



# HHS Public Access

Author manuscript

*Physiol Behav.* Author manuscript; available in PMC 2021 August 01.

Published in final edited form as:

*Physiol Behav.* 2020 August 01; 222: 112930. doi:10.1016/j.physbeh.2020.112930.

## Ethical Considerations for Food and Beverage Warnings

**Anna H. Grummon, PhD, MSPH<sup>a,\*</sup>, Marissa G. Hall, PhD, MSPH<sup>b</sup>, Jason P. Block, MD, MPH<sup>c</sup>, Sara N. Bleich, PhD<sup>d</sup>, Eric B. Rimm, ScD<sup>e</sup>, Lindsey Smith Taillie, PhD, MPH<sup>f</sup>, Anne Barnhill, PhD<sup>g</sup>**

<sup>a</sup>Harvard Center for Population and Development Studies, Harvard TH Chan School of Public Health. Address: 9 Bow Street, Room 306, Cambridge, MA, 02138, United States.

<sup>b</sup>Department of Health Behavior, University of North Carolina Gillings School of Global Public Health, Lineberger Comprehensive Cancer Center, and UNC Center for Health Promotion and Disease Prevention, University of North Carolina Chapel Hill. Address: 312 Rosenau Hall, 135 Dauer Drive, Chapel Hill, NC, 27599, United States.

<sup>c</sup>Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute. Address: 401 Park Drive, Suite 401 E, Boston, MA, 02215, United States.

<sup>d</sup>Department of Health Policy and Management, Harvard TH Chan School of Public Health, and Radcliffe Institute for Advanced Study. Address: 677 Huntington Avenue, Kresge 405, Boston, MA, 02115, United States.

<sup>e</sup>Department of Epidemiology and Department of Nutrition, Harvard TH Chan School of Public Health. Address: 655 Huntington Avenue, Building II Room 373a, Boston, MA, 02115, United States.

<sup>f</sup>Department of Nutrition, University of North Carolina Gillings School of Global Public Health, and Carolina Population Center, University of North Carolina Chapel Hill. Address: 123 W. Franklin St, Room 2107, Chapel Hill, NC, 27514, United States.

<sup>g</sup>Berman Institute of Bioethics, Johns Hopkins University, Deering Hall, 1809 Ashland Avenue, Baltimore, MD, 21205, United States.

### Abstract

Several countries have implemented warnings on unhealthy foods and beverages, with similar policies under consideration in the U.S. and around the world. Research demonstrating food warnings' effectiveness is emerging, but limited scholarship has evaluated the ethics of food warning policies. Using a public health ethics framework for evaluating obesity prevention policies, we assessed the ethical strengths and weaknesses of food warnings along multiple dimensions: 1) Health behaviors and physical health, 2) Psychosocial well-being, 3) Social and cultural values, 4) Informed choice, 5) Equality, 6) Attributions of responsibility, 7) Liberty, and 8)

---

\*To whom correspondence should be addressed: Anna H. Grummon, Harvard Center for Population and Development Studies, 9 Bow St., Room 306, Cambridge, MA 02138, agrummon@hsph.harvard.edu, phone: (617) 496-8225.

**Publisher's Disclaimer:** This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Privacy. Our analysis identifies both ethical strengths and weaknesses of food warnings, including that: 1) warnings are likely to generate important benefits including increased consumer understanding and informed choice, healthier purchases, and potential reductions in obesity prevalence; 2) warnings evoke negative emotional reactions, but these reactions are an important mechanism through which food warnings encourage healthier behaviors and promote informed choice; 3) warnings appear unlikely to have ethically unacceptable effects on social and cultural values, attributions of responsibility, liberty, or privacy. Current research suggests we continue to pursue food warnings as a policy option for improving public health while simultaneously conducting additional research on the ethics of these policies. Future research is especially needed to clarify warnings' effects on stigma and to characterize the balance and distribution of costs of and benefits from implementing food warning policies.

### Keywords

Food and beverage warnings; health warnings; warning labels; ethics; ethical considerations; obesity prevention

---

### Introduction

Globally, consumption of unhealthy foods (e.g., processed meats, sugar-sweetened beverages) has risen over the last several decades.<sup>1</sup> Poor dietary quality increases risk for premature death and several of the most common chronic diseases, including obesity,<sup>2–4</sup> cardiovascular disease,<sup>5,6</sup> and type 2 diabetes.<sup>6,7</sup> Policy action is needed to reverse these trends and achieve meaningful, population-wide improvements in dietary quality and diet-related disease.<sup>8–11</sup>

Policies requiring warnings on unhealthy foods and beverages are emerging as a promising strategy to address poor dietary quality, as research suggests that warnings encourage healthier purchases<sup>12–14</sup> and could spur product reformulation.<sup>15</sup> Food and beverage warnings (hereafter simply “food warnings”) refer to messages on products, menus, or advertisements that either make a direct statement about a product’s health consequences (e.g., “contributes to obesity”) or alert consumers that a product contains an excessive amount of an unhealthy nutrient (e.g., a stop sign logo with the statement “High in sodium”). Food *warnings* are distinct from numerical nutrition *labels* such as nutrition facts panels and calorie content labels that provide numerical information only without conveying information about healthfulness. Warnings also exclude traffic light, health star, or Nutri-Score labels because these labels describe positive as well as negative health attributes and typically do not provide statements about excessive amounts of nutrients in products or the health consequences associated with consumption.

Policymakers are increasingly interested in food warning policies. In the U.S., lawmakers in five states have proposed policies to require warnings on sugar-sweetened beverages (SSBs) that describe the health consequences of these products (Figure 1).<sup>16–20</sup> Other countries have already adopted food warnings: in 2016, Chile began requiring front-of-package “high in” warnings on products that exceed recommended levels of sugar, sodium, saturated fat, or calories (Figure 2).<sup>21</sup> Similar policies have been passed or implemented in Peru, Uruguay,

and Israel<sup>22</sup> and are under consideration in South Africa,<sup>23</sup> Canada,<sup>24</sup> Brazil,<sup>25</sup> and elsewhere.

Debates about food warning policies often center on ethical questions such as whether warnings will achieve their public health goals,<sup>26</sup> infringe on consumers' autonomy by appealing to fear,<sup>27,28</sup> exacerbate disparities,<sup>29</sup> or increase stigma.<sup>30</sup> Answering these and other ethical questions is important to ensure that warning policies properly balance ethics with the goal of improving population health. Anticipating and mitigating potential ethical pitfalls of food warnings can also help preempt opposition to these policies.<sup>31,32</sup> To date, limited scholarship has considered the ethics of food warnings. In this article, we explore potential ethical implications of requiring warnings on foods and beverages.

### **Framework for Evaluating the Ethical Implications of Food and Beverage Warnings**

A variety of frameworks exist for examining ethical dimensions of public health policies.<sup>31,33–35</sup> Recently, Marieke ten Have and colleagues developed a framework for analyzing the ethics of a program or policy aimed at preventing obesity. The framework consists of identifying the policy's ethical strengths and weaknesses along multiple dimensions (e.g. informed choice, equality), considering ways to minimize weaknesses and maximize strengths, and assessing whether the policy's ethical weaknesses can be justified.<sup>32,36,37</sup> Our analysis focuses on six components of this framework: 1) health behaviors and physical health, 2) psychosocial well-being, 3) social and cultural values, 4) informed choice, 5) equality, and 6) attributions of responsibility (Table 1). Although the framework also encourages the ethical analyst to examine policies' effects on liberty and privacy, food warnings have little or no potential impact on liberty or privacy; thus, we do not discuss those in depth here.

Using the framework, we review available research to identify ethical strengths and concerns of food warnings. Ethical concerns do not necessarily disqualify food warnings from policy consideration. Instead, one must consider whether any ethical downsides of food warnings are reasonable in light of their ethical strengths and their potential to improve population health. Table 1 provides a summary of our analysis, current conclusions, and potential areas for future research.

