Ethical issues in the development and implementation of nutrition-related public health policies and interventions: A scoping review

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Abstract

Background
The limited integration of ethics in nutrition-related public health policies and interventions is one major concern for those who have the task of implementing them. Ethical challenges that are overlooked during the development of such interventions could raise serious ethical issues during their implementation and even after. As a result, these decision makers need technical support and ethical guidance for adaptation of interventions to local (cultural, social, economic, etc.) contexts.

Aim
The goal of this scoping review is to delineate and “map” the range of ethical issues in nutrition-related public health interventions, as well as the range of the various fields in which they may arise.

Methods
A scoping review of empirical research and conceptual literature was conducted following the framework of Arksey and O’Malley. Searches using PubMed with Medical Subject Headings (MeSH) categories and Advanced Search Builder as well as in the Global Health Library were performed. The final sample consists of 169 publications.

Results
The ethics of public health prevention or treatment of obesity and non-communicable diseases is the most explicitly and frequently discussed subject. In comparison, ethical issues raised by public health interventions in the fields of undernutrition, breastfeeding, vitamin/mineral supplementation and food fortification, food security, food sustainability and food
Introduction

There is increasing support for developing frameworks for ethical considerations in the development and implementation of nutrition-related public health interventions [1–4]. Kass defines ethical frameworks as an analytic tool “designed to help public health professionals consider the ethics implications of proposed interventions, policy proposals, research initiatives, and programs” (p. 1777 in [5]). There have been systematic efforts to articulate such frameworks to guide public health interventions [5–11]. A number of general moral considerations have been addressed, that include: producing benefits, preventing harms, distributing health benefits fairly; respecting individual autonomy and liberty of action; respecting and fulfilling universal human rights; protecting vulnerable groups from marginalization and stigmatization; building and maintaining trust. Efforts have been made to produce frameworks of unranked principles [10] or theories of social justice [9], among other more practical approaches [5], but much work needs to be done to translate these general ethical considerations or some subset of them into guiding principles and frameworks for nutrition-related public health policy and intervention. Such work entails identifying actual and potential ethical issues, defining them, determining their scope, specifying criteria for resolving conflicts among them, and so on. The limited integration of ethics in nutrition-related public health policies and interventions [12] is one major concern for those who have the task of implementing policies, as the ethical challenges that were overlooked during the development of an intervention could raise serious ethical issues during its implementation and even after. As a result, these decision makers need technical support and ethical guidance for adaptation of interventions to local (cultural, social, economic, etc.) contexts. Depending on the flexibility that is
given to them by the policy, it is expected that all implementation of a given intervention should be preceded by an examination of the basic ethical principles that serve as a justification for the particular ethical prescriptions and evaluations of human actions [13]. As an example, in 2002, the Public Health Leadership Society elaborated 12 principles of the ethical practice of public health [14].

The following scoping review is part of an assignment commissioned by the World Health Organization. The authors were asked to conduct a scoping review of the literature on ethical issues in nutrition-related public health activities for ethics-related guidance to be developed by the WHO Department of Nutrition for Health and Development. This review aims to ascertain and delineate the range of ethical issues in nutrition public health interventions that could serve as a basis to increase efforts to address the ethics of public health nutrition, and, in future steps, to further develop and integrate ethical frameworks in this field.

Materials and methods

Scoping reviews are broad by nature are used to delineate, to map the key concepts underpinning a field of research as well as to clarify working definitions, and/or the conceptual boundaries of a topic that encompass a range of interventions and outcome measures (p. 6–8 in [15]). This scoping review of empirical research and conceptual literature follows the framework of Arksey and O’Malley [16], which involves: 1) defining a research question, 2) identifying and selecting relevant studies/publications, 3) charting resulting data, 4) interpreting, summarizing, and reporting the results.

Step 1: Identifying the research question

The purpose of this review is to delineate and “map” the range of ethical issues in nutrition-related public health interventions, as well as the range of the various fields in which they may arise. It covers the ethical issues that may arise at all levels in nutrition-related interventions, including the development of policies, guidelines, recommendations, and interventions at the population level, as well in their implementation and evaluation [17–21].

Step 2: Identifying relevant articles and selecting articles

A time frame for publications was set in order to focus on recent developments (2009 and 2015). We performed a search with PubMed Advanced Search Builder using truncation and combinations of the following keywords: “ethics”, “health”, “public health”, “global health”, “nutrition”, “undernutrition”, “malnutrition”, “recommendation”, “guideline”, “activity”, “policy”, “intervention”, and “evidence” (see S1 Table). Fig 1 outlines the search strategy. After de-duplication, we screened the records to assess eligibility and analyse the full-text manuscripts. The final sample consists of 169 publications (S2 Table).

It is difficult to determine to what extent issues linked to ethics have to be dealt with in an article before it can be considered as actually addressing “ethical issues”. For instance, articles that briefly mention the importance of cultural factors in the implementation of nutrition policies or the need to involve target populations in the development of these policies are, in effect, addressing “ethical issues”, yet without explicitly mentioning it, and thus, may not have been identified as such using PubMed Advanced Search Builder. Similarly, key principles in bioethics can be associated with many dimensions of a public health policy, and authors considering these issues may do so without explicitly identifying them as “ethical” issues. Thus, in order to ensure that we sufficiently captured the field of ethics, we also conducted a search on Pubmed using Medical Subject Headings (MeSH) categories and the Global Health Library—which includes Latin American and Caribbean Health Sciences Literature (LILACS), the World
**Exclusion criteria:** Non-human studies; public health surveillance not related to nutrition, patents issues, articles that do not address ethical issues, publications focusing only on diets in patients with one specific disease—unless a significant number of papers addressing the same disease can be found; end of life and parenteral nutrition; nutrition and sport; basic and clinical nutrition research not related to public health interventions and policies; research ethics; education in ethics, bariatric surgery; articles focusing on physical activity only in the prevention or treatment of obesity; publications about hunger strikes; editorials, short news, article not in French or English. 11 publications were excluded after full-text screening, as it appears that their identification with the keyword “ethic**” in PubMed database only resulted from: a) the mention of “ethical” approval (or exemption of ethical approval) from a research ethics board or, b) the mention of the affiliation of the author (an institute/department of ethics) in the body of the text. These 11 articles were not addressing any ethical issue. However, articles that are clearly describing ethical issues (even without using the word “ethics” or “ethical”) were kept in our final sample even if their identification in PubMed only resulted from the mention of “ethical”
Health Organization library database (WHOLIS), the African Index Medicus (AIM), the Western Pacific Region Index Medicus (WPRIM), and the Index Medicus for the Eastern Mediterranean Region (IMEMR). We used combinations of the following subject headings: “Morals”, “Nutrition disorders”, “Nutrition Policy and Nutrition Sciences”. In the PubMed MeSH system, “Ethics” is a category that is included in “Morals” (Time limit: 2009–2015). This latter category encompasses articles that were classified under a number of other subcategories, such as “Principle-Based Ethics”, and, thus, includes terms such as “beneficence”, “autonomy” and “justice”. Consequently, the results of our search with MeSH should theoretically include all articles addressing these principles.

After screening, the final sample resulting from this MeSH search (n = 157) included 34 articles that were already included in the first sample of this scoping review. A vast majority of the articles identified through the MeSH search focused on obesity (over 71%) and the relevance of many articles was doubtful with regard to the purpose of this scoping review (for instance, articles that focused on philosophical and moral theories are only tenuously related to concrete actions and practical ethical issues in public health nutrition-related interventions). In every case, we observed that all the fields and subjects addressed by the publications identified through the Pubmed search with MeSH categories, as well as in the Global Health Library, were covered by the initial sample obtained using PubMed’s Advanced Search Builder. Therefore, this scoping review focuses solely on that first sample.

Step 3: Charting resulting data

The categorization of articles into main fields of public health nutrition was a first step in charting the data (Fig 2). The next stage involved additional ‘charting’ of key items, particularly in the field of ethics (Fig 3). In this field, the principles of beneficence, non-maleficence, autonomy and justice are the most commonly used. These principles are broad concepts that may be applied to more specific ethical issues, depending on the circumstances and contexts in which these issues may arise or on the perspectives from which they are analysed. Beneficence includes considerations of the cost-effectiveness and utility of interventions, as well as for the social impact of those interventions on populations and individuals. Similarly, non-maleficence encompasses considerations about potential physical harms, as well as social risks. An ethical issue such as empowerment, for instance, can be linked to both beneficence and autonomy. Stigmatization, as another example, has ethical dimensions that are related to non-maleficence as well as to the principle of justice (see legend of Fig 3).

Given the different nature of risks and benefits of public health interventions, we identified specific, recurring issues linked to ethics during the data extraction process (see Fig 3). All publications were screened a second time to determine whether (or not) these issues were being addressed. We extracted the following data from each record: author(s), year of publication, type of publication, aims of study or subject of article, outcomes/conclusion, target populations, summary of ethical aspects addressed, and keywords.

