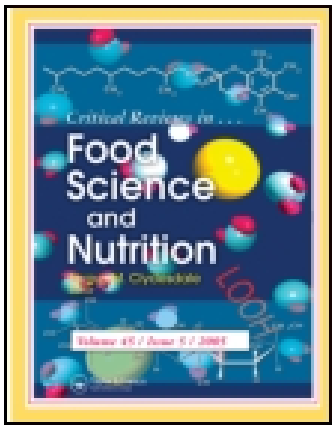

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EURRECA—A Framework for Considering Evidence in Public Health Nutrition Policy Development

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EURRECA—A Framework for Considering Evidence in Public Health Nutrition Policy Development

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A key step toward developing appropriate evidence-based public health nutrition policies is determining exactly how that evidence should be collected and assessed. Despite this the extent to which different evidence bases influence policy selection is rarely explored. This article presents an epistemological framework which offers a range of considerations affecting this process generally and with particular implications for both micronutrient requirements and the role of behavior in the policy-making process. Qualitative case study data covering 6 European countries/regions (Czech Republic, Italy, the Netherlands, Nordic countries, Poland, and Spain), and three micronutrients (folate, iodine, and vitamin D), have been presented to illustrate the relevance of the Framework.

Keywords Public health, evidence based, policy making, nutrition, EURRECA

INTRODUCTION

As the role played by nutrition in the rising prevalence of non-communicable diseases becomes increasingly evident (World Health Organization, 2011) so does the corresponding need for more rigorously evidence-based public health policy (EBP) to counter it (European Commission, 2001; World Health Organization, 2004). The establishment of systems to collate and assess such evidence is therefore a key objective for policy makers.

Currently, the scientific evidence base for nutrition policy is provided by the same advisory bodies (e.g., European Food Safety Authority, EFSA; Food Standards Agency UK, FSA UK; The National Health Council in the Netherlands, HCN) tasked with developing micronutrient Dietary Reference Values (DRV) and monitoring diet adequacy (Matthys et al., 2011). Micronutrient DRVs, therefore, provide the template for public health nutrition policy development, informing policy options as both a tool for product development and a guide for professional practice [e.g., dietetics (EFSA Panel on Dietetic Products, 2010; King and Garza, 2007)].

Nevertheless the actual processes by which DRV-based evidence influences the development and application of public health nutrition policy remains poorly understood. Elucidating this relationship will require a better understanding of the full range of considerations that can influence policy makers as they attempt to balance scientific evidence with information from myriad other perspectives (Parsons, 2002). To this end, the

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EURRECA Network of Excellence is developing a framework to help map out these different types of influence.

EVIDENCE-BASED POLICY MAKING

The growing desire for EBP has generated an on-going debate about exactly what constitutes evidence given the increasing recognition of the extent to which other influences such as prejudices, values, tacit understandings, and competing world views all factor into the process of translating evidence into policies (Brownson, Chriqui, and Stamatakis 1576–83; Nutley; Owens 294–401;Oxman et al. S1).

Even if one accepts Lomas et al's definition that "evidence concerns facts (actual and asserted) intended for use in support of a conclusion," translating these facts into policy and practice still requires not just the selection and interpretation of evidence but also decisions about which conclusions to draw from it and how to communicate those conclusions to others (Oxman et al., 2009).

The drive toward EBP assumes a model of policy-making guided by instrumental rationality, in which cost-effectiveness criteria underpin decisions. This assumption has led to the emergence of frameworks that represent evidence-based decision making as a linear translation of science into policy, and the corresponding development of tools intended to increase use of evidence through anticipatory problem solving (e.g., scenario testing), planning, and rational choice making (Lasswell, 1951). Such approaches have been criticized for not recognizing the role of context, practices, and norms, as well as personal bias due to academic, professional, or commercial interests (Norris et al., 2012).

The context-specific nature of policy making perhaps partially explains the aforementioned lack of clarity concerning the exact role evidence plays in this process. The persistence of this uncertainty despite a concerted global effort to put evidence at the heart of nutrition policy (Brownson et al., 2009; World Health Organization, 2011) is no more apparent than with micronutrient DRVs. Some attempts have been made to develop frameworks specifically intended for translating micronutrient DRVs into nutrition policy. For instance, MacKerras (MacKerras, 2012) reviews the Risk Analysis Framework approach to development of food dietary guidelines, though this approach, like many others, has an implicit linearity. The validity in practice of such linear models (of translation of science into policy) has often come in for criticism (Dhonukshe-Rutten et al., 2010). Dhonukshe-Rutten et al. (Dhonukshe-Rutten et al., 2010) have argued that elucidating the true role played by DRVs in the decisions of policy makers requires a framework capable of teasing out the various factors that interact with science-based recommendations in guiding policy formation.