### **Health Behaviors and Physical Health**

An important first question in evaluating the ethics of food warnings is assessing whether warnings encourage healthier behaviors and/or better physical health. Most research has focused on warnings' shorter-term impacts on health behaviors like food purchases, rather than their longer-term impacts on health outcomes. Experimental and quasi-experimental evidence indicates that food warnings reduce purchases of the targeted nutrients or products. Two recent studies of U.S. adults found that exposure to sugar-sweetened beverage (SSB) health warnings reduced calories purchased from these beverages by 14% to 22%.<sup>12,13</sup> Another trial of more than 3,500 Canadian adolescents and adults found that participants exposed to "high in" warnings purchased less sugar, saturated fat, and calories from beverages and less sodium and calories from foods.<sup>14</sup> Because food and beverage purchases are predictive of dietary intake,<sup>38,39</sup> these studies suggest that warnings could improve

physical health by encouraging healthier diets. Additionally, two recent microsimulation studies projected that SSB warnings' effects on purchases are large enough to meaningfully reduce obesity prevalence.<sup>40,41</sup>

Food warning policies could also spur manufacturers to reformulate products to avoid triggering a mandatory warning.<sup>42,43</sup> While research on food warnings' effects on reformulation is limited,<sup>15</sup> studies examining other nutrition labeling schemes,<sup>44–46</sup> as well as other nutrition policies like taxes,<sup>47–49</sup> find that implementing these policies can prompt positive changes in products' overall nutritional profile. Additionally, a recent experiment with 306 Uruguayan adults found that consumers preferred reformulated foods without warnings to non-reformulated foods with warnings,<sup>50</sup> suggesting that reformulation could encourage healthier purchases.

As food warning policies are enacted, opportunities to explore their effects on physical health in real-world settings will emerge. Several questions will be important to address. First, studies can establish the trajectory of warnings' effects over time. Warnings that become more or less effective over time may have different effects on long-term health outcomes;<sup>40</sup> rotating warnings could help ensure sustained effectiveness.<sup>51</sup> Second, research can determine the extent to which food warnings spur product reformulation<sup>15</sup> and whether reformulation enhances warnings' health benefits. Third, most research on food warnings has focused on obesity; additional research will clarify warnings' impacts on type 2 diabetes, heart disease, and other diet-related diseases. Additionally, food warnings may be implemented in tandem with other nutrition policies such as taxes or marketing restrictions;<sup>21</sup> future research can examine whether these policies have synergistic effects on health behaviors and health outcomes. Despite these gaps, a growing body of evidence suggests that food warnings are likely to help consumers make healthier choices and could lead to improvements in population-level health outcomes.

## Psychosocial Well-Being

Even if warnings generate unambiguous improvements to health behaviors and physical health, they might simultaneously have negative effects on psychosocial well-being. We focus here on warnings' potential to generate three kinds of psychosocial effects: negative emotions, stigma, and negative body image and disordered eating behaviors.

### Negative emotions.

When consumers view a food warning, they may experience a range of short-term negative emotional responses;<sup>52–56</sup> for example, consumers may feel fear and anxiety in response to the knowledge that a product contributes to health harms. Whether causing these negative emotions is ethically justifiable depends upon their intensity, duration, and prevalence. If the negative emotions caused by warning labels are transient and do not lead to lasting harm, eliciting these emotions may be ethically justifiable, especially given that short-term negative emotions are a ubiquitous part of everyday life.<sup>57,58</sup> An ethical analysis of warnings' emotional impacts should also recognize the potential beneficial roles of negative emotions. Evidence suggests that experiencing anxiety, fear, or other negative emotions in response to warnings is a *productive* reaction because these emotions are a key pathway

through which warnings encourage healthier behaviors<sup>52</sup> and promote informed choice<sup>54,59–62</sup> (see also further discussion of emotion and informed choice below).

In addition to their direct effects on emotions, food warnings may also affect emotions indirectly by reducing enjoyable but unhealthy food and beverage consumption.<sup>63</sup> Reducing consumption of unhealthy foods could also lead to *improvements* in psychosocial well-being if consumers feel empowered or happy after making healthier choices.<sup>64</sup> Warnings' negative and positive emotional effects should be investigated further, and should be weighed against one another when analyzing warnings' ethical acceptability.

### **Stigma.**

Scholars have suggested that “information initiatives” like some food warnings could increase stigma toward people with certain health conditions by emphasizing personal responsibility for health outcomes.<sup>65,66</sup> This concern likely applies primarily to food warnings that include health effects statements (e.g., “sugary drinks contribute to obesity”), rather than warnings that signal excess levels of nutrients. To our knowledge, only one study has examined whether food warnings with health effects statements contribute to stigma, focusing specifically on stigma toward people with obesity. In that study, researchers recruited 681 adults and randomized half to view a pictorial SSB warning that described the health consequences of these beverages (“WARNING: Drinking beverages with added sugar(s) contribute to: obesity, diabetes, and tooth decay”) accompanied by images of the bare stomach of a person with obesity, a person injecting their stomach with a needle, and decaying teeth. Exposure to the pictorial warning led to small increases in both bias and disgust toward people with obesity.<sup>30</sup> However, the warning did not lead to more negative judgments about people with obesity, nor did it affect participants' beliefs about the importance protecting the rights of people with obesity. Still, ethicists have raised special concerns about messaging that provokes disgust toward others because of how disgust dehumanize its targets,<sup>67</sup> and food warnings that do not elicit disgust are likely to be more ethically acceptable.

More research will help to clarify the extent to which food warnings increase stigma (and perhaps particularly disgust) and what types of warnings elicit these responses. For example, text-only warnings or warnings with images of nutrients (e.g., number of teaspoons of sugar in a beverage) might elicit less stigma than warnings showing pictures of people, but this has not been studied. Warnings might also be less likely to generate stigma if they focus on health outcomes other than obesity.<sup>68</sup> Similarly, “high in” warnings like those required in Chile do not describe health consequences and, therefore, should be less likely to stigmatize.

### **Body image and disordered eating.**

Researchers have raised concerns that obesity prevention interventions, including nutrition labeling, could worsen body image and increase risk of disordered eating.<sup>30,69,70</sup> One experimental study has examined warnings' effects on body image. In a sample of 561 U.S. adults who considered themselves overweight or obese, researchers found that exposure to an SSB warning accompanied by an image of a person with obesity did not worsen participants' appearance self-esteem or overall self-esteem.<sup>30</sup> To our knowledge, studies

have not examined whether food warnings affect disordered eating; however, studies have examined traffic light labels, which share some similarities with “high in” food warnings. In one survey of 1,294 college students, 9% of those surveyed reported that they believed traffic light labels could put people at risk for developing an eating disorder.<sup>71</sup> However, in focus groups with 57 students, very few participants said they knew someone who had changed their eating behaviors in an unhealthy way after these labels were implemented in the students’ cafeterias.<sup>71</sup> Thus, the available limited evidence does not suggest that warnings will have major negative effects on body image or disordered eating.

## Social and Cultural Values

Some foods and beverages have important cultural or social value.<sup>32,36</sup> For example, we might eat cake to celebrate a birthday or share a particular meal as part of a family, religious, or cultural tradition.<sup>63</sup> Specific foods are linked to cultural, ethnic, national or regional identities, and have special significance for various population groups. If warnings reduce consumption of these foods and beverages, they might also diminish the positive feelings of identity, community, and belonging people experience from consuming these products. Most relevant to our analysis is whether warnings have a disparate effect on some cuisines or cultural groups and whether this is ethically acceptable. In one relevant case, the Italian government claimed that the United Kingdom’s voluntary traffic light labeling scheme unfairly targeted traditional Mediterranean foods such as cheeses and meats.<sup>72</sup> It is worth noting that in most countries with food warnings, the nutrient profile model used to determine when a product triggers a nutrient-based warning is an objective numerical system that evaluates a product’s nutrient content,<sup>73</sup> making it unlikely that the system would “single out” any particular food group based on cultural or ethnic background. Further, warnings do not prevent people from buying or consuming products, so major ethical concerns on this dimension appear unlikely.

