treatment & 52 control)	1 month & 31 months after intervention implementation	30% decrease in the generation of avoidable food waste sustained long term, with no significant differences observed between treatment and control groups
van der Werf et al. [38] & also reported in van der Werf et al. [69]	London, Ontario	September to October 2017	Pre-intervention: survey & waste audits Post-intervention: waste audits	112 single-family households (54 treatment & 58 control)	1 month after intervention implementation	30% decrease in the generation of avoidable foodwaste in treatment households compared to control households ($p = 0.05$)

Appendix D cont.

Table of household food waste reduction interventions

Intervention studies	Geography	Time of data collection	Methodologies	Sample size	Time of post-intervention measurement	Change in food waste post-intervention
Cooper et al. [41]	Canada	September to December 2020	Pre-intervention: survey Post-intervention: survey	909 households (186 treatment #1, 182 treatment #2, 202 treatment #3, & 185 treatment #4, & 154 control)	1, 2, 3, 4, 5, & 8 weeks after intervention implementation	33% decrease in the generation of food waste in treatment households compared to control households during the first few weeks of the intervention ($p < 0.001$ to $p = 0.03$), not sustained long-term
Eckert et al. [44]	Ontario	May 2023 to January 2024	Pre-intervention: survey & food diaries Post-intervention: survey, food diaries, & interviews	Intervention: 25 households (all treatment, no control) Surveys: 23 participants Diaries: 16 households Interviews: 10 participants	4 months after intervention implementation	53% decrease in the generation of avoidable & possibly avoidable food waste ($p = 0.002$)
Soma et al. [65] & Soma et al. [71]	Toronto, Ontario	August 2018 to March 2019	Pre-intervention: survey, waste audits Post-intervention: survey, waste audits, & focus groups	Intervention: 501 households (140 information treatment group, 119 community engagement treatment group, 122 gamification treatment group, & 120 control) Surveys: 261 participants Audits: 146 single-family households Focus groups: 44 participants	12 weeks (immediately following end of intervention period)	13% to 18% decrease in the generation of avoidable food waste with a significant difference observed between the gamification treatment group and control group ($p = 0.07$)