This article will present such a framework, one specifically designed to make explicit decision-making processes by identifying the key domains of evidence and knowledge policy makers draw upon. The framework is based on several studies and was developed through a series of meetings and workshops in which its utility was assessed by relevant stakeholders.

DEVELOPMENT OF THE FRAMEWORK

The framework discussed in this article emerged from an iterative examination of a substantial body of comparative and multidimensional research.

An initial version of the framework was proposed early on in the research process and drew largely on reviews of existing literature and theoretical concepts. The model was then repeatedly revised and reevaluated via meetings of the multidisciplinary project team, several stakeholder workshops (including representatives from national and international nutrition advisory bodies, charities and consumer representatives, public health policy makers, industry, academics, and practitioners) and through case studies specifically designed to test and further develop the framework (Table 1). The constant presence of competing perspectives made the process of developing the framework challenging to say the least. Because one of the important aspects of this process was clarification of what the framework was and what it was not it was decided to define the framework in the following way:

(1) It is epistemological, concerned with the "thinking process" underpinning the selection of policy options. It is not a prescriptive decision-making tool, but an abstracted description

Table 1 Data sets that constitute case studies used to evaluate the Framework

	Study 1: quantitative and qualitative online questionnaire (Dhonukshe-Rutten et al. 2010)	Study 2: qualitative interviews (Brown et al., 2012)	Study 3: qualitative interviews	Study 4: qualitative interviews (Brown et al., in preparation)	In-depth desk research
Czech Republic	Fo, I, D	Dietary guidelines	Fo, I, D		Fo, I, D
Italy	Fo, I, D		Fo, I, D		Fo, I, D
Netherlands	Fo, I, D		Fo, I, D	Fo, D	Fo, I, D
Nordic countries (Denmark, Finland, Iceland, Norway, Sweden)	Fo, I, D		Fo, I, D (Denmark only)	Fo, D	Fo, I, D
Poland	Fo, I, D		Fo, I, D	Fo, D	Fo, I, D
Spain	Fo, I, D	Dietary guidelines	Fo, I, D	Fo, D	Fo, I, D

Abbreviations: Fo, folate; I, iodine; D, vitamin D.

of the process. Thus, its purpose is not to prescribe the "best way of making decisions" but to make this process more transparent.

(2) It is nonlinear—it does not dictate a specific ordering of the elements of the framework, and recognizes iterative, sometimes circular process of decision making. Each element of the frameworks is in some way connected and can impact upon the others. Implicit in the framework is the assumption that the starting point for considering nutrition policy options and the way in which evidence is weighed and prioritized will vary with each problem.

(3) It is inevitably an abstraction of the process, not an exhaustive list of all the factors and possible linkages between the different factors. Its choices of emphasis are substantiated by the analysis of the case studies below, but the complex nature of the problem is such that it can never capture the full complexity of the process.

CASE STUDY DATA

A series of 18 retrospective case studies were created to reveal the role played by micronutrient recommendations in the public health nutrition policy-making process of 6 countries or regions [Czech Republic, CZ; Italy, IT; the Netherlands, NL; Nordic countries (Denmark, DK; Finland, FI; Iceland, IS; Norway, NO; and Sweden, SE); Poland, PL; and Spain, ES]. The 3 micronutrients—folate, iodine, and vitamin D—were selected from the 10 priority micronutrients identified by previous research within the EURRECA network (Cavelaars et al., 2010). The countries and micronutrients were chosen to provide case studies offering policy decision-making contexts that varied widely in terms of health outcomes, geography, political, historical, and socio-cultural factors.

Each case study was created from data collated during EURRECA.

Quantitative online questionnaire survey conducted in 2007:

(1) Study 1 surveyed micronutrient DRV relevant key informants from universities, public health institutes and governmental organizations representing various countries/regions (CZ, DK, ES, FI, IS, IT, NL, NO, PO, and SE). Open- and closed-ended questions identified the organizations responsible for developing micronutrient DRVs and nutrition policies and elicited the current micronutrient policies for each country/region (Table 2) (Dhonukshe-Rutten et al. 2010). All 35 questionnaires sent out were completed and scientific background reports on micronutrient recommendations were collated for 11 European countries.

Qualitative interview studies conducted from 2008–2011:

(2) Study 2 interviewed micronutrient DRV stakeholders about their beliefs regarding consumers and dietary guidelines [CZ, ES (Brown et al. 872-74; Brown)]. In total, 77 interviews were conducted. The 21 CR participants were recruited within the context of a workshop. Response rates ranged from 75% (ES) to 95% (CR).