## Informed Choice

A widely accepted view is that exercising autonomy requires making informed choices and being free of controlling influence by others.<sup>1</sup> For food warnings to respect and promote individual autonomy, they must promote consumers’ informed choosing without subjecting them to unacceptable manipulation, recognizing that our food choices are already heavily shaped by external forces including the food environment<sup>39,75,76</sup> and food marketing.<sup>77,78</sup>

To exercise informed choice, individuals must first understand their options for how to behave and the consequences of those behaviors.<sup>79</sup> Food warnings are likely to strengthen informed choice along these dimensions. Randomized experiments demonstrate that exposure to warnings increases consumers’ understanding of the healthfulness and health consequences of foods and beverages.<sup>80–85</sup> One randomized experiment with 387

---

<sup>1</sup>While it’s widely accepted that promoting informed choice is valuable as a way to promote individual autonomy, some ethicists have pointed out that not everyone wants information or wants to make an informed choice, and promoting *their* autonomy requires respecting their “right *not* to know.” For example, Bonotti argues that food labeling policies should strike a balance between respecting the autonomy of information-seekers who want nutritional information and information-avoiders who do not, for example by putting peel-off flaps on top of labels, or putting labels on the back of food packages.<sup>74</sup>

Uruguayan adults found that warnings improved consumers' ability to correctly identify products high in unhealthy nutrients.<sup>83</sup> Another study with 2,381 U.S. parents showed that warnings helped correct misperceptions about the healthfulness of certain sugary drinks (e.g., sweetened teas) often believed to be healthier than sodas.<sup>84</sup> Food warnings have also been shown to reduce the time and cognitive effort it takes consumers to evaluate product healthfulness,<sup>86</sup> suggesting that well-designed food warnings may benefit consumers' overall autonomy by freeing up cognitive resources to focus on other things.<sup>74</sup>

Food warnings also *activate* consumers' understanding of the health consequences of consuming certain foods by making that knowledge salient and accessible when consumers are making choices about what to buy. Experimental studies have demonstrated that food warnings encourage individuals to think more deeply about the health consequences of products when deciding what to buy or consume.<sup>12,13,56</sup> One randomized trial with 400 adults found that participants who saw warnings on SSBs reported thinking more about the harms of SSB consumption than those exposed to a control label,<sup>12</sup> and increased thinking about harms led to healthier beverage purchases.<sup>87</sup> Because decisions about food are often made without active thinking,<sup>75</sup> helping consumers keep products' health consequences at top of mind when making a purchase decision is likely to enhance their capacity to make and carry out informed choices.<sup>39,79</sup>

While food warnings increase and activate understanding, they also evoke emotions. Some scholars argue that interventions that change behavior by evoking emotion (in contrast to changing behavior by providing behavior) are unacceptably manipulative.<sup>27,88,89</sup> However, several considerations indicate that food warnings' emotional effects are *not* unacceptably manipulative. First, scholars have argued that there is not a dichotomy between conveying information and eliciting emotions,<sup>90–92</sup> but instead, that effectively conveying information *requires* eliciting emotion. The evidence is consistent with this view. Factual information (such as the information provided in text-only warnings) can and does elicit emotion,<sup>12,56,93,94</sup> and information that does not generate emotion lacks meaning.<sup>60–62</sup> Warnings that do not generate emotions are thus unlikely to effectively inform consumers and in this respect, warnings' emotionality functions to enhance informed choice. Second, some scholars have argued that eliciting emotion is not manipulative (and thus not ethically problematic) when the emotional response evoked is appropriate and improves reasoning.<sup>95,96</sup> Warnings are likely to meet this standard. Feeling fear, worry, or other negative emotions after seeing a food warning is likely an appropriate response to learning that consuming a product is associated with serious health consequences, and experimental studies find that feeling these emotions improves reasoning about the health consequences of unhealthy products.<sup>54,59</sup> Third, even if food warnings were manipulative, this could be seen as a form of counter-manipulation that aims to counteract arguably manipulative food marketing that often misrepresents products' healthfulness<sup>97</sup> and appeals to emotions<sup>98</sup> to sell products.

One additional consideration is how consumers feel about food warnings – do they perceive warnings as unacceptably manipulative? Studies typically find high public support for food warning policies,<sup>80,81,99–102</sup> suggesting that many consumers find warnings acceptable and desirable. Additionally, some studies have directly assessed perceptions of control over

one's eating choices. One study of 1,000 Canadian adults asked participants to rate whether "high in" beverage warnings made them feel more or less "in control" of their eating choices. Most respondents reported that the warnings made them feel more in control; fewer than 5% said the warnings made them feel less in control.<sup>99</sup> This study offers preliminary evidence that food warnings may not be unethically controlling, or at least may not be perceived as such. While future studies should examine whether this finding extends to other warnings types (e.g., graphic warnings) and in other populations, the balance of available evidence indicates food warnings are likely to promote informed choice without being unacceptably manipulative.

## Equality

The principle of equality requires a fair distribution of both goods and burdens.<sup>32,103,104</sup> For warnings to promote equality, they must not disproportionately benefit or burden a particular group unless doing so would reduce morally relevant inequities.<sup>103</sup> Existing research provides some initial insight into the likely distribution of warnings' benefits and harms.

### Distribution of benefits.

As discussed above, two benefits of food warnings are that they are likely to promote informed choice and discourage unhealthy purchases. Research to date has generally found that food warnings have similar beneficial effects on consumer knowledge and understanding,<sup>80,81,105</sup> behavioral intentions<sup>80,81</sup> (which are predictive of behavioral performance<sup>106</sup>) and actual purchase behaviors<sup>12</sup> across diverse demographic groups. These findings are consistent with studies of tobacco warnings, which also find that warnings typically produce similar beneficial responses across groups.<sup>53,55,94</sup> If these patterns hold in response to real-world implementation of food warning policies, warnings would be unlikely to exacerbate underlying disparities in knowledge or dietary behaviors. In this regard, food warnings differ from calorie labels and back-of-package nutrition information panels, which are used more often and understood better among more advantaged groups.<sup>107–109</sup>

If food warnings indeed exert similar effects on behavior across groups, they could reduce health disparities (and thus promote equality) in contexts where unhealthy food consumption is highest among more disadvantaged groups. This is because the same *proportional* reduction in unhealthy food consumption in response to warnings will generate larger *absolute* reductions among groups with higher baseline consumption of these foods. Consistent with that possibility, one recent simulation study projected that implementing SSB warnings in the U.S. would yield the largest reductions in SSB consumption racial/ethnic minorities and individuals with lower socioeconomic status, a result driven by higher baseline SSB consumption among these groups.<sup>40</sup> The study also projected larger obesity reductions among racial/ethnic minorities and individuals with lower socioeconomic status. These groups have higher rates of obesity, suggesting that implementing SSB warnings could reduce obesity disparities in the U.S. and thus promote equality along this dimension.



### Distribution of costs.

As mentioned above, research to date suggests that the costs of food warnings include possible emotional costs and the potential for increased stigma. Emotional costs (i.e., short-term negative emotions in reaction to warnings, potential lost enjoyment) would largely be concentrated among individuals who consume the products that display warnings. The ethical implications of this distribution of costs will depend in part on whether individuals who consume unhealthy products belong to a group that society especially wants to protect from additional burdens, such as lower-income or otherwise disadvantaged groups. The possibility of greater emotional costs among some groups should be weighed against the likelihood that these groups will also reap the largest health benefits from food warning policies. Further research should explore these tradeoffs in more depth and across different contexts.