Step 4: Collating, summarizing and reporting results

Table 1 summarizes the frequencies at which specific ethical issues are discussed in each public health nutrition field. The ethical issues linked to challenges in implementation and evaluation of public health nutrition policies and intervention are presented in Tables 2 and 3. Results for

https://doi.org/10.1371/journal.pone.0186897.g001

Final sample (S2 Table) contains research articles, reviews, feature articles and commentaries.
each field of public health nutrition are presented, developed and commented in the following sub-sections.

| Field (number of articles) | Percentage (%) |
|---------------------------|----------------|
| Obesity (n=62)            | 36.7           |
| Non-communicable diseases (n=52) | 30.8           |
| Health claims, food marketing, labeling & advertisement (n=49) | 29             |
| Food security (n=38)      | 22.5           |
| Public health ethics in general (n=29) | 17.1           |
| Undernutrition (n=28)     | 16.6           |
| Food taxes and food bans (n=27) | 16             |
| Sustainability (n=24)     | 14.2           |
| Breastfeeding (n=17)      | 10             |
| Cash transfer (n=15)      | 8.9            |
| Food safety (n=9)         | 5.3            |
| Fortification (n=6)       | 3.5            |
| Vitamin/mineral supplementation (n=6) | 3.5           |
| Humanitarian aid, emergencies, disasters (n=5) | 2.9            |
| HIV & Nutrition (n=1)     | 0.5            |
| Other (n=9)               | 5.3            |

Fig 2. Main fields of public health and nutrition addressed in the whole sample (n = 169). Total of articles: 169. A same article may appear in more than one category. Note that 8 articles could not be accessed online through the University of Montreal electronic resources for full content analysis. Thus, these articles might have appeared in additional categories that could not be identified only in abstract and title. 1Includes food access disparities; 2This category encompasses all articles that address ethics in public health in general (e.g., ethical framework in public decision-making and that do not focus on nutrition-related interventions); 3Including in food production; 4These articles [12, 22–26] are cited in this paper when relevant (most of them are classified in another field), but given their small number, there is no specific section about HIV and nutrition and nutrition-intervention in humanitarian aid in this paper; 5Articles that could not be classified in one (at least) of the other fields. Several of these articles address conflict of interests, sponsorships and partnerships in public health and nutrition [27–30]. The other articles focus on behaviors, perceptions and food choice motives [31–33], nutritionism and the ethics of the commercialization of food [34], and the implications for public health of appropriate information to consumers and health claims linked to polyphenols [35]. These articles are not discussed further in this paper, but are included in the statistics.

https://doi.org/10.1371/journal.pone.0186897.g002
Fig 3. Most addressed issues linked to ethics in the whole sample (n = 169). Articles may appear in more than one category, and certain categories are directly linked to others (e.g., paternalism and empowerment can be linked to autonomy, as can stigmatization to justice). Note that 8 articles could not be accessed online through the University of Montreal electronic resources for full content analysis. Thus, these articles might have appeared in additional categories that could not be identified only through abstract and title. It is worth pointing out that searches within articles with specific words has limitations, as papers can actually address similar issues without using these specific terms. *Most articles address benefits of interventions to a certain extent, often without explicitly considering beneficence as an ethical requirement. Search was limited to the explicit use of the word “benefit” in the articles, except for the articles appearing in the category “Empowerment”, which were all included here. 2Search was limited to the explicit use of the words “risk”, “harm” and “non-maleficence”, except for the articles appearing in category “Paternalism” and “Stigmatization-Discrimination”, which were all included here. Articles may address risks of interventions to a certain extent without explicitly associating them with an ethical principle. 3Accountability is understood as state, institutions, and organizations’ responsibility in their activities. Search was limited to the explicit use of the word “accountability”. 4Search was limited to the explicit use of the words “freedom”, “choice” and “autonomy”. 5Search within articles with the words “freedom”, “choice” and “autonomy”. 6This category includes all articles that describe and comment on collaborations/partnerships between organizations, corporations, institutions, both in the public and private sectors. 7Search was limited to the explicit use of the words “stigma” and “discrimination” in the articles. 8Search was limited to the explicit use of the word “paternalism” in the articles. 9Search was limited to the explicit use of the words “human rights” in the articles. 10Search was limited to the explicit use of the word “empowerment” in the articles.

https://doi.org/10.1371/journal.pone.0186897.g003
Results

Ethical issues in public health policies

Twenty-nine articles (17.1% of the whole sample) explicitly address ethics in public health [12, 22, 23, 36–61] (see Table 1). While some of these articles do not focus on nutrition-related interventions in particular, they were included in our sample as they provide a useful picture of the background of this scoping review as well as describe current challenges in the field of ethics and public health that apply to various types of public health interventions. Justice and equity are addressed in a vast majority of these articles, as they constitute one of the core principles in public health ethics and illustrate the strong link that exists between population health and social inequities. Several of these articles stress the lack of integration of ethics and ethical

| Table 1. Most addressed issues linked to ethics in the whole sample (n = 169), % per field. |
|-----------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| (n = 29) | (n = 62) | (n = 52) | (n = 38) | (n = 28) | (n = 24) | (n = 17) | (n = 9) | (n = 6) | (n = 6) |
| Justice and equity | 86.2 | 37.1 | 28.8 | 52.6 | 46.4 | 54.2 | 23.5 | 33.3 | 33.3 | 16.6 |
| Beneficence, benefits | 75.9 | 58.1 | 75 | 55.3 | 39.3 | 54.2 | 58.8 | 55.5 | 50 | 33.3 |
| Non-maleficence, harms, risks | 75.9 | 62.9 | 63.5 | 50 | 35.7 | 50 | 52.9 | 44.4 | 50 | 33.3 |
| Accountability | 65.5 | 46.8 | 30.8 | 44.7 | 50 | 58.3 | 29.4 | 44.4 | 50 | 16.6 |
| Individual/parental autonomy | 48.3 | 43.5 | 34.6 | 28.9 | 21.4 | 16.7 | 41.2 | 11.1 | 33.3 | - |
| Stigmatization/discrimination | 41.4 | 40.3 | 13.5 | 21 | 10.7 | 12.5 | 11.8 | - | - | - |
| Partnerships–PPPs** | 41.4 | 40.3 | 25 | 55.3 | 46.4 | 62.5 | 41.2 | 33.3 | 33.3 | 16.6 |
| Community involvement–Participatory process | 31 | 12.9 | 7.7 | 28.9 | 21.4 | 29.2 | 11.8 | 22.2 | - | - |
| Social determinants of health | 37.9 | 48.4 | 38.8 | 63.1 | 50 | 50 | 23.5 | 22.2 | 16.6 | - |
| Individual or parental responsibility | 27.6 | 46.8 | 21.1 | 31.6 | 17.8 | 20.8 | 23.5 | - | 16.6 | 16.6 |
| Cultural factors and issues | 27.6 | 37.1 | 40.4 | 50 | 39.3 | 58.3 | 41.2 | 33.3 | 16.6 | 16.6 |
| Empowerment | 24.1 | 11.3 | 19.2 | 15.8 | 7.1 | 8.3 | 11.8 | 11.1 | - | - |
| Paternalism | 24.1 | 22.6 | 11.5 | 7.9 | 3.6 | 4.2 | 23.5 | - | 33.3 | - |
| Human rights | 20.7 | 16.1 | 15.4 | 34.2 | 35.7 | 29.2 | 11.8 | 22.2 | 16.6 | 33.3 |
| Conflict of interests | 13.8 | 16.1 | 15.4 | 5.3 | 10.7 | 16.7 | 23.5 | 22.2 | 33.3 | 16.6 |
| Stakeholders' perceptions | 6.9 | 9.7 | 15.4 | 5.3 | 10.7 | 8.3 | 23.5 | - | 33.3 | 16.6 |

https://doi.org/10.1371/journal.pone.0186897.t001
guidance in public health policies and interventions [40, 43, 44, 48, 50, 55, 57, 61]. Education and/or the assistance in ethics while developing/implementing public health interventions is also recommended [12, 40, 44, 53, 55]. Ten articles comment on existing and/or propose frameworks for an ethical evaluation of public health interventions in various contexts (including in health promotion, allocation decisions in humanitarian aid, health governance, and the monitoring and evaluation of interventions) [12, 23, 36, 39, 46, 48, 54, 57, 58, 61].

Ethical issues in obesity prevention and treatment

Although there are broader actions that aim at promoting healthy diets in general, the ethics of public health prevention or treatment of obesity is the most explicitly and frequently discussed subject: 62 articles (36.7%) address this topic (see Table 1) [1–4, 43, 56, 57, 60–114]. There is a significant variety in the nature, scope, population targets and types of public health interventions in this field.

Several authors address ethical issues linked to regulations on and/or control of health claims & nutrition, as well as of food marketing, advertisement and labelling [57, 60, 61, 64, 67, 70, 78, 82, 88, 91–93, 95–99, 103–109, 113, 114], for instance the ethical acceptability of food marketing to children, management of competing commercial and public health interests, and the need to improve labelling so that to promote individual responsibility. Ethical issues raised by food bans and food taxes interventions—in particular sugar taxes—are mainly linked to the acceptability of restricting consumer choice, and to the risks that such interventions exacerbate socioeconomic inequalities [3, 4, 65, 79, 82–85, 87, 93, 95, 98–100, 102, 106, 108]. Public health interventions aimed at promoting access to healthy foods through incentives such as food stamps and cash transfers are considered by several authors as ethically problematic, in particular in terms of excessive paternalism, infringement of individual autonomy and risks of stigmatization [4, 57, 68, 79, 95, 97, 99, 100, 106, 109, 113].

Much emphasis is made on the unintended effects of obesity prevention programs, such as stigmatization and discrimination. Several papers describe the barriers that impede personal empowerment and respect for individual autonomy in the choice of food and lifestyle. The necessity to consider social determinants of obesity and cultural factors is also stressed in many of these articles, along with the need to address underlying social inequities and the risk of increasing existing health disparities when implementing obesity prevention policies. The balance between individual and collective responsibility (including in terms of health authorities’ as well as food industries’ accountability) is described as an important ethical issue in 29 articles. Some authors provide ethical guidance by developing or commenting on ethical frameworks to guide the development and implementation of policies in the field of obesity prevention specifically [1–4, 57, 61, 65, 79, 84, 85, 89, 92, 96–99, 110].