(3) Study 3 explored the policy-making process by interviewing 57 participants who had been involved in areas of national policy development relevant to the DRVs for folate, iodine or vitamin D [CZ, DK, ES, IT, NL, and PO. Response rates

Table 2 Achieving micronutrient DRVs: changes in individual behavior

		Increase micronutrient intake		Decrease micronutrient intake	
		Targeted nutrient	Several nutrients	Targeted nutrient	Several nutrients
Add	Foods or supplements	Buy/choose new foods/supplements that are good sources of targeted nutrient	Buy/choose foods/multisupplements that are micronutrient rich, e.g., fruit and vegetables, lentils, whole grain products		
Omit	Foods or supplements			Stop buying/choosing foods/supplements that are good sources of targeted nutrient	Stop buying foods/multisupplements that are micronutrient rich, e.g., fruit and vegetables, lentils, whole grain products
Switch	Shopping purchases	Change within/between product categories to foods/supplements that are a better source of target nutrient	Change within/between product categories to foods/multisupplements are more micronutrient rich, e.g., fruit and vegetables, lentils, whole grain products	Change within/between product categories to foods/supplements that are a worse source of target nutrient	Change within/between product categories to foods/multisupplements that less micronutrient rich, e.g., sweetened confectionery
	Portion size	Increase the portion size of foods that are micronutrient rich		Decrease the portion size of foods that are micronutrient rich	
	Composition of meal	Change the components of a meal to increase the proportion of micronutrient rich foods		Change the components of a meal to decrease the proportion of micronutrient rich foods	
	Frequency/dietary pattern	Change dietary patterns to include more opportunity for micronutrient rich foods (e.g., add breakfast)		Change dietary patterns to avoid the opportunity for micronutrient rich foods (e.g., skip breakfast)	

Figure 1 Public Health Nutrition Policy-making Framework. (color figure available online.)

ranged from 38% to 100% (ES and IT with 38% and CZ, DK, NL, PO with 86–100%).

(4) Study 4 interviewed 21 key informants about the process of developing of DRVs for folate and vitamin D [ES, NL, Nordic Countries, and PL (Brown, 2012)]. The response rate ranged from 67% (NL) to 100% (PL).

(5) In-depth desk research of policy documents relevant to the 3 micronutrients within each country (reports, meeting minutes, press releases, journal articles, consultation documents/responses from the government, scientific advisory body (SAB)/expert committee, academic, professional, industry, charity, and nongovernmental organizations (NGOs).

Content Analysis of the 18 case studies was conducted using NVivo software (QSR International Pyt Ltd. Version 9, 2010). Case study data identifying the evidence bases and other influential factors in the DRV development process were categorized using an iteratively developed coding scheme. The top-level coding comprised 3 codes which were not mutually exclusive: "Science," "Policy and Institutions," and "Wider context" (represented in the final framework Figure 1). Four of the case studies were coded by 2 researchers each to check inter-rater reliability, which was found to be within acceptable ranges according to Cohen's kappa coefficient, (agreement ranged from 85.8% to 94.73% and kappa values from 0.55 to 0.78 for each category). Any areas of disagreement were resolved through discussion and the remaining twelve case studies then coded by a single researcher.

The proposed framework (Figure 1, Public Health Nutrition Policy-making Framework) classifies the various types of consideration that influence public health nutrition policy using the following broad categories:

- science (as an institution and process) and scientific community;
- the policy-making process and its institutions/actors;
- wider contextual elements.

The link with micronutrient DRVs is key since DRVs are a product of scientific decision making for the purpose of policy making, product development, and other applied endeavors, but are developed with policy making as a guiding principle.

Central to the Framework is a description of the decision-making process which translates the policy goal, most often a measure of health outcome, into the final policy decision. This decision-making process may draw on considerations from any one of the 3 categories. Furthermore, each consideration may exert a different degree of influence over the decision-making process.

The following text outlines the Public Health Nutrition Policy-making Framework and describes its main characteristics using qualitative case study data to illustrate the relevance of the Framework.

The remainder of this article presents the various components of the Public Health Nutrition Policy-making Framework with illustrative case study data. Double quotation marks and italics

have been used to identify the use of direct interview quotes and single quotation marks to denote the use of case study text.

DESIRED HEALTH OUTCOME AND POLICY ACTION

Nutrition policy makers are tasked with choosing policy options that will maximize the likelihood of the relevant population achieving a desired health outcome. The ultimate goal of micronutrient DRVs (and any policy action based on them) is achieving such an outcome as defined in terms of either optimal health or the prevention of nutrient deficiency. The choice of health outcome is typically informed by scientific evidence based on intake amounts, health and nutrient status, bioavailability data, and study of the links between nutrient intake and health outcomes. Such choices are typically prompted by the on-going monitoring of the healthiness of the population and are usually considered in the context of broader health policy.