Increasing stigma could have negative impacts that extend beyond individuals who consume the products that display warnings. For example, if food warnings do increase stigma toward people with obesity, this would disproportionately affect these individuals. People with diet-related health conditions such as obesity are already burdened by reduced health and by the stigma that chronic diseases often carry; policies that disproportionately harm these groups raise ethical concerns. This concern highlights the importance identifying warning designs that minimize this unintended consequence.

### Attribution of Responsibility

Public health policies and programs often communicate ideas about who is responsible for addressing public health problems.<sup>32,110</sup> Encouraging healthier eating and reducing diet-related disease might be framed as the responsibility of individuals, organizations, the government, industry, or some combination of these. Ethical public health policies should promote a fair and just balance of responsibility across these entities. On one hand, warnings are meant to change individual consumers' behavior and thus could suggest to the public that individual consumers are the primary entity responsible for ensuring healthy dietary intake and avoiding diet-related disease. This may be seen as unjust distribution of responsibility given that diet and health are the result of a variety of factors, many of which are outside of an individual's control.<sup>8,111,112</sup> On the other hand, warnings may also improve health by prompting industry reformulation.<sup>15</sup> Nutrition policies can be designed specifically to encourage product reformulation;<sup>113</sup> doing so may help shift the balance of implied responsibility to an ethically more favorable equilibrium (i.e., toward shared responsibility between individuals and industry). Additionally, warning policies can be accompanied by mass communication campaigns that emphasize that individuals, organizations, industry, and the government each have a role to play in encouraging healthy eating.<sup>114</sup>

### Conclusions

Four countries have mandated warnings on foods and beverages, with additional jurisdictions in the U.S. and around the world considering similar regulations. This paper drew on the framework developed by Marieke ten Have and colleagues<sup>32</sup> – a public health ethics framework for evaluating obesity prevention policies – to probe the ethics of food

warning policies. Our analysis of available evidence suggests that food warnings may be ethically defensible, depending upon the nature, magnitude and distribution of their costs and benefits (Figure 3). First, research suggests that food warnings generate important benefits including increased consumer understanding and informed choice, healthier food and beverage purchases, and potential reductions in obesity prevalence. Second, warnings also generate costs, including evoking negative emotions; however, these emotional reactions are an important mechanism through which warnings achieve their beneficial effects. Finally, research to date suggests that warnings are unlikely to have unacceptable effects on social and cultural values, attributions of responsibility, liberty, or privacy.

Our analysis also suggested key areas for future research. For example, there is limited research examining whether food warnings perpetuate stigma. Warnings should be designed to minimize stigma. If even well-designed warnings lead to some stigma, this must be weighed against warnings' benefits, particularly if this cost unfairly burdens certain groups. Research will also help clarify warnings' effects on equality. Emerging evidence suggests sugary drink warnings may reduce disparities in obesity prevalence in the United States, but additional investigation is needed to characterize the full distribution of food warnings' costs and benefits across ethically-relevant population subgroups. As additional evidence emerges on these topics, ethical analyses of food warnings should be refined and revised.

Policy action is essential to address the growing burden of diet-related disease worldwide. Our analysis suggests we pursue food warnings as a strategy for improving public health while also conducting additional research to enable a more thorough ethical analysis.

## Acknowledgments

We thank Doug Blanke of the Public Health Law Center for providing helpful comments on the manuscript.

### Funding

K01HL147713 from the National Heart, Lung, and Blood Institute of the National Institutes of Health supported MGH's time on the paper. LST received general support from the National Institutes of Health (CPC P2C HD050924, PI: Frankenberg). The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

## References

1. Imamura F, Micha R, Khatibzadeh S, et al. Dietary quality among men and women in 187 countries in 1990 and 2010: a systematic assessment. *The Lancet Global Health*. 2015;3(3):e132–e142. doi:10.1016/S2214-109X(14)70381-X [PubMed: 25701991]
2. Swinburn B, Sacks G, Ravussin E. Increased food energy supply is more than sufficient to explain the US epidemic of obesity. *Am J Clin Nutr*. 2009;90(6):1453–1456. doi:10.3945/ajcn.2009.28595 [PubMed: 19828708]
3. Bleich SN, Cutler D, Murray C, Adams A. Why is the developed world obese? *Annu Rev Public Health*. 2008;29:273–295. [PubMed: 18173389]
4. Danaei G, Ding EL, Mozaffarian D, et al. The preventable causes of death in the United States: Comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Med*. 2009;6(4):e1000058. doi:10.1371/journal.pmed.1000058 [PubMed: 19399161]

5. Micha R, Peñalvo JL, Cudhea F, Imamura F, Rehm CD, Mozaffarian D. Association between dietary factors and mortality from heart disease, stroke, and type 2 diabetes in the United States. *Jama*. 2017;317(9):912–924. [PubMed: 28267855]
6. Schwingshackl L, Hoffmann G. Diet Quality as Assessed by the Healthy Eating Index, the Alternate Healthy Eating Index, the Dietary Approaches to Stop Hypertension Score, and Health Outcomes: A Systematic Review and Meta-Analysis of Cohort Studies. *Journal of the Academy of Nutrition and Dietetics*. 2015;115(5):780–800.e5. doi:10.1016/j.jand.2014.12.009 [PubMed: 25680825]
7. Ley SH, Hamdy O, Mohan V, Hu FB. Prevention and management of type 2 diabetes: Dietary components and nutritional strategies. *The Lancet*. 7;383(9933):1999–2007. doi:10.1016/S0140-6736(14)60613-9
8. Swinburn BA, Sacks G, Hall KD, et al. The global obesity pandemic: Shaped by global drivers and local environments. *The Lancet*. 2011;378(9793):804–814. doi:10.1016/S0140-6736(11)60813-1
9. Roberto CA, Swinburn B, Hawkes C, et al. Patchy progress on obesity prevention: Emerging examples, entrenched barriers, and new thinking. *The Lancet*. 2015;385(9985):2400–2409. doi:10.1016/S0140-6736(14)61744-X
10. Hawkes C, Smith TG, Jewell J, et al. Smart food policies for obesity prevention. *The Lancet*. 2015;385(9985):2410–2421. doi:10.1016/S0140-6736(14)61745-1
11. Office of the Surgeon General, Centers for Disease Control and Prevention, National Institutes of Health. The Surgeon General’s Call to Action to Prevent and Decrease Overweight and Obesity. Rockville, MD: Office of the Surgeon General; 2001 <https://www.ncbi.nlm.nih.gov/books/NBK44206/>. Accessed January 17, 2018.
12. Grummon A, Taillie L, Golden S, Hall M, Ranney L, Brewer N. Sugar-sweetened beverage health warnings and purchases: A randomized controlled trial. *Am J Prev Med* 2019. doi:10.1016/j.amepre.2019.06.019
13. Donnelly G, Zatz L, Svirsky D, John L. The effect of graphic warnings on sugary-drink purchasing. *Psych Science*. 2018;29(8):1321–1333.
14. Acton RB, Jones AC, Kirkpatrick SI, Roberto CA, Hammond D. Taxes and front-of-package labels improve the healthiness of beverage and snack purchases: a randomized experimental marketplace. *International Journal of Behavioral Nutrition and Physical Activity*. 2019;16(1):46. doi:10.1186/s12966-019-0799-0 [PubMed: 31113448]
15. Kanter R, Vanderlee L, Vandevijvere S. Front-of-package nutrition labelling policy: Global progress and future directions. *Public Health Nutrition*. 2018;21(8):1399–1408. doi:10.1017/S1368980018000010 [PubMed: 29559017]
16. Robinson J Concerning Mitigation of the Adverse Impacts of Sugar-Sweetened Beverages; 2016 <http://app.leg.wa.gov/billsummary?BillNumber=2798&Year=2016>.
17. Monning B Sugar-Sweetened Beverages: Safety Warnings.; 2019 [http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=201920200SB347](http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB347). Accessed February 27, 2019.
18. Kobayashi B, Lopresti M, Morikawa D. Relating to Health; 2017 [http://www.capitol.hawaii.gov/measure\\_indiv.aspx?billtype=HB&billnumber=1209&year=2017](http://www.capitol.hawaii.gov/measure_indiv.aspx?billtype=HB&billnumber=1209&year=2017).
19. Stevens T, Carr S. An Act Related to Health and Safety Warnings on Sugar-Sweetened Beverages.; 2017 <https://legislature.vermont.gov/bill/status/2016/H.89>.
20. Rivera G Requires Sugar-Sweetened Beverages to Be Labeled with a Safety Warning.; 2017 <https://www.nysenate.gov/legislation/bills/2017/S162>.
21. Corvalán C, Reyes M, Garmendia ML, Uauy R. Structural responses to the obesity and non-communicable diseases epidemic: The Chilean Law of Food Labeling and Advertising. *Obes Rev*. 2013;14(Supple 2):79–87. doi:10.1111/obr.12099 [PubMed: 24102671]
22. Global Food Research Program. Front-of-package Labeling around the World. [https://docs.google.com/viewer?url=https%3A%2F%2Fwww.dropbox.com%2Fs%2Fmmeickvdsosye6e%2FUNCGFRP\\_FOP\\_label\\_maps.pdf%3Fd1%3D0](https://docs.google.com/viewer?url=https%3A%2F%2Fwww.dropbox.com%2Fs%2Fmmeickvdsosye6e%2FUNCGFRP_FOP_label_maps.pdf%3Fd1%3D0). Published May 20, 2019. Accessed August 27, 2019.
23. Tswana Y Warning labels planned for junk food. *Cape Times*. <https://www.iol.co.za/capetimes/news/warning-labels-planned-for-junk-food-19547471>. Published February 28, 2019. Accessed September 18, 2019.