Ethical issues in prevention and treatment of noncommunicable diseases through dietary interventions

Most discussed medical conditions in the 52 articles (30.8%) [49, 56, 64, 70, 74, 75, 78–80, 87, 88, 94, 96, 98, 104, 109, 115–150] that focus on nutrition and the prevention or treatment of noncommunicable diseases are cardio-vascular diseases and diabetes (see Table 1). Twenty-one articles focus on nutrigenomics/nutrigeneics and/or epigenomics/epigenetics [49, 64, 74, 94, 118–123, 125, 126, 128, 129, 142, 143, 145, 147–150] and personalized nutrition. Note that three of these articles address or mention obesity from this angle and were also included in the section Ethical issues in obesity prevention and treatment [64, 74, 94]. While we are still far from concrete implementation of nutrigenomics/nutrigeneics or epigenomics/epigenetics in public health, authors have started to address the ethical issues that might be raised by their
applications, such as the threat to individual autonomy, the excessive burden on personal responsibility, and the stigmatization of individuals who would not comply with personal dietary recommendations. Interventions relating to health claims and nutrition, as well as food marketing, advertisement and labelling and their role in the prevention of noncommunicable diseases are mentioned or addressed in 16 articles [70, 78, 88, 96, 98, 104, 109, 127, 131, 133, 135–139, 146]. Ethical issues raised by food bans—in particular transfat bans—and food taxes interventions, such as described in the previous section, are also addressed in the field of noncommunicable diseases [79, 87, 98, 131–140]. As shown in Table 1, considerations about cultural factors and social determinants of health are often discussed in this field, as well as health authorities’ and food industries’ accountability.

Ethical issues in prevention and treatment of undernutrition

Prevention of undernutrition in public health appears as a field that has been under less ethical scrutiny compared to obesity and non-communicable diseases: 28 articles (16%) address this topic [24, 25, 56, 67, 90, 96, 98, 104, 109, 110, 143, 151–167] (see Table 1). The contexts in which ethical issues are addressed in the field of undernutrition are various and cannot be easily categorized. They include among others: prevention of acute malnutrition and cash interventions [24], food security for various targeted populations worldwide [98, 152, 156, 162, 163, 166], food stamp programs [68], inequalities between boys and girls in India [153], collaborations and participatory approaches in a specific program in Sub-Saharan Africa [157], guidance on maternal nutrition [164], food fortification [96, 164], nutritional care of the elderly [154, 158], and innovations in capture fisheries for nutrition security [155]. Interventions relating to health claims and nutrition, food marketing, advertisement and labelling are mentioned or addressed in several articles, for instance in regard with breastmilk substitutes [96, 164–166].

A majority of these articles is organized around or address food security (see section Ethical issues in food security below). Consideration for social determinants of health, states and other stakeholders’ accountability, the challenges in partnerships (such as commercial versus public health interests) and the importance of community involvement as well as cultural factors for sustainability, and the issues of justice and equity in particular fair access to food are some of the most discussed issues (see Table 1).

Ethical issues in breastfeeding practices

Breastfeeding is addressed in 17 articles (10%) [38, 51, 67, 72, 73, 96, 152, 153, 162, 164–166, 168–172] (see Table 1). Beyond the benefits and risks of public health interventions linked to breastfeeding, respect for mothers’ autonomy and their cultural values [168] in the promotion of breastfeeding, infants’ best interests [170], as well as the challenges that are raised by public-private partnerships in this field (e.g., conflicts of interest) are among the major ethical issues discussed in these articles. Several articles mention/address concerns relating to health claims, as well as marketing, advertisement and labelling of breastmilk substitutes, in particular concerns about aggressive marketing of infant formula by private companies that interferes with public health promotion of breastfeeding [67, 96, 164–166].

It is worth noting that Fetherstone and Leach [171] address public health policies promoting breastfeeding: they refer to the Nuffield Council of Bioethics ethical framework and includes the principles of utility, evidence base and effectiveness of action, fairness, accountability, costs and burdens, and community acceptance.
Ethical issues in vitamin/mineral supplementation and food fortification

Six articles address vitamin/mineral supplementation [67, 74, 104, 151, 173, 174] and six comment on food fortification [61, 96, 164, 166, 167, 175] (see Table 1). No article specifically focuses on the ethical issues that could be raised by vitamin/mineral supplementation. The contexts in which vitamin/mineral supplementation is addressed are various; for instance: needs for additional skills and knowledge of pharmacists to support appropriate nutritional advice to consumers in pharmacy settings and marketing practices [67]; lack of clinical access to specific innovative nutrition/vitamin products and regulations about food labelling and health claims [173]; lack of education in populations about the use of vitamin supplements [174]; limitations of observational evidence in vitamin supplementation [74]; and risks associated with the combination of public health interventions of different natures, such as vaccines and vitamin A supplementation [151]. Similarly, food (or water) fortification is not the subject of extensive ethical analysis, except in regard to states and other stakeholders’ accountability and to the benefits of such interventions (see Table 1). Fortification is mentioned in the following contexts, for instance: ethical acceptability, benefits and challenges of artificial water fluoridation [61, 175]; challenges in the implementation of interventions in the field of maternal nutrition, including food fortification policies [164]; balance of benefits and risks of crop biofortification in the prevention of hunger [167]; and food fortification programmes and challenges raised by public-private partnerships, including by marketing communications [96].

Ethical issues in food security

Food security is explicitly addressed in 38 articles (22.5%) [26, 56, 57, 68, 71, 77, 79, 86, 87, 90, 96, 98–101, 104, 109, 110, 124, 134, 143, 152, 153, 155, 157, 159–163, 166, 167, 176–181] (see Table 1). The concept of food security has various definitions and dimensions (food appropriateness, availability, accessibility, affordability, utilization and stability of supply) and ethical ramifications [68, 79, 90, 104, 109, 143, 159–162, 167]. Food security (implying a fair access to food) is directly associated with the ethical principle of justice, and as such, is included in several proposed ethical frameworks [79, 98, 166]. Most authors stress that food security cannot be reached without due considerations for social determinants of health and cultural factors. In addition, incentives such as food stamps and cash transfers are rising ethical issues that were shortly described above [57, 68, 79, 99, 100, 109, 163]. Marketing and private-public partnerships may also impact food security and raise risks such as conflicts between commercial and public health interests [96]. Finally, availability of food may also depend on efficient food production, which can generate concerns about animal welfare [176, 177]. Other issues listed in Table 1 are also commonly covered.

Ethical issues in food sustainability

There is a direct link between sustainability and food security (see previous section). Among the 24 papers (14.2%—see Table 1) addressing sustainability [26, 48, 56, 57, 71, 87, 96, 99, 100, 104, 109, 110, 116, 143, 155, 157, 166, 167, 176–178, 180, 182, 183], 19 also appear in the field of food security. The sustainability of nutrition-related public health interventions, as well as the sustainability of effective food production depend on numerous factors, among which ethical consideration for the importance of partnerships with local communities, of the accountability of governments and private firms, of cultural factors, of justice and equity (for instance fair trading), and social determinants of health (see Table 1). Sustainability is an ethical consideration included in the ethical framework for monitoring and evaluating public health interventions proposed by Gopichandran et al. [48], as well as in the ethical principles proposed by
Singh et al. [166]. The concept is also addressed in the ethical frameworks reviewed by Ten Have et al. [57].

**Ethical issues in food safety**

As shown in Table 1, nine articles (5.3%) address issues that are linked to food safety, notably: challenges for food safety at all stages of production, including considerations for cultural factors, health claims and labelling [64, 109, 143, 183]; conflicts of interests with food industry and in expert panels that advise government agencies and public health officials formulating nutrition and food safety policy [27, 184]; and ethical issues that are specific to genetically modified animals and crops, including in labelling (e.g., respect for the freedom of choice of consumers) and animal welfare [178–180].

**Ethical issues raised by challenges in implementation and evaluation of public health nutrition policies and interventions**

Challenges in implementation of public health policies are mentioned or addressed in 55 articles (32.5%–see Table 2). While such challenges are not necessarily discussed in terms of “ethical issues”, they may have an impact on the ethics of nutrition-related interventions. Most challenges are associated with the complexity of contexts in which nutrition policies are expected to be implemented (in particular, how to consider specific local settings, as well as perspectives and interests of various actors). The ethical frameworks reviewed by some authors do not make a clear distinction between the development of policies and their implementation [38, 57, 84, 130]. Brown and Allison suggest six recommendations when considering the implementation of an obesity-targeted public health policy and assume that implementators can “[e]valuate whether the proposed policy addresses an exposure that can truly be considered a public health concern” (p. 343 in [84]). Similarly, Thomson et al. suggest a checklist to help prevent premature or inappropriate implementation of certain public health interventions and stress that “[a]nticipation of positive and negative unintended consequences should be integral to the planning, design and implementation of interventions that include incentives, helping to ensure that any benefits are maximised” (p. 19 in [38]).

Table 2. Number of articles mentioning or addressing challenges linked to ethical issues in the implementation of public health policies or interventions, per field (n = 55).

| Fields                        | Number of articles | References                                                      |
|-------------------------------|--------------------|-----------------------------------------------------------------|
| Obesity                       | 26                 | [1, 2, 43, 57, 67, 70–73, 77, 79–84, 88, 89, 96, 98–100, 103, 106, 111, 112] |
| Food security                 | 15                 | [26, 57, 71, 77, 79, 96, 98–100, 155, 160, 162, 167, 178, 181]      |
| Breastfeeding                 | 12                 | [38, 51, 67, 72, 73, 96, 162, 164, 165, 169, 171, 172]              |
| Sustainability                | 12                 | [26, 48, 57, 71, 96, 99, 100, 116, 155, 167, 178, 182]              |
| Public health ethics          | 12                 | [12, 38, 41–43, 46–48, 51, 54, 57, 58]                            |
| Noncommunicable diseases      | 9                  | [70, 79, 80, 88, 96, 98, 116, 126, 130]                           |
| Undernutrition                | 9                  | [96, 98, 151, 155, 160, 162, 164, 165, 167]                       |
| Food fortification            | 4                  | [96, 164, 167, 175]                                             |
| Vitamin/mineral supplementation| 2                  | [67, 151]                                                       |
| Food safety                   | 2                  | [27, 178]                                                       |
| Others*                       | 2                  | [12, 26]                                                        |

Note that one same article may appear in more than one field.
* Includes the categories “HIV and nutrition”, “Humanitarian aid” and “Others” categories (see Fig 2).

https://doi.org/10.1371/journal.pone.0186897.t002
In 62 articles (excluding 8 articles focusing on nutrigenomics/nutrigenetics and epigenomics/epigenetics), issues relating to the evaluation of public health interventions and/or to the evidence on which they are or should be grounded are explicitly addressed (see Table 3). While most of these publications do not focus explicitly on the ethical dimensions of these matters, they address the benefits (n = 41, i.e., 66.1%) and risks (n = 39, i.e., 62.9%) of nutrition-related interventions or policies. In terms of ethics, assessing evidence and evaluating effectiveness are crucial steps in the development and implementation of such interventions and policies. Interventions “should be implemented only in the face of a clear public health need and good data demonstrating effectiveness” (p. 4 in [57]).