The following quotes highlight a range of health outcomes cited in the case studies as bases for nutrition policy, some directly linked to DRVs and others based on broader obesity policies.

> *"We did not only think about the bone health but we took into account the role of vitamin D in the prophylaxis of obesity and coronary heart disease and that's why we prepared the dietary guidelines for adults"* [Study 3, NGO representative, PL, vitamin D].

However, the case studies indicate that science and population monitoring are not the only factors influencing the choice of health outcome. Political realities (e.g., lobbying and campaigning, ideological orientation, economic, and budgetary constraints) and aspects of the wider context (e.g., international pressures, ethical considerations, technological, and economic trends) can influence which micronutrient-related health outcome becomes a policy goal.

> *"So first, we looked at the Dutch nutrient reference values and the scientific evidence for new developments. Second, we looked at intake and status data [. . .] and after this we also looked at current policy and current legislation, hence, on European level, and we looked at foreign policies, just to complete the picture"* [Study 3, SAB, NL, vitamin D].

This process of evidence gathering varies in the degree to which it is formalized across Europe. Whilst western European and Nordic countries have clear protocols for collation of evidence, this is less notable in Italy and Poland.

> *"Public health nutrition policy based on dietary reference values is [. . .] informal . . . based mainly on available evidence, on the evaluation of evidence by experts, dialogue with stakeholders, consumers, citizens, target groups of population; identification of the policy instrument for the implementation of the decision, evaluation of barrier, and continuous adjustment of aims. But, it is something very flexible and very informal"* [Study 2, Independent expert, IT, folate].

Every policy action (a concrete action to achieve a policy goal) hinges on the choice of policy option. Policy options relevant to micronutrient DRVs can target a specific micronutrient (e.g., recommend supplementation with folic acid) or the whole diet (e.g., Food-based Dietary Guidelines, FBDG) and often vary in how much they rely on individuals actually changing their food-related behaviors. For example, some policy options can achieve health outcomes without behavior change simply by altering the composition of food. Such policy options usually require strong evidence of the link between intake of a single nutrient with the health outcome and that the population-level risks and benefits of food composition changes are clearly understood. Moreover, the policy option must have general societal acceptance (Kim, 2007; United Nations System Standing Committee on Nutrition, 2007). This is illustrated in the extracts below.

> 'There are very few policy actions regarding micronutrients in Spain. Iodine is the most documented example, with a long history of measures as legislative policy instrument. Efforts are nowadays in obesity, with little room for other integrated strategies, despite of the opinion of scientific societies and public health experts' [Case study, ES, iodine].

> *"There has to be a significant part of the population that has the problem before one should control it through the diet. If there is a smaller part of the population that has a need and [. . .] on top of that risk that some people will be harmed then you shouldn't do it through the diet. In this case [regarding folate], one has to try to encourage the use of supplements"* [Study three, DK, folate].

On the other hand, behavioral approaches are often seen as the only option as they rely on consumers' voluntary acceptance of messages to change diet and does not require undertaking a complex legislative process to implement it. The basis of national nutrition and health policy is to make healthy dietary patterns more accessible to consumers, or "to make the healthy choice the easy choice" [Desk research, Ministry of Health Welfare and Sport and Ministry of Agriculture Nature and Food safety, 2008, NL, iodine]. The effectiveness of such approaches, however, is not always measured (Brown et al., 2011).

SCIENCE

Nutrition policy is typically informed by evidence from the natural and social sciences. Links between markers of nutrient status/intake and health status/outcome, for example, can be evaluated for their strength, relevance, and degree of associated uncertainty (Scientific Advisory Committee on Nutrition, 2011). Producing micronutrient DRVs from such work typically involves a series of systematic reviews and meta-analyses conducted within SABs, which are then communicated to policy makers who will develop an appropriate policy action (please see publications in this issue detailing systematic review and meta-analysis case study examples for vitamin B12, folate, iodine, iron, selenium, and zinc).

"Micronutrient recommendations, in particular, for iodine, derive fundamentally from WHO epidemiological surveys and it was scientifically proven that, through a programme of iodine supplementation, there were beneficial effects . . . that is the scientific evidence of the benefits of the health care programme has for sure influenced our politicians in choosing to approve the law" [Study 3, individual expert, IT].

With an increased focus upon prevention of chronic diseases (as opposed to nutrient deficiencies), achieving wellbeing and optimal health (World Health Organization, 2003), and food-based dietary targets, there is now a recognized need for use of evidence based on social science paradigms and approaches such as dietary attitudes or behavior evidence. Motivations effecting dietary choice which compete with and may supersede health motivations, such as geographical, cultural, economic, and psycho-social factors, as well as taste preferences (Pollard et al., 1998) are recognized in literature as important in designing public health nutrition policy. This applies equally to both food based-approaches targeting changes in dietary pattern, and nutrient-based approaches such as fortification. In each case, consumer acceptance (partly determined by their attitudes, beliefs and habits) is a necessary precondition for any successful policy option. Therefore, the need to identify the consumer factors influencing nutrient intake that are linked to a desired health outcome emerges strongly from our case studies, just as the importance of looking beyond nutrient intake is articulated by many interviewees.