24. Health Canada. Toward Front-of-Package Nutrition Labels for Canadians. <https://www.canada.ca/en/health-canada/programs/front-of-package-nutrition-labelling/consultation-document.html>. Published 2016. Accessed September 18, 2019.
25. Culliney K Warning or traffic-light labels? Brazil debates best option for compulsory labeling policy. Food Navigator. [https://www.foodnavigator-latam.com/Article/2018/08/15/Brazil-front-of-pack-food-labeling-traffic-light-or-warning-label-ABIA-and-IDEC-discuss?utm\\_source=copyright&utm\\_medium=OnSite&utm\\_campaign=copyright](https://www.foodnavigator-latam.com/Article/2018/08/15/Brazil-front-of-pack-food-labeling-traffic-light-or-warning-label-ABIA-and-IDEC-discuss?utm_source=copyright&utm_medium=OnSite&utm_campaign=copyright). Published August 15, 2018. Accessed September 18, 2019.
26. Cartwright M Soda Warning Labels: Rated “F” for Futility. Psychology Today. <https://www.psychologytoday.com/us/blog/food-thought/201406/soda-warning-labels-rated-f-futility-0>. Published June 15, 2014. Accessed August 27, 2019.
27. Bubb R TMI: Why the optimal architecture of disclosure remains TBD. *Mich L Rev.* 2014; 113:1021–1042.
28. R.J. Reynolds Tobacco Co. v. Food and Drug Admin.(United States Court of Appeals, District of Columbia Circuit 2012).
29. Cantrell J, Vallone DM, Thrasher JF, et al. Impact of tobacco-related health warning labels across socioeconomic, race and ethnic groups: Results from a randomized web-based experiment. *PLoS ONE.* 2013;8(1):e52206. doi:10.1371/journal.pone.0052206 [PubMed: 23341895]
30. Hayward L, Vartanian L. Potential Unintended Consequences of Graphic Warning Labels on Sugary Drinks: Do They Promote Obesity Stigma? *Obesity Science & Practice.*
31. Kass NE. An Ethics Framework for Public Health. *Am J Public Health.* 2001;91(11):1776–1782. doi:10.2105/AJPH.91.11.1776 [PubMed: 11684600]
32. ten Have M, Van Der Heide A, Mackenbach JP, De Beaufort ID. An ethical framework for the prevention of overweight and obesity: a tool for thinking through a programme’s ethical aspects. *The European Journal of Public Health.* 2012;23(2):299–305. [PubMed: 23132871]
33. Beauchamp DE. Public health as social justice. *Inquiry.* 1976;3–14. [PubMed: 130348]
34. Childress JF, Faden RR, Gaare RD, et al. Public health ethics: mapping the terrain. *The Journal of Law, Medicine & Ethics.* 2002;30(2):170–178.
35. Andre J Bioethics as Practice. Univ of North Carolina Press; 2002.
36. ten Have M, De Beaufort I, Teixeira P, Mackenbach J, Van der Heide A. Ethics and prevention of overweight and obesity: an inventory. *Obesity reviews.* 2011;12(9):669–679. [PubMed: 21545391]
37. ten Have M, de Beaufort ID, Mackenbach JP, van der Heide A. An overview of ethical frameworks in public health: can they be supportive in the evaluation of programs to prevent overweight? *BMC Public Health.* 2010;10(1):638. doi:10.1186/1471-2458-10-638 [PubMed: 20969761]
38. Appelhans BM, French SA, Tangney CC, Powell LM, Wang Y. To what extent do food purchases reflect shoppers’ diet quality and nutrient intake? *Int J Behav Nutr Phys Act.* 2017;14(1):46. doi:10.1186/s12966-017-0502-2 [PubMed: 28399887]
39. Cohen D, Lesser LI. Obesity prevention at the point of purchase. *Obes Rev.* 2016;(5):389–396. doi:10.1111/obr.12387 [PubMed: 26910361]
40. Grummon AH, Smith NR, Golden SD, Frerichs L, Taillie LS, Brewer NT. Health warnings on sugar-sweetened beverages: Simulation of impacts on diet and obesity among U.S. adults. *Am J Prev Med.* Forthcoming.
41. Lee BY, Ferguson MC, Hertenstein DL, et al. Simulating the Impact of Sugar-Sweetened Beverage Warning Labels in Three Cities. *Am J Prev Med.* 2018;54(2):197–204. doi:10.1016/j.amepre.2017.11.003 [PubMed: 29249555]
42. Vandevijvere S, Vanderlee L. Effect of Formulation, Labelling, and Taxation Policies on the Nutritional Quality of the Food Supply. *Current Nutrition Reports.* 2019;8(3):240–249. doi:10.1007/s13668-019-00289-x [PubMed: 31321705]
43. Khandpur N, Swinburn B, Monteiro CA. Nutrient-based warning labels may help in the pursuit of healthy diets. *Obesity.* 2018;26(11):1670–1671. [PubMed: 30358147]
44. Vyth EL, Steenhuis IH, Roodenburg AJ, Brug J, Seidell JC. Front-of-pack nutrition label stimulates healthier product development: a quantitative analysis. *Int J Behav Nutr Phys Act* 2010;7:65. doi:10.1186/1479-5868-7-65 [PubMed: 20825645]