The major challenges described in these articles are to determine what constitutes sound “evidence” in public health programs and the lack of data [61, 71, 74]. Moreover, most authors stress that scientific evidence alone (in particular analyses limited to measuring effects on health and/or cost-effectiveness) cannot guide and determine health policy and decisions for intervention [1, 2, 43, 45, 51, 61, 143]. Ethical aspects, including unexpected consequences—such as stigma, negative impact on autonomy and individual choice, and negative perceptions [38, 47, 92]—must be considered in the monitoring and evaluation of interventions [92]. Several authors stress the importance of including the public or targeted communities (including health workers involved in the intervention) in the evaluation process [38, 41, 51, 56]. These results are further discussed below.

Discussion

The results of this scoping review show that nutrition-related public health interventions can take many forms and their nature, goals, scope, and population targets may vary considerably. Such interventions may also occur at different levels, in different contexts, with the collaboration of various stakeholders. As a result, the ethical issues faced in the development and implementation of nutrition-related public health interventions are varied and cannot be equated with, nor generalized about, when dealing with specific activities in this field. More
importantly, these ethical issues cannot be managed without a careful consideration for the complexity of contexts in which nutrition-related interventions are expected to be implemented. These contexts engage a variety of actors with diverse perspectives and interests, who can influence the implementation of policies [67]. There can be multiple interpretations of a policy and the intentions of policy-makers do not necessarily determine how a policy will be interpreted [85]. In some circumstances, “implementators”, as well as other health professionals, communities, institutions, etc. involved in public health interventions, can be at odds with the content of a policy, given specific local contexts, community values or personal beliefs or practices [41, 51, 111]. For such reasons, many articles stress the importance of partnerships and community’s/stakeholders’ involvement in the development and the implementation of policies [26, 42, 160, 178]. Participatory processes and consultations could allow them to anticipate ethical issues such as implementation of policies that conflict with personal or community values [99]–or avoid them altogether. Likewise when confronted by policies that are not adapted to the local contexts, as cultural factors are particularly important when it comes to food [26, 111]. Partnerships and cross-sectoral collaborations may be needed at different levels, across different sectors, public or private [54, 165]. Some authors from our sample stress the importance of not working in silos [12, 85], one policy aimed at improving access to healthy food, for instance, may not be effective without the concurrent implementation of other social measures to reduce poverty or environmental barriers. The implementation of a policy may require additional measures that were not initially described or planned in the policy, so it is also possible that several policies must be implemented at the same time to be effective [71, 79]. Those in charge of implementing nutrition-related policies may also have to cope with significant political resistance [88], lobbying pressures [80, 88], bureaucracy [47], and the risks raised by the presence of potential conflicts of interests when developing partnerships [54, 96].

Those involved in implementation need training and/or support, technical assistance, resources and ethical guidance for the adaptation of interventions to (cultural, social, economic, political, etc.) local contexts [55, 73]. Ten Have et al. [57], for instance, assume that implementators keep a certain margin of choice in the implementation of policies. Yet, this will actually depend on the flexibility of the policy, and no author in our sample discusses to what extent those who are involved in its implementation can question the ethics concerning a policy or an intervention or what latitude is left to them in specific and local contexts. In any case, adaptation of policies to local settings and community values calls for an ethical review. In this respect, Behrmann’s ethical principles outlined as a “Guide in Implementing Policies for the Management of Food Allergies in Schools” constitute a solid example of an ethical framework that is sensitive to the context in which it must apply and to the specificity of the nutrition-related interventions that it covers [130]. As such, it is a relevant example that can be used to develop and adapt frameworks for other nutrition-related public health interventions.

Finally, some authors consider that any implementation of an intervention should be accompanied with a plan to monitor and evaluate its impact [12, 48], including its ethical impact [38]. What constitutes sound "evidence" in public health programs and interventions remains a controversial issue. Two types of evidence are relevant in this field: evidence about causes of ill health, and evidence about the efficacy and effectiveness of interventions [61]. While focus is mainly on evidence-based practices [3, 72–74, 99, 157, 182], such evidence is often hard to obtain [152], lacking or incomplete [3, 74, 109, 116]. One current challenge to building an evidence base is the lack of data and commonly used tools and indicators to measure the effectiveness (including the cost effectiveness) of initiatives and programs [42, 71, 74]. Moreover, evidence about the impact of an intervention on nutrition in one context may not necessarily apply to other contexts [24]. It is often suggested that in the face of significant public health issues, “doing something is better than doing nothing” (p. 342 in [43]) and "how
could it hurt to try?” (p. 342 in [84]). This viewpoint implies that interventions could be implemented if they are expected to be effective, without waiting for sufficient evidence [1, 43]. Yet, this stance is obviously problematic from an ethical standpoint, as such interventions could have no beneficial outcomes or could even be unsafe [151]. Conversely, a lack of evidence and/or absence of data such as relevant indicators allowing the measure of a public health problem [116] can prevent the implementation of needed public health interventions, something stressed by Shrimpton [164] in his discussion of maternal nutrition and iron fortification in the prevention of anaemia. Such issues are linked to debate and controversies surrounding the application of the precautionary principle (e.g., in [186, 187]), including to public health actions [188]. It calls for a careful assessment of risks and benefits of any intervention before implementation, even if there is not available evidence of either.

While monitoring and evaluation are essential parts of any public health policy or program [48], and the generation of evidence is integral to the work of public health and health service providers [24, 39, 112], too many interventions have still not been subjected to careful evaluation to assess their impact [106, 112, 114, 151, 152]. In this context, policy-makers and “implementors” can be left in a void, without guidance to determine what constitutes sound evidence to justify an intervention, and what factors must be considered within such an evaluation. Interventions “should be implemented only in the face of a clear public health need and good data demonstrating effectiveness” (p. 4 in [57]). Yet, as mentioned in our results, most authors in our sample that address issues relating to evidence in public health interventions stress that scientific evidence alone cannot guide and determine health policy and interventions decisions. Beyond evidentiary considerations, ethical impacts or issues must be considered, including unintended consequences of policies, such as stigma, negative impact on autonomy and individual choice, and negative perceptions [38, 47, 92]. Without such considerations, a sound evaluation of efficacy as well as a right balance of risks and benefits cannot be achieved.

The boundaries between research and public health monitoring and evaluation may be indistinct, and as such, the extent to which such evidence-generating activities should undergo ethical review has been debated [39, 48]. Yet, irrespective of whether the monitoring and evaluation qualifies as research, there is a definite need for ethical standards in practice. As mentioned by Gopichandran et al. [48], while there are several ethical frameworks in public health, none had focused on the monitoring and evaluation process. The framework proposed by these authors constitutes an ethical ground to guide ethical decision-making in the evaluation of public health interventions and can certainly be used for, and adapted to, the development of ethical guidelines for other specific nutrition-related public health interventions. In addition, all ethical frameworks mentioned in this article are valuable tools to develop ethical guidelines for the evaluation of nutrition-related public health interventions. The recommendations that are provided by these authors for the design and implementation process of policies are relevant when it comes to assessing their actual impact. Some of these frameworks [12] explicitly include post-implementation evaluation as an ethical requirement.

Limitations

Beyond the limitations described in Section “Material and Methods: Step 2” and in the legends of figures and tables, we acknowledge that the use of different databases could provide records of publications that were not identified in this scoping review. Despite this limitation, we think that our sample captures the field of ethics when explicitly addressed in the literature related to nutrition-related public health interventions, but also illustrates the difficulties to practically cover such a broad field in a scoping review, and thus a priori in a systematic review. The
presence in our final sample of 30 articles in which the "ethic" word is not used while they are actually addressing ethical issues demonstrates the challenge in identifying relevant literature in a scoping review that includes all potential nutrition-related interventions. However, the results reported above clarify a complex field by illustrating the extent, range and nature of the ethical issues discussed in nutrition-related public health interventions.

Conclusion
The results of this review illustrate the various natures, types, and scopes of existing (or planned) public health nutrition-related interventions, the widely differing contexts in which they are implemented, and the array of ethical issues that may arise. Ethical issues can only be addressed by taking into consideration the complexities of each specific setting. As a consequence, while general ethical frameworks or recommendations that follow from such consideration are certainly useful to draw attention to these issues, they cannot be expected to provide policy makers, implementors and other public health personnel with sufficient practical ethical guidance on how to achieve such goals in complex settings and specific public health nutrition interventions.

This scoping review also illustrates the methodological challenges that must be faced when conducting such a review and constitutes a needed and useful step in the design and achievement of future research seeking to identify ethical issues that are raised by nutrition-related public health interventions and in the development of ethical frameworks for policy makers and health professionals. We suggest that, given the complexity and diverse natures of interventions and contexts in the field of public health nutrition, future reviews should focus solely on specific interventions, without limiting their search to articles or studies that explicitly address ethical issues. Every item in the sample of publications should then be reviewed and analyzed in order, first, to identify ethical issues, addressed or not and, second, potential gaps in existing recommendations and guidelines relating to that specific nutrition-related intervention.