"When we were thinking about the promotion of diet and of some foods, we haven't forgotten food culture, which is an Italian thing, and the habits, the productions, our agriculture [. . .] you can't overturn a food habit when promoting health, it is something that has to be introduced in that culture" [Study 3, SAB, IT].

"So if you look at older population groups in Scandinavia they actually have a higher level of vitamin D than in Southern Europe. This is due to tradition in Denmark to take a vitamin supplement every day and although we have lower amount of sun hours—when the sun is finally out we love to sunbath whereas in southern parts of Europe they stay in the shade. So this behavior also needs to be taken into account when discussing whether or not to introduce mandatory fortification" [Study 3, DK, vitamin D].

Nevertheless, nutrition surveys are frequently the only evidence of food and dietary behaviors available. This is a problem because nutrient intake as a measure says little about the complex food-related behavior that underpins it and which can include food choice (buying certain foods), food storage, preparation, and food occasions (when and how it is eaten) (Jensen et al., 2012).

'The dietary survey is used widely by the Veterinary and Food Administration, by other scientific institutions, policy makers, and other stakeholders. Without the dietary survey, it would not be possible to carry out targeted dietary campaigns, enrichments programs, as well as nutritional and toxicological evaluation of new food products. The nutritional surveys, performed by the National Food Institute, give the answer to the current micronutrient status in the Danish population and this can be compared to the answer book' [Desk research, NNA 2004, DK].

Based on these observations, the current Framework calls for the development of a more nuanced way of representing and thinking about nutrient-related behavior. Table 2 represents the typology of behaviors relevant to nutrient intake as developed by EURRECA, reflecting the breadth and complexity of possible behavioral changes based on using nutrient intakes as a target for behavior.

Whilst some of the behaviors in the above table can overlap it is nonetheless essential to keep the "choice/buying behaviors" and the "eating behaviors" separate given that "choice behaviors" precede the availability of an option at home (or at the table), whereas "eating behaviors" encompass choosing how much to eat and the cultural conventions of how we construct our meals.

There are also other nutrient-related behaviors that do not directly impact on nutrient intake. For instance, information about specific nutrients can increase motivation to eat more healthily, fostering a greater awareness of nutrition and an increased ability to make the right dietary changes. Such behaviors are more prerequisites for behavior change (in this case, by acquiring sufficient knowledge to make better choices) than food choice or eating behaviors in themselves, and as such are valid targets for policy actions, even though they only impact nutrient intake indirectly through choice and eating behaviors.

In addition to considerations about the kind of behavioral changes that are required one must also consider the behavioral mechanisms underpinning these changes. There is now growing recognition that most successful behavior change approaches share substantial commonalities (Beutler 997–1007; Michie, van Stralen, and West 42;Thaler and Sunstein) both in terms of focusing on the capability, opportunity, or motivation to change and in that many of these discrete theoretical models actually function via broadly comparable mechanisms. This allows interventions to be based on empirically validated mechanisms (Jensen et al., 2012).

Extending this reasoning to food choice, it becomes clear that nutrient-related health outcomes can be effected by myriad behavioral mechanisms including habit, cognitive dissonance, attitudes, self-efficacy, emotions, identity, and social norms (Jensen et al., 2012). This is consistent with the failure of information campaigns which fail to acknowledge the roles played by heuristics and cognitive distortions (Kahneman and Tversky, 2012) and assume that individuals are motivated to seek information in order to achieve an optimal outcome (Fishbein and Ajzen, 1975).

POLICY AND INSTITUTIONS

Strong scientific evidence and a clear rationale for the benefits and risks of micronutrient intake do not by themselves guarantee that a policy will be adopted. Such decisions will be made in the context of both the wide array of policy options available (Table 3) and the institutional and regulatory frameworks within which they exist. In general, voluntary behavior change is often the preferred policy option (Jensen et al., 2012), with voluntary food fortification, supplementation and

Table 3 Policies implemented across European countries/regions* relevant to folate, iodine, and vitamin D Nutrient Intake Values