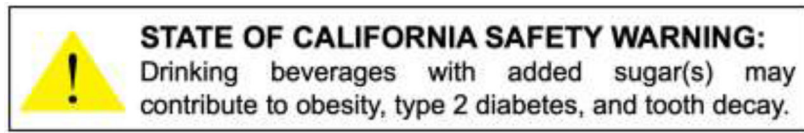
45. Mhurchu CN, Eyles H, Choi YH. Effects of a Voluntary Front-of-Pack Nutrition Labelling System on Packaged Food Reformulation: The Health Star Rating System in New Zealand. *Nutrients*. 2017;9(8). doi:10.3390/nu9080918
46. Bradley RH, Borra S, Lichtenstein AH, Yin-Piazza SY. Understanding the Complexity of Trans Fatty Acid Reduction in the American Diet. *Circulation*. 2007;115(16):2231–2246. doi:10.1161/CIRCULATIONAHA.106.181947 [PubMed: 17426064]
47. Cawley J, Frisvold D, Hill A, Jones D. The Impact of the Philadelphia Beverage Tax on Prices and Product Availability. National Bureau of Economic Research; 2018 <https://www.nber.org/papers/w24990>. Accessed January 5, 2019.
48. Batis C, Rivera JA, Popkin BM, Taillie LS. First-year evaluation of Mexico's tax on nonessential energy-dense foods: An observational study. *PLoS Med*. 2016;13(7):e1002057. [PubMed: 27379797]
49. Bíró A Did the junk food tax make the Hungarians eat healthier? *Food Policy*. 2015;54:107–115. doi:10.1016/j.foodpol.2015.05.003
50. Ares G, Aschemann-Witzel J, Curutchet MR, et al. Product reformulation in the context of nutritional warning labels: Exploration of consumer preferences towards food concepts in three food categories. *Food Res Int*. 2018;107:669–674. doi:10.1016/j.foodres.2018.03.021 [PubMed: 29580533]
51. World Health Organization. WHO Framework Convention on Tobacco Control. Geneva, Switzerland: WHO Document Production Services; 2003.
52. Brewer N, Parada H Jr., Hall M, Boynton M, Noar S, Ribisl K. Understanding why pictorial cigarette pack warnings increase quit attempts. *Ann Behav Med*. 2019;53(3):232–243. doi:10.1093/abm/kay032 [PubMed: 29850764]
53. Noar S, Hall M, Francis D, Ribisl K, Pepper J, Brewer N. Pictorial cigarette pack warnings: A meta-analysis of experimental studies. *Tob Control*. 2015;25:341–354. [PubMed: 25948713]
54. Emery LF, Romer D, Sheerin KM, Jamieson KH, Peters E. Affective and cognitive mediators of the impact of cigarette warning labels. *Nicotine Tob Res*. 2014;16(3):263–269. doi:10.1093/ntr/ntt124 [PubMed: 23946325]
55. Brewer NT, Hall MG, Noar SM, et al. Effect of pictorial cigarette pack warnings on changes in smoking behavior: A randomized clinical trial. *JAMA Internal Medicine*. 2016;176(7):905–912. doi:10.1001/jamainternmed.2016.2621 [PubMed: 27273839]
56. Grummon A, Hall M, Taillie L, Brewer N. How should sugar-sweetened beverage health warnings be designed? A randomized experiment. *Prev Med*. 2019;121:158–166. doi:10.1016/j.ypmed.2019.02.010 [PubMed: 30772370]
57. Zelenski JM, Larsen RJ. The distribution of basic emotions in everyday life: A state and trait perspective from experience sampling data. *Journal of Research in Personality*. 2000;34(2):178–197.
58. Ben-Ze'ev A, Revhon N. Emotional complexity in everyday life. *Social Science Information* 2004;43(4):581–589.
59. Hall MG, Sheeran P, Noar SM, et al. Negative affect, message reactance and perceived risk: How do pictorial cigarette pack warnings change quit intentions? *Tob Control*. 12 2017. doi:10.1136/tobaccocontrol-2017-053972
60. Peters E. Affect and emotion In: Fischhoff B, Brewer NT, Downs JS, eds. *Communicating Risks and Benefits: An Evidence-Based User's Guide*. Silver Spring, MD: United States Department of Health and Human Services Food and Drug Administration; 2011.
61. Slovic P, Finucane ML, Peters E, MacGregor DG. Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Anal*. 2004;24(2):311–322. [PubMed: 15078302]
62. Peters E, Lipkus I, Diefenbach MA. The functions of affect in health communications and in the construction of health preferences. *J Commun*. 2006;56(s1):S140–S162. doi:10.1111/j.1460-2466.2006.00287.x
63. Barnhill A, King KF, Kass N, Faden R. The value of unhealthy eating and the ethics of healthy eating policies. *Kennedy Institute of Ethics Journal*. 2014;24(3):187–217. [PubMed: 25423848]

64. Wahl DR, Villinger K, König LM, Ziesemer K, Schupp HT, Renner B. Healthy food choices are happy food choices: Evidence from a real life sample using smartphone based assessments. *Scientific Reports*. 2017;7(1):17069. doi:10.1038/s41598-017-17262-9 [PubMed: 29213109]
65. Bell E, Zizzo N, Racine E. Caution! Warning Labels About Alcohol and Pregnancy: Unintended Consequences and Questionable Effectiveness. *American Journal of Bioethics*. 2015;15(3):18–20. doi:10.1080/15265161.2014.998376
66. Vartanian LR, Smyth JM. Primum Non Nocere: Obesity Stigma and Public Health. *Journal of Bioethical Inquiry*. 2013;10(1):49–57. doi:10.1007/s11673-012-9412-9 [PubMed: 23288439]
67. Kelly D, Morar N. I eat, therefore I am: Disgust and the intersection of food and identity In: Barnhill A, Budolfson M, Doggett T, eds. *The Oxford Handbook of Food Ethics*. New York: Oxford University Press; 2018.
68. Puhl R, Peterson JL, Luedicke J. Fighting obesity or obese persons? Public perceptions of obesity-related health messages. *International Journal of Obesity*. 2013;37(6):774. [PubMed: 22964792]
69. O’Dea JA. Prevention of child obesity: ‘First, do no harm.’ *Health Education Research*. 2004;20(2):259–265. doi:10.1093/her/cyg116 [PubMed: 15328303]
70. Schwartz MB, Henderson KE. Does Obesity Prevention Cause Eating Disorders? *Journal of the American Academy of Child & Adolescent Psychiatry*. 2009;48(8):784–786. doi:10.1097/CHI.0b013e3181acfb88 [PubMed: 19628995]
71. Seward MW, Block JP, Chatterjee A. Student experiences with traffic-light labels at college cafeterias: a mixed methods study. *Obes Sci Pract*. 2018;4(2):159–177. doi:10.1002/osp4.159 [PubMed: 29670754]
72. Davies L Italy claims “traffic-light” labelling unfair on Mediterranean food. *The Guardian*. <https://www.theguardian.com/world/2013/oct/21/italy-traffic-light-food-labels-unfair>. Published October 21, 2013. Accessed September 13, 2019.
73. Pan American Health Organization. Pan American Health Organization Nutrient Profile Model. 2016.
74. Bonotti M Food labels, autonomy, and the right (not) to know. *Kennedy Inst Ethics J*. 2014;24(4):301–321. [PubMed: 25638945]
75. Cohen D, Farley TA. Eating as an automatic behavior. *Prev Chronic Dis*. 2008;5(1):A23. [PubMed: 18082012]
76. Cohen D, Babey SH. Contextual influences on eating behaviours: Heuristic processing and dietary choices. *Obesity Reviews*. 2012;13(9):766–779. [PubMed: 22551473]
77. Boyland EJ, Nolan S, Kelly B, et al. Advertising as a cue to consume: a systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults1,2. *The American Journal of Clinical Nutrition*. 2016;103(2):519–533. doi:10.3945/ajcn.115.120022 [PubMed: 26791177]
78. Harris JL, Pomeranz JL, Lobstein T, Brownell KD. A Crisis in the Marketplace: How Food Marketing Contributes to Childhood Obesity and What Can Be Done. *Annu Rev Public Health*. 2009;30(1):211–225. doi:10.1146/annurev.publhealth.031308.100304 [PubMed: 18976142]
79. Barnhill A, King KF. Ethical agreement and disagreement about obesity prevention policy in the United States. *Int J Health Policy Manag*. 2013;1(2):117–120. doi:10.15171/ijhpm.2013.21 [PubMed: 24596849]
80. VanEpps EM, Roberto CA. The Influence of Sugar-Sweetened Beverage Warnings: A Randomized Trial of Adolescents’ Choices and Beliefs. *Am J Prev Med*. 2016;51(5):664–672. doi:10.1016/j.amepre.2016.07.010 [PubMed: 27617366]
81. Roberto CA, Wong D, Musicus A, Hammond D. The Influence of Sugar-Sweetened Beverage Health Warning Labels on Parents’ Choices. *Pediatrics*. 2016;137(2):e20153185. doi:10.1542/peds.2015-3185 [PubMed: 26768346]
82. Mantzari E, Vasiljevic M, Turney I, Pilling M, Marteau T. Impact of warning labels on sugar-sweetened beverages on parental selection: An online experimental study. *Preventive Medicine Reports*. 2018;12:259–267. doi:10.1016/j.pmedr.2018.10.016 [PubMed: 30406003]
83. Arrúa A, Machín L, Curutchet MR, et al. Warnings as a directive front-of-pack nutrition labelling scheme: Comparison with the Guideline Daily Amount and traffic-light systems. *Public health nutrition*. 2017;20(13):2308–2317. [PubMed: 28625228]