Supporting information
S1 Table. Queries in PubMed.
(DOCX)

S2 Table. Final sample.
(XLSX)

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References

1. Ten Have M. Ethical aspects of obesity prevention. Best Pract Res Clin Gastroenterol. 2014; 28:303–14. https://doi.org/10.1016/j.bpg.2014.03.004 PMID: 24810191

2. Riiser K, Londal K, Ommundsen Y, Misvaer N, Helseth S. Targeting and tailoring an intervention for adolescents who are overweight: some ethical concerns. Nursing ethics. 2015; 22:237–47. https://doi.org/10.1177/0969733014524761 PMID: 24714049

3. 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; 104:787–95. https://doi.org/10.2105/AJPH.2013.301708 PMID: 24625154

4. Buchanan D. Ethical Standards to Guide the Development of Obesity Policies and Programs Comment on "Ethical Agreement and Disagreement about Obesity Prevention Policy in the United States". Int J Health Policy Manag. 2013; 1:313–5. https://doi.org/10.15171/ijhpm.2013.63 PMID: 24596891

5. Kass NE. An ethics framework for public health. Am J Public Health. 2001; 91:1776–82. PMID: 11684600

6. Childress JF, Faden RR, Gaare RD, Gostin LO, Kahn J, Bonnie RJ, et al. Public health ethics: mapping the terrain. J Law Med Ethics. 2002 30:170–8. PMID: 12066595

7. Roberts MJ, Reich MR. Ethical analysis in public health. Lancet. 2002; 359:1055–9 https://doi.org/10.1016/S0140-6736(02)08097-2 PMID: 11937202

8. Upshur RE. Principles for the justification of public health intervention. Can J Public Health. 2002; 93:101–3. PMID: 11968179

9. Powers M, Faden R. Social Justice: The Moral Foundation of Public Health and Health Policy. New York: Oxford University Press; 2006. https://doi.org/10.1016/j.healthpol.2006.02.016

10. Nuffield Council on Bioethics. Public Health: Ethical Issues. London: Nuffield Council on Bioethics; 2007. http://nuffieldbioethics.org/project/public-health. Accessed 11 April 2017.

11. Bernheim RG, Stefanak M, Brandenburg T, Pannone A, Melnick A. Public health accreditation and metrics for ethics: a case study on environmental health and community engagement. J Public Health Manag Pract. 2013; 19:4–8. https://doi.org/10.1097/PHM.Ob013e31824acb25 PMID: 23169397

12. Clarrinval C, Biller-Andorno N. Challenging Operations: An Ethical Framework to Assist Humanitarian Aid Workers in their Decision-making Processes. PLoS Curr. 2014; https://doi.org/10.1371/currents.dis.96bec99f13800a8059bb5a82028bbf PMID: 24987575

13. Hitchcock J, Schubert P, Thomas S. Community Health Nursing: caring in action. Clifton Park, NY: Thomson/Delmar Learning; 2003.

14. Public Health Leadership Association. Principles of the Ethical Practice of Public Health. Chicago, IL; 2002. https://www.apha.org/--/media/files/pdf/membergroups/ethics_brochure.ashx. Accessed 11 April 2017.

15. The Joanna Briggs Institute. Joanna Briggs Institute Reviewers’ Manual 2015 —Methodology for JBI Scoping Reviews. University of Adelaide: The Joanna Briggs Institute; 2015. Available from https://joannabriggs.org/assets/docs/sumari/Reviewers-Manual_Methodology-for-JBI-Scoping-Reviews_2015_v2.pdf. Accessed October 10, 2017.

16. Arksey H, O’Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005; 8:19–32.

17. Flynn MA. Empowering people to be healthier: public health nutrition through the Ottawa Charter. Proc Nutr Soc. 2015; 74:303–12. https://doi.org/10.1017/S002966511400161X PMID: 25602708

18. Temple NJ. Strategic nutrition: a vision for the twenty-first century. Public Health Nutr. 2016; 19:164–75. https://doi.org/10.1017/S1368980014003292 PMID: 25638207
19. Stockley L. Toward public health nutrition strategies in the European Union to implement food based dietary guidelines and to enhance healthier lifestyles. Public Health Nutr. 2001; 4:307–24. PMID: 11688436

20. Pekka P, Pirjo P, Ulla U. Influencing public nutrition for non-communicable disease prevention: from community intervention to national programme—experiences from Finland. Public Health Nutr. 2002; 5:245–51. PMID: 12027291

21. Mozaffarian D. Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity: A Comprehensive Review. Circulation. 2016; 133:187–225. https://doi.org/10.1161/CIRCULATIONAHA.115.018585 PMID: 26746178

22. Christian MD, Devereaux AV, Dichter JR, Rubinson L, Kissoon N. Task Force for Mass Critical Care. Introduction and executive summary: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. Chest. 2014; 146:8s–34s. https://doi.org/10.1378/chest.14-0732 PMID: 25144202

23. Knebel AR, Sharpe VA, Danis M, Toomey LM, Knickerbocker DK. Informing the gestalt: an ethical framework for allocating scarce federal public health and medical resources to states during disasters. Disaster Med Public Health Prep. 2014; 8:79–88. https://doi.org/10.1017/dmpp.2014.9 PMID: 24612854

24. de Pee S, Grais R, Fenn B, Brown R, Briend A, Frize J, et al. Prevention of acute malnutrition: distribution of special nutritious foods and cash, and addressing underlying causes—what to recommend when, where, for whom, and how. Food Nutr Bull. 2015; 36:S24–9. https://doi.org/10.1177/15648265150360104 PMID: 25902611

25. Grais RF, Luquero FJ, Grellety E, Pham H, Coghlan B, Salignon P. Learning lessons from field surveys in humanitarian contexts: a case study of field surveys conducted in North Kivu, DRC 2006–2008. Confl Health. 2009; 3:8. https://doi.org/10.1186/1752-1505-3-8 PMID: 19744319

26. Kaye HL, Moreno-Leguizamon CJ. Nutrition education and counselling as strategic interventions to improve health outcomes in adult outpatients with HIV: a literature review. Afr J AIDS Res. 2010; 9:271–83. https://doi.org/10.2989/16085906.2010.530183 PMID: 25960361

27. Rowe S, Alexander N, Weaver CM, Dwyer JT, Drew C, Applebaum RS, et al for the International Life Sciences Institute (ILSI] North America Conflict of Interest Working Group. How experts are chosen to inform public policy: can the process be improved? Health Policy. 2013; 112:172–8. https://doi.org/10.1016/j.healthpol.2013.01.012 PMID: 23415508

28. Gupta A, Holla R, Suri S. Conflict of interest in public health: should there be a law to prevent it? Indian J Med Ethics. 2015; 12:172–7. https://doi.org/10.20529/IJME.2015.047 PMID: 26060144

29. Connor SL. The role of sponsorship in achieving our mission. J Acad Nutr Diet. 2015; 115:691. https://doi.org/10.1016/j.jand.2015.03.007 PMID: 25911338

30. Labonte R. Health in All (Foreign] Policy: challenges in achieving coherence. Health Promot Int. 2014; 29 Suppl 1:i48–58.

31. Joy P, Mann L, Biotricky K. Identification of Healthy Eating and Active Lifestyle Issues through Photo Elicitation. Can J Diet Pract Res. 2014; 75:152–6. https://doi.org/10.3148/cjdpr-2014-006 PMID: 26066821

32. Mubeen SM, Mansoor S, Hussain A, Quadir S. Perceptions and practices of fasting in Ramadan during pregnancy in Pakistan. Iran J Nurs Midwifery Res. 2012; 17:467–71. PMID: 23922591

33. Hoffman SR, Stallings SF, Bessinger RC, Brooks GT. Differences between health and ethical vegetarians. Strength of conviction, nutrition knowledge, dietary restriction, and duration of adherence. Appetite. 2013; 65:39–44.

34. Barnhill A. Nutritionism, commercialization and food comment on “buying health: the costs of commercialism and an alternative philosophy”. Int J Health Policy Manag. 2013; 1:223–5. https://doi.org/10.15171/ijhpm.2013.4.1 PMID: 24968689

35. Rusconi M, Conti A. Theobroma cacao L., the Food of the Gods: a scientific approach beyond myths and claims. Pharmacol Res. 2010; 61:5–13. https://doi.org/10.1016/j.phrs.2009.08.008 PMID: 19735732

36. Grill K, Dawson A. Ethical Frameworks in Public Health Decision-Making: Defending a Value-Based and Pluralist Approach. Health Care Analysis. 2015;1–17. https://doi.org/10.1007/s10728-013-0232-1

37. Pickett KE, Wilkinson RG. The ethical and policy implications of research on income inequality and child well-being. Pediatrics. 2015; 135 Suppl 2:S39–47.

38. Thomson G, Morgan H, Crossland N, Baud L, Dykes F, Hoddinott P. Unintended consequences of incentive provision for behaviour change and maintenance around childbirth. PloS One. 2014; 9: e111322. https://doi.org/10.1371/journal.pone.0111322 PMID: 25357121
39. Willison DJ, Ondrusk N, Dawson A, Emerson C, Ferris LE, Saginur R, et al. What makes public health studies ethical? Dissolving the boundary between research and practice. BMC Med Ethics. 2014; 15:61. https://doi.org/10.1186/1472-6939-15-61 PMID: 25104180

40. Desy M, Hughes D, Filiatrault F. [Solutions for the better integration of public health ethical considerations]. Can J Public Health. 2014; 105:e142–5. PMID: 24886851

41. Brown SL, Whiting D. The ethics of distress: toward a framework for determining the ethical acceptability of distressing health promotion advertising. Int J Psychol. 2014; 49:89–97. https://doi.org/10.1002/ijop.12002 PMID: 24811879

42. Williamson L. Patient and citizen participation in health: the need for improved ethical support. Am J Bioeth. 2014; 14:4–16.

43. Vallgarda S. Ethics, equality and evidence in health promotion Danish guidelines for municipalities. Scand J Public Health. 2014; 42:337–43. https://doi.org/10.1177/1403494814525007 PMID: 24608091

44. Stapleton G, Schroder-Back P, Laaser U, Meershoek A, Popa D. Global health ethics: an introduction to prominent theories and relevant topics. Glob Health Action. 2014; 7:23569.