Micronutrient	General health education	Food-based dietary guidelines	Monitoring and evaluation	Specific health education	Fortification	Supplementation	Labeling	Inducing voluntary action in industry	Legislation on micronutrient composition in food products	Setting up task force
Folate	5 (CZ, IS, IT, NL, NO)	7 (CZ, ES, IS, IT, NL, NO, SE)	3 (IS, IT, PL)	6 (CZ, IT, IS, NL, NO, PL)	2 (NL, PL)	8 (DK, ES, FI, IS, IT, NL, NO, PL)	1 (PL)			6 (ES, IT, NL, NO, PL, SE)
Iodine	6 (CZ, ES, IS, IT, NO, PL)	5 (CZ, ES, IS, IT, NO)	3 (CZ, IS, PL)	3 (CZ, ES, IT)	7 (DK, ES, IT, NL, NO, PL, SE)		1 (PL)	2 (DK, IT)	2 (ES, IT)	4 (ES, IT, NL, PL)
Vitamin D	5 (CZ, IS, IT, NL, NO)	6 (CZ, IS, IT, NL, NO, PL)	5 (IS, IT, PL, SE)	3 (CZ, IS, NO)	4 (NL, NO, PL, SE)	6 (DK, IS, IT, NL, NO, PL)	1 (PL)	2 (FI, NO)		2 (NL, NO)

Abbreviations: CZ, Czech Republic; DK, Denmark; ES, Spain; FI, Finland; IS, Iceland; IT, Italy; NL, Netherlands; NO, Norway; PL, Poland; and SE, Sweden.
*Nordic countries = Denmark, Finland, Iceland, Norway, and Sweden (Dhonukshe-Rutten et al., 2010).

legislation for food composition, and labeling being popular choices where micronutrient DRVs are concerned.

The kinds of evidence considered for each type of policy will vary in how implicit or explicit they are and in their relative weightings. The factors affecting a decision to adopt DRV-based policy options are wide ranging and include the feasibility and effectiveness of existing policies, regulatory and institutional frameworks, interactions with stakeholders and vested interest groups, and ultimately the likely economic consequences of the policy in action. These are ultimately an issue of politics in its broadest sense, defined as "activity through which people make, preserve and amend the general rules under which they live" (Heywood, 2007). "Politics" is an extremely wide concept and can relate to: the art of government; public affairs; compromise and consensus; and power and the distribution of resources. This is the reason we have avoided using the term "politics" explicitly in our text. Instead, we specify the elements of decision making that can be subsumed under the concept of politics.

The following table summarizes policy options adopted within Europe for the micronutrients folate, iodine, and vitamin D.

In general, legislative options are only considered if all other options are deemed unsuitable (Lawrence, 2005), and indeed, only a few EU countries EU have opted for mandatory fortification. Voluntary fortification is more widely considered (see Table 3) but in countries such as Sweden or Norway even this rarely deemed acceptable.

The hard line taken against fortification by some member states is potentially problematic as any bans on importing fortified foods risk contravening EU regulations on liberal trade, which only permit such prohibitions when justified by a clearly demonstrated risk assessment rather than simply on the basis of nutrition policy (Fletcher et al., 2004). This can have the effect of allowing economic concerns, such as the need to compete on the European market, to override public health considerations and become the dominant influence on whether food fortification policy is adopted or not.

> *"One of the biggest limitations is the role of the European legislation on voluntary fortification. That is actually the main limitation of the entire advisory process"* [Study 3, SAB, NL].

> *"[. . .] costs were taken into account, as well as exportation options, because not all countries accept foods with an obligatorily added nutrient"* [Study 3, SAB, PL, folate].

While voluntary social policy options such as FBDGs are much more widely accepted their actual ability to raise awareness, increase understanding, and change diets remains unproven (Brown et al., 2011). Indeed, evaluations that do include an assessment of actual behavior change are a source of evidence with potentially huge relevance for cost effectiveness, and yet one that is often overlooked.

> *"It is quite unique that we have such a strong monitoring program for iodine. There are many countries that have fortification with iodine but they do not have monitoring. This has only been possible because we have a strong scientific group that stand behind it and is very interested in following this through. Despite this, it is a battle every year to get money set aside to be able to continue this monitoring"* [Study 3, SAB representative, DK].

The cost implications of a policy option, for the targeted consumer as well as for related stakeholders and the government itself, are also routinely considered. The affordability of a fortified product, for example, is an important determinant of its likely effectiveness as a policy option because even small variations in food prices can effect purchasing decisions (Allen, 2006). Similarly, the costs of establishing the regulatory framework and an appropriate infrastructure necessary for product development and manufacture are often balanced against the costs of micronutrient malnutrition to public health.

The case studies confirm, then, that evidence of public health needs, though often hailed as the primary motive for adoption or rejection of food fortification policies, frequently plays a secondary role. Economic and financial considerations, and the need for short-term impact, can easily undermine any decision to adopt (or not) a food fortification policy.

> *"In the old days, the decision to fortify food products was based on a health outcome motive but about 10 years ago, there was a shift of paradigm, so today it is just as much based on a market share motive"* [Study 3, Government official, NO].

> *"In the Nordic countries, we haven't wanted health claims and stuff like that. We just wanted to inform people on how to choose a healthy diet. The philosophy was that if people follow the food-based dietary guidelines then they will get the micronutrients they need. But given the new EU regulation, we will probably also have health claims in Denmark which will mean more fortified food products"* [Study 2, DK, folate].

Vested interests are another important context influencing policy decisions and one that presents its own complex challenges. For instance, the same legislation for changing the composition of foods can present both an opportunity for some stakeholders and a threat to others.

On the one hand, industry is often quick to respond to calls for food fortification which might lead to new marketing opportunities, especially given the growing emphasis upon optimal nutrition, and often cite "Consumer choice" as an argument for voluntary fortification. On the other, many groups express concern about excessive manipulation of products and favor education about natural foods as the optimal policy option. Consumer groups, in particular, tend to be naturally skeptical, seeing voluntary fortification as purely a vehicle for market expansion rather than beneficial for public health. This can even lead to calls for regulated, mandatory fortification in preference to harder-to-control voluntary options (Tedstone et al. 23–29). The opposite is true when it comes to salt, however, where efforts to reduce levels in foods are opposed by the salt industry and by retailers but supported by consumer groups (Timotijevic, 2012).

In the following extracts, interviewees discuss how they accommodate consumer preferences and the extent to which stakeholder interests play a role in policy development.

"[. . .] we took into account what is the perception of the consumer when he sees that product is fortified with folate. Consumers do not know what the folate is and it seems to them to be a food preservative. For example, this was a constraint in the campaign led by one of the chain stores, when it gave the information that its bread was fortified with folate" [Study 3, SAB, CZ, folate].

"A policy official puzzles with [vested] interests. Every time it's looking again. [. . .] what interests are there? What interest weights heaviest? And what do you prioritize?" [Study 3, government official, NL, vitamin D].

Stakeholder consensus is a related issue which has bearing not just on the decision-making process itself but on gauging the effectiveness of policies already implemented. Legislation can sometimes circumvent the lack of consensus, but a more popular approach amongst interviewees was achieving the policy goal through a mixture of private/public partnerships and voluntary self-regulation, as in the case of food fortification (Ramakrishnan and Yip, 2002). Interviewees saw bringing together key private sector players such as producers and retailers with public sector groups such as health agencies, research communities, and legislators as the recipe for building the solid base of support required for a successful policy. Most interviewees emphasized the importance of involving the broadest possible range of sectors and stakeholders in the policy making process, ensuring that all their motivations and concerns are addressed (Griffiths, 2002).

'Placing more emphasis in existing nutritional consumer information on overall dietary patterns, rather than merely focusing on specific products. The Netherlands Nutrition Centre, NGOs (including foundations and patients' associations), industry groups, and educational institutions all play an important role in this effort' [Desk research, Ministry of Health Welfare and Sport and Ministry of Agriculture Nature and Food safety, 2008, NL, vitamin D].

However, the range of policy options available for consideration in the first place often depends on more nebulous factors such as the underlying level of commitment to public health goals and pervading beliefs about the role of the state in achieving a healthy population. For example, the perceived reluctance to adopt legislative approaches is often described in terms of respect for "consumer choice" and freedom from state interference (Mayor, 2011). The extract below illustrates this point.

"[. . .] It sounds very strange, but also nutrition policy has a "political color." We now have a minister who prefers no paternalism; hence, people have to make their choices themselves. [. . .] you do not only look at, okay, what is industry doing, but particularly also to who are the House of Representatives [the lower house/second chamber] and what direction/flow do they want regarding public health" [Study 3, SAB, NL, vitamin D].

The breadth of policy options available can also be influenced by the pervading attitude toward public health nutrition, which may be considered a less important area than mainstream healthcare and, therefore, receive less funding. Such attitudes tend also to be reflected in the degree to which policies are supported by the institutions tasked with EBP development. The existence of a dedicated SAB and an aligned Public Health Ministry, for example, tend to coincide with more explicit public health nutrition policy (Trubswasser and Branca, 2009) and better implementation and monitoring programmes. As the following extract demonstrates, the remits and responsibilities of different departments and the interactions between them can also influence institutional policy option preferences.

'The Ministry of Health, Welfare, and Sport worked in conjunction with the Ministry of Agriculture, Nature, and Food Quality to create this policy document. After all, making it easier for consumers to make healthier food choices is a priority for both the Ministry of Health, Welfare, and Sport (making the healthy choice the easy choice) and the Ministry of Agriculture, Nature, and Food Quality (to promote knowledge of where food comes from). The Ministry of Health, Welfare, and Sport is particularly skilled in the areas of prevention, the relationship between dietary choices and (chronic) diseases, and the association between prevention and care. The Ministry of Agriculture, Nature, and Food Quality, on the other hand, has expert knowledge on the production and supply chain as well as the broader context of food. In addition, both ministries promote research, innovation, and self-regulation within the business community' [Desk research, Ministry of Health Welfare and Sport and Ministry of Agriculture Nature and Food safety, 2008, NL].

WIDER CONTEXT

As well as being influenced by their immediate political context, policy option decisions were also seen to be affected by the wider social, legal, political, and economic environment. Such considerations include international influences, technological infrastructure, broader economic trends, ethical considerations, and events in the wider world.

Whilst scientific evidence provides an essential grounding for public health policy making, decisions about whether a micronutrient policy is ultimately adopted are often just as dependent on international influences, such as the success or failure of similar policies in other countries (Allen, 2006). In addition, international micronutrient recommendations can sometimes exert even more influence over the public health nutrition agenda than domestic DRVs.

'Many countries have set and updated their recommendations for many years, so action was perceived as necessary in Spain too' [Case study, ES].

Ethical considerations such as the right to food, the right to privacy, and the right to autonomy also factored into policy decisions and are commonly invoked by stakeholders as arguments for or against fortification or food composition changes. For example, worries that mandatory fortification threatens the individual's right to the autonomy promoted the UK FSA to commission a report on ethical ramifications of different approaches to fortifying foods (Fuller-Deets and Dingwall, 2007; United Nations System Standing Committee on Nutrition, 2007). This right to autonomy must be balanced with other key ethical

considerations, most notably the value of equity and social justice, as it is argued that despite years of supplementation and voluntary fortification micronutrient malnutrition still has a clear socio-economic gradient which could be overcome through mandatory fortification.

> 'The Health Council of the Netherlands is aware of the ethical and societal implications of scientific developments, but does not focus on the implementation of concrete policies. Despite the great importance of scientific knowledge and information about uncertainties in this knowledge, in taking policy actions political, economic, or social considerations always play a role. The consideration required for policy decisions is the role of government and parliament' [Desk research, Gezondheidsraad, 2011, NL].

The availability of technical skills and resources must also be considered when making policy decisions, especially those involving changes in food composition. Considerations here will range from whether the technological capacity exists to, for example, install and maintain new machinery, to the scientific feasibility of tasks such as developing appropriate micronutrients as supplements). Policy makers also have to assess whether the infrastructure necessary for successfully implementation actually exists.

> 'Official recommendations for vitamin D could not be determined precisely because there is a lack of the specialized science capacities in the CZ and foreign materials are often contradictory. Therefore, the chosen way is unofficial recommendation at the moment, for example, recommendation prepared by the Society for Nutrition' [Case study, CZ, vitamin D].

Broader economic trends and global events also impact on policy decisions. For example, in many of the future EU countries the end of World War II prompted a wave of progressive interventionist public health policies, such as universal iodization of salt. Events such as wars and global economic trends often lead to changes in health policy orientation, for example, away from a paternalistic approach and toward a model driven by consumer choice and market forces.

IMPLICATION AND SOME CONCLUSIONS

Clearly, the range of considerations effecting micronutrient DRV policy decisions is extremely wide and our understanding of the process needs to acknowledge this. Both the framework developed by the EURECCA network and its associated case studies suggest that regardless of the quality of scientific evidence available, the likelihood of a policy option being adopted and successfully put into practice is to largely determined by the institutions involved and their wider political context.

Any attempt to put evidence at the heart of policy making, therefore, needs to acknowledge gaps in scientific knowledge regarding the certainty of relationships between micronutrients and markers of health, as well as a lack of research into the behavioral factors underpinning an individual's diet. Equally, though, it must recognize the central role played by context in deciding which considerations to engage with and how to reconcile them to create a coherent public health nutrition policy.

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ABBREVIATIONS

CZ = Czech Republic
DK = Denmark
DRV = Dietary reference values
EBP = Evidence-based policy
EC = European Commission
EFSA = European Food Safety Authority
ES = Spain
EU = European Union
EURRECA = EURopean micronutrient RECommendations Aligned network of excellence
FBDG = Food-based dietary guidelines
FI = Finland
FSA UK = Food Standards Agency UK
HCN = Health Council of the Netherlands
IDD = Iodine deficiency disorder
IS = Iceland
IT = Italy
NGO = Nongovernmental organization
NL = Netherlands
NO = Norway
PL = Poland
SAB = Scientific advisory body
SE = Sweden
SEEN = Spanish society of endocrinology and nutrition

UK = United Kingdom of Great Britain and Northern Ireland
USA = United States of America
USI = Universal salt iodization
WHO = World Health Organization

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