84. Moran AJ, Roberto CA. Health Warning Labels Correct Parents' Misperceptions About Sugary Drink Options. *Am J Prev Med.* 2018;55(2):e19–e27. doi:10.1016/j.amepre.2018.04.018 [PubMed: 29903567]
85. Popova L, Nonnemaker J, Taylor N, Bradfield B, Kim A. Warning labels on sugar-sweetened beverages: An eye tracking approach. *Am J Health Behav.* 2019;43(2):406–419. [PubMed: 30808479]
86. Ares G, Varela F, Machin L, et al. Comparative performance of three interpretative front-of-pack nutrition labelling schemes: Insights for policy making. *Food Quality and Preference.* 2018;68:215–225.
87. Grummon AH, Brewer NT. Health warnings and beverage purchase behavior: Mediators of impact. In progress.
88. Brewer CD, Himes GN. Weighing the Ethical Considerations of Autonomy and Efficacy With Respect to Mandatory Warning Labels. *American Journal of Bioethics.* 2015;15(3):14–15. doi:10.1080/15265161.2014.998379
89. Louise J, Elliott J, Olver I, Braunack-Mayer A. Mandatory cancer risk warnings on alcoholic beverages: what are the ethical issues? *The American Journal of Bioethics.* 2015;15(3):3–11.
90. Popova L, Owusu D, Jenson D, Neilands TB. Factual text and emotional pictures: Overcoming a false dichotomy of cigarette warning labels. *Tob Control.* 2017;27:250–253.
91. Berman ML. Clarifying standards for compelled commercial speech. *Wash Univ J Law Policy.* 2016;50:53–88.
92. Tushnet R. More than a feeling: Emotion and the First Amendment. *Harv L Rev.* 2014:2392–2433.
93. Jeong M, Hall M, Zhang D, et al. Why do cigarette pack messages about toxic chemicals increase forgoing cigarettes? An application of the Tobacco Warnings Model. *Ann Behav Med.* 2019;53(Suppl 1):S383. doi:10.1093/abm/kaz007
94. Brewer NT, Jeong M, Mendel JR, et al. Cigarette pack messages about toxic chemicals: A randomised clinical trial. *Tob Control.* 2019;28(1):74–80. doi:10.1136/tobaccocontrol-2017-054112 [PubMed: 29654122]
95. Noggle R. Manipulative actions: a conceptual and moral analysis. *American Philosophical Quarterly.* 1996;33(1):43–55.
96. Barnhill A. What is manipulation. *Manipulation: Theory and practice.* 2014;50:72.
97. Pomeranz JL. A Comprehensive Strategy to Overhaul FDA Authority for Misleading Food Labels. *American Journal of Law & Medicine.* 2013;39(4):617–647. doi:10.1177/009885881303900403 [PubMed: 24494445]
98. Pomeranz JL. Television food marketing to children revisited: The Federal Trade Commission has the constitutional and statutory authority to regulate. *J Law Med Ethics.* 2010;38(1):98–116. [PubMed: 20446988]
99. Acton RB, Hammond D. Do Consumers Think Front-of-Package “High in” Warnings are Harsh or Reduce their Control? A Test of Food Industry Concerns. *Obesity (Silver Spring).* 2018;26(11):1687–1691. doi:10.1002/oby.22311 [PubMed: 30281206]
100. Capewell S. Sugar sweetened drinks should carry obesity warnings. *BMJ: British Medical Journal.* 2014;349(7967):g3428–2. doi:10.1136/bmj.g3428
101. Miller CL, Dono J, Wakefield MA, et al. Are Australians ready for warning labels, marketing bans and sugary drink taxes? Two cross-sectional surveys measuring support for policy responses to sugar-sweetened beverages. *BMJ Open.* 2019;9(6):e027962. doi:10.1136/bmjopen-2018-027962
102. Field F. Voters See a Close Linkage between Kids Regularly Drinking Sugary Beverages and Their Developing Serious Health Conditions, like Type-2 Diabetes. Broad-Based Support for Both Government and Beverage Company Actions to Address the Problem. Field Research Corporation; 2016 [http://www.kickthecan.info/system/files/4\\_Field%20Poll.pdf](http://www.kickthecan.info/system/files/4_Field%20Poll.pdf). Accessed August 28, 2019.
103. Kass N, Hecht K, Paul A, Birnbach K. Ethics and Obesity Prevention: Ethical Considerations in 3 Approaches to Reducing Consumption of Sugar-Sweetened Beverages. *Am J Public Health.* 2014;104(5):787–795. doi:10.2105/AJPH.2013.301708 [PubMed: 24625154]

104. Novotny TE, Carlin D. Ethical and legal aspects of global tobacco control. *Tobacco control*. 2005;14(suppl 2):ii26–ii30. [PubMed: 16046698]
105. Acton RB, Vanderlee L, Hammond D. Influence of front-of-package nutrition labels on beverage healthiness perceptions: Results from a randomized experiment. *Prev Med*. 2018;115:83–89. doi:10.1016/j.ypmed.2018.08.022 [PubMed: 30145345]
106. Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychol Bull*. 2006;132(2):249–268. doi:10.1037/0033-2909.132.2.249 [PubMed: 16536643]
107. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: A systematic review. *Public health nutrition*. 2005;8(01):21–28. [PubMed: 15705241]
108. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: A systematic review. *Public Health Nutr*. 2011;14(8):1496–1506. doi:10.1017/S1368980010003290 [PubMed: 21241532]
109. Chen R, Smyser M, Chan N, Ta M, Saelens BE, Krieger J. Changes in awareness and use of calorie information after mandatory menu labeling in restaurants in King County, Washington. *Am J Public Health*. 2015;105(3):546–553. doi:10.2105/AJPH.2014.302262 [PubMed: 25602868]
110. Holm S Obesity interventions and ethics. *Obesity Reviews*. 2007;8:207–210. [PubMed: 17316327]
111. Finegood DT. The complex systems science of obesity In: Cawley J, ed. *The Oxford Handbook of the Social Science of Obesity*. Oxford: Oxford University Press; 2011:208–236.
112. Davison KK, Birch LL. Childhood overweight: A contextual model and recommendations for future research. *Obesity reviews*. 2001;2(3):159–171. [PubMed: 12120101]
113. HM Treasury. Budget 2016. UK.GOV. <https://www.gov.uk/government/publications/budget-2016-documents>. Published March 16, 2016. Accessed August 28, 2019.
114. Katz MH, Schwartz MB, Schneider GE, et al. Association of a community campaign for better beverage choices with beverage purchases from supermarkets. *JAMA Intern Med*. 2017;177(5):674–674. doi:10.1001/jamainternmed.2016.9650 [PubMed: 28264081]





**Figure 1.**  
Mock-up of the sugar-sweetened beverage warning proposed by California in 2019.



**Figure 2.** One of the four health warnings implemented in Chile in 2016. The warning text translates to “HIGH IN SODIUM.”