45. Breton E. [From behavior change to the improvement of living conditions. Toward ethical and effective health education]. Sante publique. 2013; 25:s119–23. PMID: 24313071

46. Klein EP. Patient health incentives: ethical challenges and frameworks. Int J Behav Med. 2014; 21:995–1004. https://doi.org/10.1007/s12529-013-9373-3 PMID: 24281939

47. Tait CL. Resituating the ethical gaze: government morality and the local worlds of impoverished Indigenous women. Int J Circumpolar Health. 2013; 72. https://doi.org/10.3402/ijch.v72i0.21207 eCollection 2013. PMID: 23986888

48. Gopichandran V, Indira Krishna AK. Monitoring ‘monitoring’ and evaluating ‘evaluation’: an ethical framework for monitoring and evaluation in public health. J Med Ethics. 2013; 39:31–5. https://doi.org/10.1136/medethics-2012-100680 PMID: 23112043

49. Brownell KD, Warner KE. The perils of ignoring history: Big Tobacco played dirty and millions died. How similar is Big Food? The Milbank Q. 2009; 87:259–94. https://doi.org/10.1111/j.1468-0009.2009.00555.x PMID: 19298423

50. Johri M, Chung R, Dawson A, Schrecker T. Global health and national borders: the ethics of foreign aid in a time of financial crisis. Global Health. 2012; 8:19. https://doi.org/10.1186/1744-8603-8-19 PMID: 22742814

51. Masse R. [Specialist and lay ethical expertise in public health: issues and challenges for discourse ethics]. Sante publique. 2012; 24:49–61. PMID: 22730610

52. Ruger JP. Global health governance as shared health governance. J Epidemiol Community Health. 2012; 66:653–61. https://doi.org/10.1136/jech.2009.101097 PMID: 22170940

53. Forman L. Making the case for human rights in global health education, research and policy. Can J Public Health 2011; 102:207–9. PMID: 21714321

54. Hernandez VR, Montana S, Clarke K. Child health inequality: framing a social work response. Health Soc Work. 2010; 35:291–301. PMID: 21171536

55. 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; 10:638. https://doi.org/10.1186/1471-2458-10-638 PMID: 20969761

56. Rubens CE, Gravett MG, Victoria CG, Rubens CE, Stanton C, the GAPPS Review Group. Global report on preterm birth and stillbirth (7 of 7]: mobilizing resources to accelerate innovative solutions (Global Action Agenda). BMC Pregnancy Childbirth. 2010; 10 Suppl 1:S7.

57. Sather M, Fajon AV, Zaentz R, Rubens CE, the GAPPS Review Group. Global report on preterm birth and stillbirth [5 of 7]: advocacy barriers and opportunities. BMC pregnancy and childbirth. 2010; 10 Suppl 1:S5.

58. Brownell KD, Warner KE. The perils of ignoring history: Big Tobacco played dirty and millions died. How similar is Big Food? The Milbank Q. 2009; 87:259–94. https://doi.org/10.1111/j.1468-0009.2009.00555.x PMID: 19298423

59. Calman K. Beyond the 'nanny state': stewardship and public health. Public Health. 2009; 123:e6–e10.
62. Dordiev AL, Bonham MP, Ware RS, Brennan L, Truby H. Study protocol: evaluation of 'JenMe', a commercially-delivered weight management program for adolescents: a randomised controlled trial. BMC Public Health. 2015; 15:563. https://doi.org/10.1186/s12889-015-1923-y PMID: 26088581

63. Muslu GK, Beytut D, Kahraman A, Yardimci F, Başıakkal Z. Nutritional style of parents and examination of the effective factors. Turk Pediatri Ars. 2014; 49:224–30. https://doi.org/10.5152/tpa.2014.1742 PMID: 26078667

64. Di Renzo L, Colica C, Carraro A, Cenci Goga B, Tonino Marsella L, Botta R, et al. Food safety and nutritional quality for the prevention of non communicable diseases: the Nutrient, hazard Analysis and Critical Control Point process (NACCP). J Transl Med. 2015; 13:128. https://doi.org/10.1186/s12967-015-0484-2 PMID: 25899825

65. Barnhill A, King KF, Kass N, Faden R. The value of unhealthy eating and the ethics of healthy eating policies. Kennedy Inst Ethics J. 2014; 24:187–217.

66. Okafor CI, Gezawa ID, Sabir AA, Raimi TH, Enang O. Obesity, overweight, and underweight among urban Nigerians. Niger J Clin Pract. 2014; 17:743–9. https://doi.org/10.4103/1119-3077.144389 PMID: 25385913

67. Maher JH, Lowe J, Hughes R. Community pharmacy as a setting for public health nutrition action: Australian nutritionists' perspectives. Public Health Nutr. 2015; 18:1864–72. https://doi.org/10.1017/S1368980014002201 PMID: 25295409

68. Power EM, Little MH, Collins PA. Should Canadian health promoters support a food stamp-style program to address food insecurity? Health Promot Int. 2015; 30:184–93. https://doi.org/10.1093/heapro/dau080 PMID: 24887485

69. Russell CG, Worsley A, Liem DG. Parents' food choice motives and their associations with children's food preferences. Public Health Nutr. 2015; 18:1018–27. https://doi.org/10.1017/S1368980014001128 PMID: 24854368

70. Bhatnagar N, Kaur R, Dudeja P. Food marketing to children in India: comparative review of regulatory strategies across the world. Indian J Pediatr. 2014; 81:1187–92. https://doi.org/10.1007/s12098-014-1480-x PMID: 24854368

71. Pinard CA, Kim SA, Story M, Yaroch AL. The food and water system: impacts on obesity. J Law Med Ethics. 2013; 41 Suppl 2:52–60.

72. Foltz JL, Belay B, Blackburn GL. Improving the Weight of the Nation by engaging the medical setting in obesity prevention and control. J Law Med Ethics. 2013; 41 Suppl 2:19–26.

73. Reynolds MA, Jackson Cotwright C, Polhamus B, Gertel-Rosenberg A, Chang D. Obesity prevention in the early care and education setting: successful initiatives across a spectrum of opportunities. J Law Med Ethics. 2013; 41 Suppl 2:8–18.

74. Maki KC, Slavin JL, Rains TM, Kris-Etherton PM. Limitations of observational evidence: implications for evidence-based dietary recommendations. Adv Nutr. 2014; 5:7–15. https://doi.org/10.3945/an.113.004929 PMID: 24425715

75. Trovato FM, Catalano D, Musumeci G, Trovato GM. 4Ps medicine of the fatty liver: the research model of predictive, preventive, personalized and participatory medicine-recommendations for facing obesity, fatty liver and fibrosis epidemics. EPMA J. 2014; 5:21. https://doi.org/10.1186/1878-5085-5-21 PMID: 25937854

76. Freedhoff Y. The food industry is neither friend, nor foe, nor partner. Obes Rev. 2014; 15:6–8. https://doi.org/10.1111/obr.12128 PMID: 24330345

77. Bombak A. Obesity, health at every size, and public health policy. Am J Public Health. 2014; 104:e60–7.

78. Oppenheimer GM, Benrubu ID. McGovern’s Senate Select Committee on Nutrition and Human Needs versus the meat industry on the diet-heart question (1976–1977). Am J Public Health. 2014; 104:59–69. https://doi.org/10.2105/AJPH.2013.301464 PMID: 24228658

79. Azetsop J, Joy TR. Access to nutritious food, socioeconomic individualism and public health ethics in the USA: a common good approach. Philos Ethics Humanit Med. 2013; 8:16. https://doi.org/10.1186/1747-5341-8-16 PMID: 24165577

80. Popkin BM. Bellagio Declaration 2013: countering Big Food’s undermining of healthy food policies. Obes Rev. 2013; 14 Suppl 2:9–10.

81. Gesser-Edelsburg A, Endevv T, Tirosh-Kamienshchik Y. Nutrition labelling and the choices logo in Israel: positions and perceptions of leading health policy makers. J Hum Nutr Diet. 2014; 27:58–68. https://doi.org/10.1111/jhn.12050 PMID: 23656397

82. Gearhardt A, Roberts M, Ashe M. If sugar is addictive...what does it mean for the law? J Law Med Ethics. 2013; 41 Suppl 1:46–9.
83. Barnhill A, King KF. Evaluating equity critiques in food policy: the case of sugar-sweetened beverages. J Law Med Ethics. 2013; 41:301–9. https://doi.org/10.1111/jlme.12020 PMID: 23581672

84. Brown AW, Allison DB. Unintended consequences of obesity-targeted health policy. Virtual Mentor. 2013; 15:339–46. https://doi.org/10.1001/virtualmentor.2013.15.4.pfor2-1304 PMID: 23566784

85. Barnhill A, King KF. Ethical Agreement and Disagreement about Obesity Prevention Policy in the United States. Int J Health Policy Manag. 2013; 1:117–20. https://doi.org/10.15171/ijhpm.2013.21 PMID: 24596849

86. Heinrich KM, Stephen MO, Vaughan KB, Kellogg M. Kansas legislators prioritize obesity but overlook nutrition and physical activity issues. J Public Health Manag Pract. 2013; 19:139–45. https://doi.org/10.1097/PHH.0b013e318254cc57 PMID: 23358292

87. Deckers J. Obesity, public health, and the consumption of animal products. J Bioeth Inq. 2013; 10:29–38. https://doi.org/10.1007/s11673-012-9411-x PMID: 23288438

88. Campbell N, Willis KJ, Arthur G, Jeffery B, Robertson HL, Lorenzetti DI. Federal government food policy committees and the financial interests of the food sector. Open Med. 2013; 7:e107–11. PMID: 25237403

89. 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. Eur J Public Health. 2013; 23:299–305. https://doi.org/10.1093/eurpub/cks052 PMID: 23132871

90. Hilmers A, Hilmers DC, Dave J. Neighborhood disparities in access to healthy foods and their effects on environmental justice. Am J Public Health. 2012; 102:1644–54. https://doi.org/10.2105/AJPH.2012.300865 PMID: 22014282

91. Elliott C. Marketing foods to children: are we asking the right questions? Child Obes. 2012; 8:191–4. https://doi.org/10.1089/chi.2012.0013 PMID: 22799544

92. Crawford PB, Gosliner W, Kayman H. The ethical basis for promoting nutritional health in public schools in the United States. Prev Chronic Dis. 2011; 8:A98. PMID: 21843428

93. Kersh R, Stroup DF, Taylor WC. Childhood obesity: a framework for policy approaches and ethical considerations. Prev Chronic Dis. 2011; 8:A93. PMID: 21843423

94. Freudenberg N, McDonough J, Tsui E. Can a food justice movement improve nutrition and health? A case study of the emerging food movement in New York City. J Urban Health. 2011; 88:623–36. https://doi.org/10.1007/s11524-011-9598-x PMID: 21717252

95. McPhail D, Chapman GE, Beagan BL. "Too much of that stuff can’t be good": Canadian teens, morality, and fast food consumption. Soc Sci Med. 2011; 73:301–7. https://doi.org/10.1016/j.socscimed.2011.05.022 PMID: 21689876

96. Barnhill A. Impact and ethics of excluding sweetened beverages from the SNAP program. Am J Public Health. 2011; 101:2037–43. https://doi.org/10.2105/AJPH.2011.300225 PMID: 21566025

97. Purcell M. Raising healthy children: Moral and political responsibility for childhood obesity. J Law Med Ethics. 2011; 39:380–6. https://doi.org/10.1011/j.1748-720X.2011.00607.x PMID: 21871035

98. Wickins-Drazilova D, Williams G. Ethical and public policy aspects of childhood obesity: opinions of scientists working on an intervention study. Obes Rev. 2010; 11:620–6. https://doi.org/10.1111/j.1467-789X.2010.00752.x PMID: 20546143
107. Jain A. Temptations in cyberspace: new battlefields in childhood obesity. Health Aff (Millwood). 2010; 29:425–9.

108. Brownell KD, Kersh R, Ludwig DS, Post RC, Puhl RM, Schwartz MB. Personal responsibility and obesity: a constructive approach to a controversial issue. Health Aff (Millwood). 2010; 29:379–87.

109. Wahlqvist ML, Keatinge JD, Butler CD, Friel Sh, McKay J, Eastdown W, et al. A Food in Health Security (FIHS) platform in the Asia-Pacific Region: the way forward. Asia Pac J Clin Nutr. 2009; 18:688–702. PMID: 19965367

110. Chiu TH, Lin CL. Ethical management of food systems: plant based diet as a holistic approach. Asia Pac J Clin Nutr. 2009; 18:647–53. PMID: 19965360

111. Moore S, Murphy S, Tapper K, Moore L. From policy to plate: barriers to implementing healthy eating policies in primary schools in Wales. Health Policy. 2010; 94:239–45. https://doi.org/10.1016/j.healthpol.2009.10.001 PMID: 19896747

112. Dietz WH, Hunter AS. Legal preparedness for obesity prevention and control: the public health framework for action. J Law Med Ethics. 2009; 37 Suppl 1:9–14.

113. Adler NE, Stewart J. Reducing obesity: motivating action while not blaming the victim. The Milbank Q. 2009; 87:49–70. https://doi.org/10.1111/j.1468-0009.2009.00547.x PMID: 19298415

114. Wilde P. Self-regulation and the response to concerns about food and beverage marketing to children in the United States. Nutr Rev. 2009; 67:155–66. https://doi.org/10.1111/j.1753-4887.2009.00183.x PMID: 19239630

115. Hannan-Jones M, Capra S. Prevalence of diet-related risk factors for chronic disease in male prisoners in a high secure prison. Eur J Clin Nutr. 2015; 70:212–6. https://doi.org/10.1038/ejcn.2015.100 PMID: 26081491

116. Johnson C, Mohan S, Praveen D, Woodward M, Maulik PK, Shanmugan R, et al. Protocol for developing the evidence base for a national salt reduction programme for India. BMJ Open. 2014; 4: e006629. https://doi.org/10.1136/bmjopen-2014-006629 PMID: 25344488

117. Leitzmann C. Vegetarian nutrition: past, present, future. Am J Clin Nutr. 2014; 100 Suppl 1:496s–502s.

118. Camp KM, Trujillo E. Position of the Academy of Nutrition and Dietetics: nutritional genomics. J Acad Nutr Diet. 2014; 114:299–312. https://doi.org/10.1016/j.jand.2013.12.001 PMID: 24439821

119. Cormier H, Tremblay BL, Paradis AM, Garneau V, Desroches S, Robitaille J. Nutrigenomics—perspectives from registered dietitians: a report from the Quebec-wide e-consultation on nutrigenomics among registered dietitians. J Hum Nutr Diet. 2014; 27:391–400. https://doi.org/10.1111/jhn.12194 PMID: 24387074

120. Nordström K, Cof f C, Jonsson H, Nordenfelt L, Görman U. Food and health: individual, cultural, or scientific matters? Genes Nutr. 2013; 8:357–63. https://doi.org/10.1007/s12263-013-0336-8 PMID: 23494484

121. Nordström K, Juth N, Kjellström S, Meijboom FLB, Görmanon U, the Food4Me project. Values at stake: autonomy, responsibility, and trustworthiness in relation to genetic testing and personalized nutrition advice. Genes Nutr. 2013; 8:365–72. https://doi.org/10.1007/s12263-013-0337-7 PMID: 23504640

122. Görman U, Mathers JC, Grimaldi KA, Ahlgren J, Nordström K. Do we know enough? A scientific and ethical analysis of the basis for genetic-based personalized nutrition. Genes Nutr. 2013; 8:373–81. https://doi.org/10.1007/s12263-013-0338-6 PMID: 23471854

123. Ahlgren J, Nordgren A, Perrudin M, Ronteltap A, Savigny J, van Trij H, et al. Consumers on the Internet: ethical and legal aspects of commercialization of personalized nutrition. Genes Nutr. 2013; 8:349–55. https://doi.org/10.1007/s12263-013-0331-0 PMID: 23471853

124. Barolia RI, Clark AM, Higgibottom GM. Protocol for a qualitative study on promoting dietary change and positive food choices for poor people with low income who experience cardiovascular disease in Pakistan. BMJ Open. 2013; 3:e004176. https://doi.org/10.1136/bmjopen-2013-004176 PMID: 24309173

125. Gibney MJ, Walsh MC. The future direction of personalised nutrition: my diet, my phenotype, my genes. Proc Nutr Soc. 2013; 72:219–25. https://doi.org/10.1017/S0029665112003436 PMID: 23360849

126. Fears R, ter Meulen V. The perspective from EASAC and FEAM on direct-to-consumer genetic testing for health-related purposes. Eur J Hum Genet. 2013; 21:703–7. https://doi.org/10.1038/ejhg.2012.238 PMID: 23169492

127. Bruyere O, Rizzoli R, Coxam V, Chevalier T, Fabien-Soule V, Kanis JA, et al. Assessment of health claims in the field of bone: a view of the Group for the Respect of Ethics and Excellence in Science.
128. Lobanenkov V, Loukinov D, Pugacheva E. Environmental epigenomics and disease susceptibility. Keystone symposia on molecular and cellular biology. The Grove Park Inn & Spa, Asheville, NC, USA, 27 March-1 April 2011. Epigenomics. 2011; 3:261–6. https://doi.org/10.2217/epi.11.25 PMID: 22122336

129. Weir M, Morin K, Ries N, Castle D. Canadian health care professionals' knowledge, attitudes and perceptions of nutritional genomics. Br J Nutr. 2010; 104:1112–9. https://doi.org/10.1017/S0007114510002035 PMID: 20550743

130. Behrmann J. Ethical principles as a guide in implementing policies for the management of food allergies in schools. J Sch Nurs. 2010; 26:183–93. https://doi.org/10.1177/1059840510364844 PMID: 20348215

131. Resnik D. Trans fat bans and human freedom. Am J Bioeth. 2010; 10:27–32.

132. Deville K. Trans fat bans and the dynamic of public health regulation. Am J Bioeth. 2010; 10:46–9.

133. Kirkwood K. Lipids, liberty, and the integrity of free actions. Am J Bioeth. 2010; 10:45–6.

134. Boddington P. Dietary choices, health, and freedom: hidden fats, hidden choices, hidden constraints. Am J Bioeth. 2010; 10:43–4.

135. Rubel A. Local trans fat bans and consumer autonomy. Am J Bioeth. 2010; 10:41–2.

136. Nobis N, Gardner M. Cut the fat! Defending trans fats bans. Am J Bioeth. 2010; 10:39–40.

137. Keane M. Public health interventions need to meet the same standards of medical ethics as individual health interventions. Am J Bioeth. 2010; 10:36–8.

138. Wilson J, Dawson A. Giving liberty its due, but no more: trans fats, liberty, and public health. Am J Bioeth. 2010; 10:34–6.

139. Gostin LO. Trans fat bans and the human freedom: a refutation. Am J Bioeth. 2010; 10:33–4.

140. Resnik D. Response to open peer commentaries on "Trans fat bans and human freedom". Am J Bioeth. 2010; 10:W4–5.

141. Herman J. Saving U.S. dietary advice from conflicts of interest. Food Drug Law J. 2010; 65:285–316, ii. PMID: 24475543

142. Saukko PM, Reed M, Britten N, Hogarth S. Negotiating the boundary between medicine and consumer culture: online marketing of nutrigenetic tests. Soc Sci Med. 2010; 70:744–53. https://doi.org/10.1016/j.socscimed.2009.10.066 PMID: 20022680

143. Wahlqvist ML. Why food in health security (FIHS)? Asia Pac J Clin Nutr. 2009; 18:480–5. PMID: 19965335

144. Elia M. The economics of malnutrition. Nestle Nutr Workshop Ser Clin Perform Programme. 2009; 12:29–40. https://doi.org/10.1159/000235666 PMID: 19858684

145. Ghosh D. Personalised food: how personal is it? Genes Nutr. 2010; 5:51–3. https://doi.org/10.1007/s12263-009-0139-0 PMID: 19763657

146. Mann J, Nye ER. Fad diets in Sweden, of all places. Lancet. 2009; 374:767–9. https://doi.org/10.1016/S0140-6736(09)61575-0 PMID: 19733769

147. Capron AM. Learning from the past and looking to the future. J Nutrigenet Nutrigenomics. 2009; 2:85–90. https://doi.org/10.1159/000227295 PMID: 19690435

148. Ghosh D. Future perspectives of nutrigenomics foods: benefits vs. risks. Indian J Biochem Biophys. 2009; 46:31–6. PMID: 19374251

149. Morin K. Knowledge and attitudes of Canadian consumers and health care professionals regarding nutritional genomics. OMICS. 2009; 13:37–41. https://doi.org/10.1089/omi.2008.0047 PMID: 19290810

150. Komduur RH, Korthals M, te Molder H. The good life: living for health and a life without risks? On a prominent script of nutrigenomics. Br J Nutr. 2009; 101:307–16. https://doi.org/10.1017/S0007114508076253 PMID: 18828951

151. Benn CS. Combining vitamin A and vaccines: convenience or conflict? Dan Med J. 2012; 59:B4378. PMID: 22238946

152. Donegan S, Maluccio JA, Myers CK, Menon P, Ruel MT, Habicht JP. Two food-assisted maternal and child health nutrition programs helped mitigate the impact of economic hardship on child stunting in Haiti. J Nutr. 2010; 140:1139–45. https://doi.org/10.3945/jn.110.114272 PMID: 20392883

153. Fledderjohn J, Agrawal S, Veilakkal S, Basu S, Campbell O, Doyle P, et al. Do girls have a nutritional disadvantage compared with boys? Statistical models of breastfeeding and food consumption
inequalities among Indian siblings. PloS One. 2014; 9:e107172. https://doi.org/10.1371/journal.pone.0107172 PMID: 25229235

154. Gholizadeh L, Yazdi K, Dehghan Nayeri N, Mohammadi E. Nutritional care of elderly patients in acute care settings: A qualitative study. Geriatr Gerontol Int. 2015; 16:374–9. https://doi.org/10.1111/ggi.12532 PMID: 26081495

155. Hall SJ, Hilborn R, Andrew NL, Allison EH. Innovations in capture fisheries are an imperative for nutrition security in the developing world. Proc Natl Acad Sci USA. 2013; 110:8393–8. https://doi.org/10.1073/pnas.1208067110 PMID: 23671089

156. Isanaka S, Grais RF, Briend A, Checchi F. Estimates of the duration of untreated acute malnutrition in children from Niger. Am J Epidemiol. 2011; 173:932–40. https://doi.org/10.1093/aje/kwq436 PMID: 21378127

157. Lachat C, Nago E, Roberfroid D, Holdsworth M, Smit K, Kinabo J, et al. Developing a sustainable nutrition research agenda in sub-Saharan Africa—findings from the SUNRAY project. PLoS Med. 2014; 11:e1001593. https://doi.org/10.1371/journal.pmed.1001593 PMID: 24492348

158. Mamhidir AG, Kihlgren M, Soerlie V. Malnutrition in elder care: qualitative analysis of ethical perceptions of politicians and civil servants. BMC Med Ethics. 2010; 11:11. https://doi.org/10.1186/1472-6939-11-11 PMID: 20553607

159. Mishra S. Hunger, ethics and the right to food. Indian J Med Ethics. 2012; 9:32–7. PMID: 22319850

160. Perez-Escamilla R. Can experience-based household food security scales help improve food security governance? Glob Food Sec. 2012; 1:120–5. https://doi.org/10.1016/j.gfs.2012.10.006 PMID: 23795344

161. Rodota S. The right to secure food in the perspective of the general improvement of the fundamental rights. Rev Derecho Genoma Hum. 2010; 33:13–9.

162. Salmon L. Food security for infants and young children: an opportunity for breastfeeding policy? Int Breastfeed J. 2015; 10:7. https://doi.org/10.1186/s13006-015-0029-6 PMID: 25750657

163. Schmitz BA, Moreira EA, Freitas MB, Fiaites GM, Gabriel CG, Fagundes RL. Public intervention in food and nutrition in Brazil. Arch Latinoam Nutr. 2011; 61:361–6. PMID: 23094518

164. Shrimpton R. Global policy and programme guidance on maternal nutrition: what exists, the mechanisms for providing it, and how to improve them? Paediatr Perinat Epidemiol. 2012; 26 Suppl 1:315–25.

165. Singer PA, Ansett S, Sagoe-Moses I. What could infant and young child nutrition learn from sweatshops? BMC Public Health. 2011; 11:276. https://doi.org/10.1186/1471-2458-11-276 PMID: 21545745

166. Singh JA, Daar AS, Singer PA. Shared principles of ethics for infant and young child nutrition in the developing world. BMC Public Health. 2010; 10:321. https://doi.org/10.1186/1471-2458-10-321 PMID: 20529339

167. von Braun J. Food insecurity, hunger and malnutrition: necessary policy and technology changes. N Biotechnol. 2010; 27:449–52. https://doi.org/10.1016/j.nbt.2010.08.006 PMID: 20727428

168. Lessen R, Kavanagh K. Position of the academy of nutrition and dietetics: promoting and supporting breastfeeding. J Acad Nutr Diet. 2015; 115:444–9. https://doi.org/10.1016/j.jand.2014.12.014 PMID: 25721389

169. Fahlquist JN. Experience of non-breast feeding mothers: Norms and ethically responsible risk communication. Nurs Ethics. 2014; 23:231–41 https://doi.org/10.1177/0969733014561913 PMID: 2533621

170. Froh EB, Spatz DL. An ethical case for the provision of human milk in the NICU. Adv Neonatal Care. 2014; 14:269–73. https://doi.org/10.1097/ANC.0000000000000109 PMID: 25075925

171. Fetherston CM, Leach JS. Analysis of the ethical issues in the breastfeeding and bedsharing debate. Breastfeed Rev. 2012; 20:7–17.

172. Hirani SA, Karmaliati R, Christie T, Parpio Y, Rafique G. Perceived Breastfeeding Support Assessment Tool [PBSAT]: development and testing of psychometric properties with Pakistani urban working mothers. Midwifery. 2013; 29:599–607. https://doi.org/10.1016/j.midw.2012.05.003 PMID: 23039941

173. Merritt RJ, Goldsmith AH. Scientific, economic, regulatory, and ethical challenges of bringing science-based pediatric nutrition products to the U.S. market and ensuring their availability for patients. JPN En Parenter Enteral Nutr. 2014; 38:175–34a. https://doi.org/10.1177/0148607114549771 PMID: 25249029

174. Al-Naggar RA, Chen R. Prevalence of vitamin-mineral supplements use and associated factors among young Malaysians. Asian Pac J Cancer Prev. 2011; 12:1023–9. PMID: 21790245

175. Botchey SA, Ou Yang J, Vivekanantham S. Global water fluoridation: what is holding us back? Altern Ther Health Med. 2015; 21:46–52.
176. Cronin GM, Rault JL, Glatz PC. Lessons learned from past experience with intensive livestock management systems. Rev Sci Tech. 2014; 33:139–51. PMID: 25000786

177. Martin GB. An Australasian perspective on the role of reproductive technologies in world food production. Adv Exp Med Biol. 2014; 752:181–97. https://doi.org/10.1007/978-1-4614-8887-3_9 PMID: 24170360

178. Frewer LJ, Kletter GA, Brennan M, Coles D, Fischer ARH, Houdebine LM, et al. Genetically modified animals from life-science, socio-economic and ethical perspectives: examining issues in an EU policy context. N Biotechnol. 2013; 30:447–60. https://doi.org/10.1016/j.nbt.2013.03.010 PMID: 23567982

179. Croney CC, Anthony R. Invited review: ruminating conscientiously: scientific and socioethical challenges for US dairy production. J Dairy Sci. 2011; 94:539–46. https://doi.org/10.3168/jds.2010-3627 PMID: 21257024

180. Weale A. Ethical arguments relevant to the use of GM crops. N Biotechnol.2010; 27:582–7. https://doi.org/10.1016/j.nbt.2010.08.013 PMID: 20850572

181. Schuftan C. Making nutrition and health more equitable within inequitable societies. Public Health Nutr. 2009; 12:137–8. https://doi.org/10.1017/S1368980008004151 PMID: 19087375

182. Adams V, Craig SR, Samen A. Alternative accounting in maternal and infant global health. Glob Public Health. 2015:1–19. https://doi.org/10.1080/17441692.2015.1021364 PMID: 25782602

183. Oliver SP, Patel DA, Callaway TR, Torrence ME. ASAS Centennial Paper: Developments and future outlook for preharvest food safety. J Anim Sci. 2009; 87:419–37. https://doi.org/10.2527/jas.2008-2008-1151 PMID: 18708597

184. Nestle M. Conflicts of interest in the regulation of food safety: a threat to scientific integrity. JAMA Intern Med. 2013; 173:2036–8. https://doi.org/10.1001/jamainternmed.2013.9158 PMID: 23925569

185. Yach D. Food industry: friend or foe? Obes Rev. 2014; 15:2–5.

186. Munthe C. The Price of Precaution and the Ethics of Risks. Springer, 2011. 189 pp. ISBN 978–9400713291

187. Steel D. Philosophy and the Precautionary Principle: Science, Evidence, and Environmental Policy. Cambridge University Press, 2015, 256pp., ISBN 9781107078161

188. Goldstein BD. The Precautionary Principle Also Applies to Public Health Actions. Am J Public Health. 2001; 91:1358–1361. PMID: 11527755