- Food warnings are likely to generate important benefits including increased consumer understanding and informed choice, healthier food and beverage purchases, and potential reductions in diet-related diseases.
- Food warnings evoke negative emotions; however, these emotions are an important mechanism through which food warnings promote informed choice and encourage healthier behaviors.
- Available evidence indicates that warnings are unlikely to have unacceptable effects on social and cultural values, attributions of responsibility, liberty, or privacy.

**Figure 3.**  
Summary of evidence that food warnings may be ethically defensible.

**Table 1.**

Ethical considerations, summary of ethical analysis, current conclusions, and areas for future research for food and beverage warnings.

<b>Ethical consideration</b> <i>Key question</i>	<b>Summary of ethical analysis</b>	<b>Current conclusion</b>	<b>Possible areas for future research</b>
<b>Health behaviors and physical health</b> <i>To what extent do food warnings encourage healthier behaviors and promote physical health?</i>	<ul style="list-style-type: none"> <li>Warnings promote healthier purchases.<sup>12-14</sup></li> <li>Warnings could prompt industry reformulation, which could improve the healthfulness of the food supply<sup>15,44,45</sup> and consumers' purchases.<sup>50</sup></li> <li>Simulation modeling studies project that implementing warnings could reduce obesity prevalence.<sup>40,41</sup></li> </ul>	Positive health effects are likely.	<ul style="list-style-type: none"> <li>What is the trajectory of warnings' effects on behavior and health over time?</li> <li>To what extent do warnings spur product reformulation? Does reformulation bring additional health benefits?</li> <li>What are warnings' effects on diabetes, heart disease, and other diet-related diseases?</li> <li>Do warnings have synergistic effects with other nutrition policies such as taxes or marketing restrictions?</li> </ul>
<b>Psychosocial well-being</b> <i>To what extent do food warnings promote or diminish positive psychosocial well-being?</i>	<ul style="list-style-type: none"> <li>Warnings generate short-term negative emotions.<sup>12,13,56</sup> However, these emotional responses are productive reactions that help warnings achieve their beneficial effects such as promoting informed choice<sup>54,59-62</sup> and changing behavior.<sup>52</sup></li> <li>Warnings may reduce enjoyment by reducing consumption of foods consumers find pleasurable.<sup>63</sup> On the other hand, warnings could improve psychosocial well-being if consumers feel happier after making healthier dietary choices.<sup>64</sup></li> <li>Whether warnings' emotional consequences are ethically justifiable will depend on the magnitude of their long-term costs and benefits as well as their nature, prevalence, intensity, and duration.</li> <li>Graphic warnings depicting images of people with obesity could increase some forms of weight stigma,<sup>30</sup> but limited research has examined this question. Food warnings that do not describe obesity may be less likely to increase stigma.</li> <li>Studies have not found that warnings worsen body image<sup>30</sup> or contribute to disordered eating,<sup>71</sup> but limited research has examined these outcomes.</li> </ul>	Negative psychosocial consequences are possible, but may be justifiable.	<ul style="list-style-type: none"> <li>To what extent do warnings increase stigma? How can warnings be designed to minimize stigma?</li> <li>To what extent do warnings worsen body image?</li> <li>To what extent do warnings affect disordered eating?</li> </ul>
<b>Social and cultural values</b> <i>To what extent do food warnings interfere with</i>	<ul style="list-style-type: none"> <li>Studies have not examined whether warnings diminish feelings of identity, community, or belonging that consumers may get from eating particular foods.</li> </ul>	Interference with social and cultural values is unlikely.	<ul style="list-style-type: none"> <li>Do current or proposed warning policies require warnings on foods or beverages with cultural or social importance? If</li> </ul>

Ethical consideration Key question	Summary of ethical analysis	Current conclusion	Possible areas for future research
<i>cultural or social values?</i>	<ul style="list-style-type: none"> <li>Research has not yet examined whether warnings differentially affect foods that have cultural or social importance to particular groups.</li> <li>Existing food warning policies use objective nutrient profiling systems to determine what products trigger mandatory warnings.<sup>73</sup> These systems are unlikely to single out foods from particular cultural or ethnic groups.</li> <li>Warnings do not prevent people from buying or consuming socially or culturally important products.</li> </ul>		<ul style="list-style-type: none"> <li>so, to what extent do warnings reduce positive feelings of identity, community, or belonging? What groups are most affected?</li> </ul>
<b>Informed choice</b> <i>To what extent do food warnings promote consumers' informed choosing without subjecting them to unacceptable manipulation?</i>	<ul style="list-style-type: none"> <li>Warnings increase understanding of products' healthfulness.<sup>80-85</sup></li> <li>Warnings also activate this understanding by making it salient in consumers' minds at the point of purchase.<sup>12,13,56</sup></li> <li>Warnings evoke emotions, and emotions are part of how warnings change behavior. However, warnings' emotionality does not make them unacceptably manipulative, because these emotional responses are necessary for warnings to inform,<sup>60-62</sup> are appropriate responses that improve reasoning,<sup>95,96</sup> and could "level the playing field" against manufacturers' arguably manipulative narratives about their products.<sup>97,98</sup></li> <li>Warnings may help consumers feel more in control of their eating choices.<sup>99</sup></li> </ul>	Promotion of informed choice is likely.	<ul style="list-style-type: none"> <li>How can warnings be designed to maximize their effects on consumers' understanding of product healthfulness?</li> <li>What types of warnings increase consumers' feelings of control?</li> </ul>
<b>Equality</b> <i>To what extent are the costs and benefits of food warnings fairly distributed?</i>	<ul style="list-style-type: none"> <li>Warnings have similar effects on consumer understanding,<sup>80,81,105</sup> behavioral intentions,<sup>80,81</sup> and purchase behaviors<sup>12</sup> across diverse groups, suggesting they are unlikely to exacerbate underlying disparities in these outcomes.</li> <li>Warnings could reduce disparities in diet-related diseases,<sup>40</sup> but limited research has examined this question.</li> </ul>	Increased equality is possible, but more research is needed.	<ul style="list-style-type: none"> <li>What is the distribution of costs and benefits of warning policies in real-world settings (i.e., in jurisdictions where warnings have been implemented)?</li> <li>How can warnings be designed to maximize their potential to enhance equality?</li> </ul>
<b>Attributions of responsibility</b> <i>To what extent do food warnings imply a fair division of who is responsible for dietary behaviors and health?</i>	<ul style="list-style-type: none"> <li>Because one goal of warnings is to change individual consumer behavior, warnings might suggest to the public that consumers are primarily responsible for their own diet and health.<sup>32</sup></li> <li>Warnings can also be designed to spur reformulation,<sup>15,50</sup> which could shift implied responsibility for diet and health toward industry.</li> <li>Limited research has examined these two possibilities.</li> </ul>	Acknowledgement of responsibilities of various entities is possible, but more research is needed.	<ul style="list-style-type: none"> <li>Does proposing or implementing a food warning policy increase the public's perception that individuals are the primary entity responsible for diet and health? Is this reaction attenuated when policies are explicitly designed to encourage reformulation?</li> </ul>

Ethical consideration <i>Key question</i>	Summary of ethical analysis	Current conclusion	Possible areas for future research
<b>Liberty</b> <i>To what extent do warnings constrain liberty or freedom of choice?</i>	<ul style="list-style-type: none"> <li>Warnings do not ban consumers from buying or consuming products, so warnings have little or no impact on liberty.</li> </ul>	Constraints on liberty are negligible.	Not applicable.
<b>Privacy</b> <i>To what extent do food warnings intrude on privacy?</i>	<ul style="list-style-type: none"> <li>Warnings do not require the government to gather any personal information from consumers, so warnings have little or no impact on privacy.</li> </ul>	Intrusions on privacy are negligible.	Not applicable.

*Note.* Ethical considerations are drawn from ten Have and colleagues' ethical framework for evaluating obesity prevention programs and policies.

32

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript