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Nutrient profiling for front of pack labelling: how to align logical consumer choice with improvement of products?

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The primary goal of front of pack (FOP) labelling is to help consumers make healthier choices through communication. A secondary goal is to encourage producers to improve the nutritional composition of their products. Evidence has shown that (FOP) labelling can help consumers to make healthier food choices and has been an incentive for producers to improve product composition. As FOP labelling is seen as an important tool to improve food environments for public health purposes, the WHO supports initiatives of governments to implement an FOP labelling system. Based on the experiences of a wide range of countries over many years, possible success factors for such an FOP system have been defined, six of which are discussed in the present paper and used to evaluate the Dutch Choices Programme that was started in 2006. In the course of time a large number of producers joined the programme and the logo was recognised by more than 90 % of the consumers, but by 2016 the Dutch consumer organisation argued on the basis of their own research that a quarter of the consumers did not understand the colour coding of the logo and as a result the Dutch government decided to no longer support this logo and to introduce a nutrition app. The challenge that remains is to find a system that consumers understand well and that still encourages manufacturers of food to improve product composition. New technology-based data collecting initiatives might provide the right tools to develop such a system.

Nutrient profiling: Front of pack labelling: Consumers: Food products: Producers

Why front of pack labelling?

In 2004 the WHO called upon the food industry to 'Make the healthy choice the easy choice', to make it easier for consumers to make the right healthy choices by reducing levels of *trans* fatty acids, SFA, sodium, free sugar and energy in foods and through responsible communication[1].

One way of communicating healthiness of products to consumers is nutrition labelling in tabular form. This is now mandatory in a large part of the world[2]. In most countries consumers can read nutrient content on the label of packaged foods, expressed per 100 g, 100 ml or per portion. The nutrition information mostly given is: amount of energy, fat (of which saturated), protein, carbohydrates (of which sugar), sodium or salt. For specific foods, other nutrients such as vitamins or fibre are shown on the label as well. In the USA, added sugar has recently been added to the Nutrition Facts Panel.

Understanding the impact of particular amounts is hard for consumers and to use them as a basis for their food choices is virtually impossible if they do not know what they mean. As interpreting nutrition labelling is often difficult for consumers, front of pack (FOP) labelling has been designed in various forms. With FOP labelling, an interpretation of the healthiness of a product has been made available to the consumer. An underlying nutrient profiling system is used to make this interpretation in a systematic way.

The WHO defines nutrient profiling as the science of classifying or ranking foods according to their nutritional composition for reasons related to preventing disease and promoting health[3]. A nutrient profiling system is a set

Abbreviation: FOP, front of pack.

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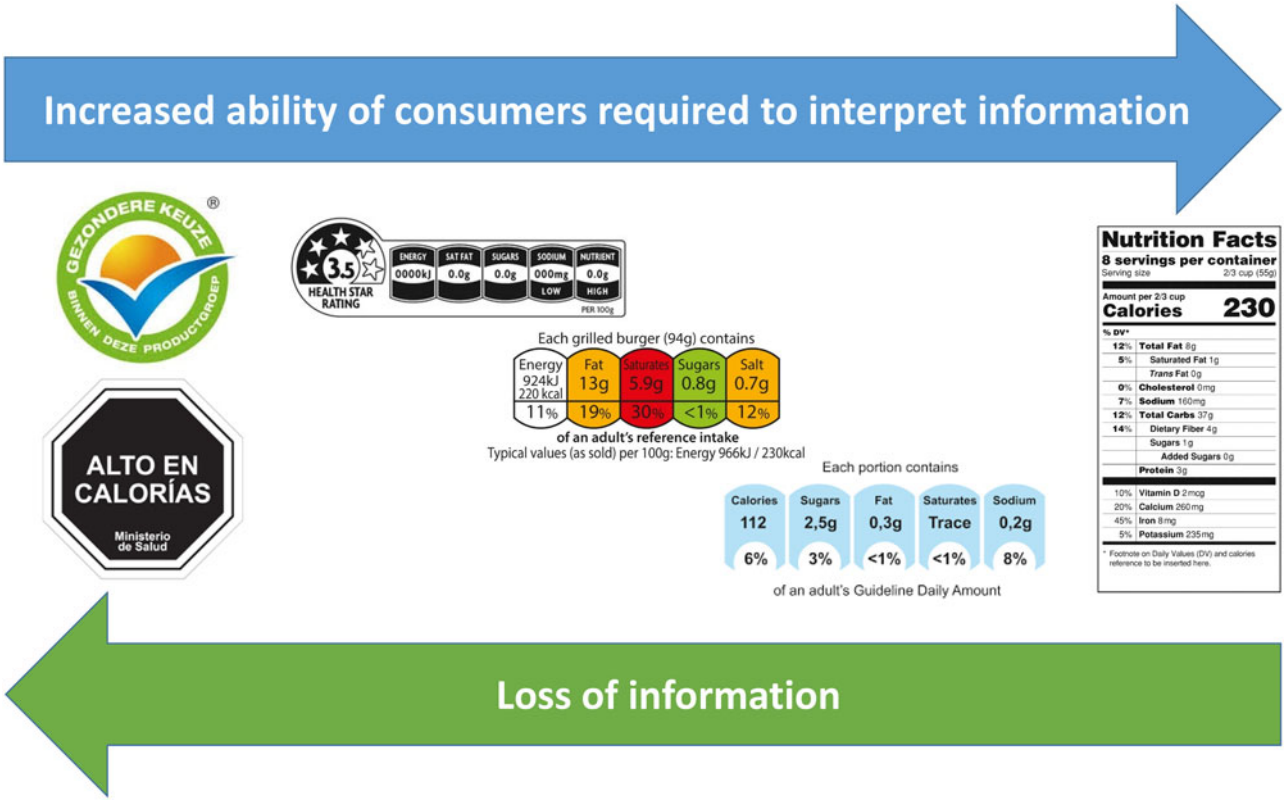

Fig. 1. Increased loss of information with increased level of interpretation in food labelling. From nutrition labelling (in tabular form) to logo or warning label: There is a gradual change: Less ability to interpret for consumers required, but more information is lost. From left to right the following front of pack labelling systems are shown: Choices Logo, The Netherlands; Warning Label, Chile; Health Start Rating, Australia and New Zealand; Traffic Lights, UK and Ireland; Guideline Daily Amounts, international; Nutrition Facts Panel, the USA.

of criteria foods need to comply with, in order to carry a health logo. In the case of traffic lights, these criteria determine which colours will be on the label. Usually these criteria are maximum levels of salt, (saturated) fat and sugars, because we consume too much of these. Some nutrient profiling systems also contain targets for other nutrients such as fibre, energy or ingredients such as vegetables. All over the world there are many of these nutrient profiling systems. Not only for the purpose of FOP labelling, but also for product improvement purposes, or regulating marketing to children, health claims legislation, or criteria for school foods. In general, loss of information always happens with any nutrition profiling system, because some sort of interpretation is given. This is illustrated in Fig. 1.

Both FOP labelling and nutrition labelling are solutions to make the healthy choice the easy choice. They present a way of communicating healthiness of products to consumers and at the same time, promote health-related product innovation, the two goals of FOP labelling as mentioned earlier. However, what is the evidence that this is happening?

Evidence of effects of front of pack labelling on consumers

Many studies are available that have looked into the effects of FOP labelling or nutrition labelling on consumers. One of the key outcomes of the European project FABEL (Food Labelling to Advance better Education for Life), studying effects of FOP labelling on consumers, was that attention is a prerequisite for liking and understanding FOP labelling[4]. More recently, in their review Van Kleef and Dagevos discussed the controversies of the consumers' perspective on FOP labelling[5]. Understanding is essential for the consumers' ability to use a label. In general, the simpler the label, the easier it is for consumers to understand it. However, simple labels such as a health logo may also lead to misinterpretation, probably due to over-simplification[5]. This is illustrated by two examples: In the first example, if a health logo indicates the healthier choice within a product group, a small cookie or a low-fat mayonnaise can be healthier choices within the product groups of snacks or sauces, respectively. These products will be carrying the same health logo as fresh vegetables, which is also a healthy choice. This is difficult to understand: How can a cookie and fresh vegetables both have the same health logo? Clearly a cookie is much unhealthier than a vegetable! In addition, the second example of a potential misconception is the following: a health logo on a cookie, does not mean unlimited consumption. Thus the concept of a healthy choice within a product group can potentially be difficult to understand for consumers[5]. Besides understanding, it

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is important to know whether the (FOP) labelling actually helps consumers to make healthier choices. A recent meta-analysis showed an overall 18 % increase in the number of people able to select a healthier product using the different (FOP) food labels[6]. There was no significant difference between the different types of labels, although it seemed that traffic light labelling was most favourable, but they were also the most studied labels[6].

Evidence of effects of nutrition labelling and front of pack labelling on producers

In the past, natural experiments showed that nutrition labelling legislation encouraged producers to improve nutrient composition of products. For example, mandatory nutrition labelling and communication led to significantly reduced sodium intakes in Finland[7]. Another example is the mandatory labelling of *trans* fatty acids in the USA, which has led to measurable reductions in *trans*-fat intakes over time[8]. Reduced intakes of these nutrients in both these countries[7,8], illustrate the positive effect on product improvement of nutrition labelling (in tabular form) in combination with other measures, such as communication. The evidence for effectiveness of FOP labelling on product improvement is less strong. Evidence on actual nutrient intakes brought about by FOP labelling are scarce. Only a few studies have looked at the effect of FOP labelling on product improvement: Evidence for the New Zealand Pick the Tick health logo showed successful sodium reduction in a range of foods[9]. Vyth *et al.*[10] evaluated effects on producers of the Choices health logo. For this study, producers that had joined the Choices Programme were asked about the magnitude of their product innovations. The paper reported clear effects on reformulation of the key-nutrients for various product groups and new product development[10]. The answer to the question as to whether FOP labelling affects the food supply and improves nutrient intakes of a population is however a difficult one. One of the major challenges lies in the dynamics of a continuously fast changing food supply that is difficult to monitor all the time.

Success factors for a national front of pack labelling system

Based on shared experiences of various countries, a selection of six success factors for a national FOP labelling system is presented. The first success factor is a multi-stakeholder approach to enhance broad ownership. The second is a leading role for the government. The third is experts determining nutrient profiles, followed by a consultation process. The fourth is FOP labelling on all foods. The fifth is consistent FOP labelling, which is logical to the consumer. And finally, a continuous monitoring of labelling effects on consumers and producers. Below these six success factors will be discussed in more detail.

Multi-stakeholder approach enhancing broad ownership

For an FOP labelling system to be successful, a multi-stakeholder approach is necessary[11]. Lack of broad ownership will lead to erosion of any initiative. Internet information is accessible for many individuals, but establishing quality and trustworthiness is not always immediately transparent. Moreover, the high-quality peer reviewed scientific literature is not always open-access. Differences between facts and opinions disappear and emotions tend to prevail. Experts are no longer seen as experts. The truth seems to come from anyone who is able to convince. That is why broad ownership with relevant stakeholders resulting in a large 'share of voice' is necessary for any initiative to be successful, and that also holds good for an FOP labelling system. A promising example of such a multi-stakeholder process can be seen in Australia and New Zealand which resulted in the Health Star Rating system. In 2011 the Legislative and Governance Forum on Food Regulation proposed to undertake a collaborative design process with industry, public health and consumer stakeholders, with a view to reaching a broad consensus on a possible approach to an FOP labelling system[11]. The aims and objectives of the process were formulated as follows: (1) to move away from the present divisive debate and polarised views by building on the common ground among stakeholders; (2) to focus on addressing issues of concern, exploring new approaches and exploring possibilities for building on existing schemes; (3) to help avoid the proliferation of different FOP labelling systems and the potential for consumer confusion from conflicting or inconsistent nutrition messages[11]. Since launch in 2014 the programme has grown gradually. By the end of May 2016 there were over 4000 products on supermarket shelves in Australia displaying the Health Star Rating label and over 1500 products in New Zealand[12].

Leading role for the government

Preferably, the government should play a major leading role, resulting in a higher credibility of an FOP labelling system, than that of private initiatives. Although private FOP labelling systems are often designed for corporate social responsibility reasons, companies also see FOP labelling as an opportunity to support the sales of their products[13]. To promote a healthier food supply to improve public health might potentially be conflicting with interests of the private sector. That is why, for the sake of credibility, governments should take the lead. The food industry can join the initiative and collaborate with the government and other relevant stakeholders, and in that way a broad ownership can be created. For these public–private partnerships it is essential to actively manage real, perceived and potential conflicts of interest, and to be transparent at all times[13].

Experts determining nutrient profiles, followed by a consultation process

There is a consensus that independent experts should define nutrient profiles, i.e. the criteria that determine

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what foods are healthier than others and are thus eligible for FOP labels. Different disciplines should be involved in this process: nutrition, food technology, legislation and consumers' perspective[14]. Firstly, the nutrition experts define what nutrients to include, based on their public health impact. Secondly, the food technologists indicate what opportunities and barriers exist when reformulating foods to comply with the nutrient criteria and combined with good product quality. Thirdly, legislation experts are needed. Legislation can stimulate reformulation, for example through nutrition claims. Yet there are also examples of barriers because of protected product names or prohibited use of ingredients, e.g. sweeteners in bakery products[14]. Adapted legislation, such as legally determined maximum allowed levels of 'nutrients with a negative public health impact' in foods are promising mechanisms enhancing product improvement[14]. Fourthly, the consumers' perspective should be taken into account[14]. Consumers need to understand and be able to use the FOP labelling, but the criteria defined also determine whether a product tastes good and is affordable. Once the experts from different disciplines have defined the criteria, a consultation process is needed to ensure involvement of all relevant expertise and to create broad ownership.

Front of pack labelling on all foods

In addition there is consensus that ideally, FOP labelling should be on all foods. Only then will consumers be able to optimally use the label. This is a challenge as it requires mandatory FOP labelling and a leading role for the government. In many countries only nutrition labelling (in tabular form) is presently mandatory and appears on all foods, while FOP labelling is mostly voluntary[2]. At this moment Europe knows only voluntary FOP labelling, which leads to a lack of clarity for the consumer concerning the healthiness of products that do not carry an FOP label, because the producer has not been involved in the broad stakeholder process. Several European countries have government-endorsed FOP labelling, such as the traffic light system in the UK and Ireland, the Keyhole in Nordic countries and, until November 2016, the Choices logo in the Netherlands. In France, there are fierce discussions about a five-level colour coding FOP labelling system. These discussions have resulted in a plan for a comparative study into four different FOP labelling systems in large supermarkets[15]. Elsewhere in the world discussions are ongoing. In the USA the Institute of Medicine has recommended that an FOP label should be displayed on all foods[16]. So far, however, the focus in the USA has been on the new Nutrition Facts Panel[17], the mandatory nutrition labelling scheme that has recently been updated. A note-worthy example of an implemented mandatory warning label was recently seen in Chile. In April 2016, after a long process and various delays and fierce industry opposition, the Chilean government implemented a health warning label system on all foods that are too high in energy, sodium, sugars and saturated fat[18]. Such a system can only be mandatory, and was very recently also proposed in Israel[19].

Consistent front of pack labelling, logical to the consumer

Inconsistency of FOP labelling systems can be caused by the fact that in a particular country, companies are not obliged to carry these labels, which were also mentioned earlier. There will be products on the supermarket shelves that do not carry any FOP label, because the producer did not join the FOP labelling programme. This is specifically problematic with summary indicator FOP labelling, such as health logos[20]. If there is no health logo on a food, it is unclear for consumers whether that is due to a company not having joined the process or because the food is unhealthy. Thus, as stated earlier for all labelling, appearance on all foods is important. Only then will consumers get used to the labelling and learn how to use it while shopping.

FOP labelling systems should help consumers make logical healthy choices. However, underlying nutrient profiles will always leave room for debate. The nutrient criteria define whether a food is healthy or not. However, there is a loss of information with the interpretation that has been made for the consumer on the healthiness of a food (Fig. 1). The nutrient criteria can be defined 'across the board' or 'product group specific'[21]: An across the board nutrient profiling system consists of a single (or limited) set of nutrient criteria that assess all foods across the board: from sugary beverages to olive oil. A product group specific nutrient profiling system uses product group-specific nutrient criteria, which define the healthier choices within a product group. Product groups need to be defined. However, is there an optimal number of product groups? In general the more product groups and product group-specific criteria there are, the better a nutrient profiling system will enhance product improvement[22]. These targets for improvement, for example lowering of salt or sugar content, will be more realistic to achieve by food producers, because the criteria take into account all the differences between product groups. However, the more product groups a nutrient profiling system has, the more non-logical choices there are for consumers, and the less credible the system will be. For example, when a system has criteria for the product group pastry, it distinguishes between chocolate pastry and fruit-based pastry, the latter will be the healthier option, because of lower levels of energy. It is debatable however, whether pastry should be a healthier choice at all. The criteria, however will be an incentive for producers to reduce calories and lower sugar levels in pastry. A possible solution to this problem might be to disconnect criteria for product improvement and consumer choice and make two sets of criteria for two different purposes.

Continuous monitoring of effects of labelling on consumers and producers

The effectiveness of an FOP labelling system should be monitored. The two aims of the FOP labelling system

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need to be evaluated. Firstly, whether the system helps consumers to make healthier choices and secondly, whether the system encourages producers to improve their products. Consumer studies look at familiarity, understanding and liking of food labelling systems, whereas these studies should answer the question: Does the labelling help consumers to make healthier food choices? For example, annual reports on the Health Star Rating system show an increase in awareness and an increase in the ability of the consumer to use the system to choose the healthier foods[23,24]. However, much of the consumer research has been self-reported and tends to overestimate label use[25]. Studies on the effects of FOP labelling on product improvement are scarce and are mostly based on data reported by the manufacturer. In general, obtaining a good view on the availability and dynamics of the many foods that are available in the supermarkets is a real challenge. New technology-based data collecting initiatives might be a promising tool[26].

Discussion of the Dutch Choices programme on the basis of the six success factors

With the help of the six success factors that have been presented earlier, the Dutch Choices programme (Fig. 2) will be discussed.

Multi-stakeholder approach enhancing broad ownership

Although the initiative was backed by the Dutch government, European Union and the food industry, as illustrated by a broad representation of manufacturers, retailers and caterers, there has been increasing criticism in the past few years. This criticism has especially been coming from consumer organisations that are in favour of international traffic lights. Dietitians and health bloggers on social media have not been very positive either. Ownership has been shrinking over time. The fact that the logo has been well-known has also made it a great target for disapproval. The weaknesses of the programme have been relentlessly emphasised[20,22,27].

Leading role of government

Although the health logo was initiated upon request of the Dutch government[22], the government has not been in the lead, except for filing for the European notification as a nutrition claim. The Choices foundation has been steered by representatives from food companies, which has contributed to a lack of credibility. Since the new food labelling legislation was published, FOP labelling has been voluntary in addition to nutrient labelling. In The Netherlands there has been a liberal government for the past decade. This is not a government expected to introduce any additional legislation with respect to FOP labelling. Interestingly, the government has been taking the lead in phasing out the logo by introducing a nutrition-app and looking into the possibilities of an alternative logo[22,27].

Experts determining nutrient profiles, followed by a consultation process

Criteria for the Choices logo were developed by experts and published as a peer-reviewed publication[22]. A product group-specific nutrient profiling system was designed based on international dietary recommendations. Criteria were translated from these dietary recommendations and based on food composition databases[28]. A distinction was made between basic and discretionary product groups. Criteria for the discretionary product groups were stricter compared with the criteria for basic product groups, thus contributing to the intake of essential nutrients. Since the introduction of the logo, criteria for the Dutch Choices Programme have been updated twice, the last time being July 2015[29].

Front of pack labelling on all foods

One of the biggest problems is the fact that the logo does not appear on all foods. In Europe any FOP labelling system is voluntary. As discussed earlier, this is the case for a large part of the world. Hence it is difficult for Dutch consumers to distinguish foods that are unhealthy from foods that have been produced by manufacturers who did not join the programme. The appearance of an FOP logo can potentially solve this problem. For example with traffic lights or Health Star Rating system it will be easier to at least see when a manufacturer participates or not[23,24].

Consistent front of pack labelling logical to the consumer

There are a few issues with this factor. One has already been mentioned earlier: as not all producers have joined the programme, it is unclear for consumers whether foods have no logo because the foods are unhealthy, or because the producer is not participating in the Choices Programme. The second issue has to do with the Choices Programme using product group-specific nutrient profiles[20]. As mentioned earlier, this division into product groups makes a nutrient profiling system most suitable for enhancing product improvement[22]: The composition of different foods differs. Cookies and processed vegetables need different sets of criteria to enhance improvement. A reformulation target for cookies will be a reduction of saturated fat and sugar, and for processed vegetables it will be a reduction of salt. Yet the same logo will appear on cookies and vegetables, which will not be logical to most consumers. To solve this problem, as discussed in Fig. 2, the Choices Programme now distinguishes between basic foods and discretionary foods by displaying green and blue circles on the label[22]. However, this difference between green and blue is not really understood by consumers[20]. There is, however a fundamental question related to this problem: Is it at all possible to combine enhancing product improvement with enhancing logical healthy choices for consumers within one nutrient profiling system? Maybe we need different solutions for these two goals. For example a health logo for the healthy choices that are indisputable for consumers and an additional

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Fig. 2. A case study.

The Dutch Choices logo was initiated in 2006 by three large, international food companies in response to a request from the Dutch government to the food sector to come up with one single health logo to enable consumers to make healthier choices.

By the end of 2016 the number of participating companies had risen to 90, 94 % of retail participating with their private label, 80 % of caterers. In December 2016, a total of about 7000 foods were carrying the logo which meant that these foods comply with the criteria for sodium, added sugar, saturated fat, *trans* fat, energy that were defined by an expert committee. The health logo was well known and recognised by more than 90 % of the consumers.

Product group-specific criteria had been set for basic product groups contributing to intake of essential nutrients such as dairy, meat, grains, vegetables and discretionary product groups, such as snacks, beverages and sauces. To distinguish between these two sets of product groups, a green or blue circle was used on the logo[22]. Consumers, however, had difficulty in understanding this difference between green and blue. This had been put forward in a campaign of the Dutch consumer organisation (Consumentenbond). Based on a consumer questionnaire they indicated that only about a quarter of consumers understood the difference in meaning between green and blue[20].

The health logo was approved by the Dutch government and the European Committee, however, the consumer organisation filed a legal complaint, which was acknowledged in November 2016. In response the Dutch minister of Health announced that the logo would be replaced by a nutrition-app and possibly also an alternative logo. 'A poor beginning of something new', according to the Consumentenbond, 'because the nutrition app will only be used for grocery shopping by a limited number of people' The public funded, Dutch Nutrition Centre (Voedingscentrum), has been asked to lead the development of the new nutrition-app[27].

nutrition-app with different nutrient profiling criteria, to promote product improvement[27]. It must be noted that for producers too it is essential to be able to communicate product improvement to consumers.

Continuous monitoring of effects of labelling on consumers and producers

The positive effects of the Choices health logo on both consumers and producers has been studied extensively[10,25,30–32]. Dutch consumers have indicated that they were familiar with the logo and appreciated this help to make healthier choices[30]. In another study, consumers participated that had just left the supermarket after shopping. These consumers had more logo-carrying products in their shopping basket when they indicated that they used the logo while shopping, compared with consumers that did not pay attention to the logo[31]. According to participating companies the logo had been an incentive for new product development and improvement of composition of existing products[10]. However, sales in a catering setting were not influenced by the health logo[32]. The two logos (green and blue) were introduced in 2011. Since that time no studies have been published on the understanding by consumers of the two colours, green and blue on the logo. It was in April 2016 that the Dutch consumer organization Consumentenbond issued a report indicating that only about a quarter of the consumers understand the difference between green and blue[20]. As to the effect on producers, a preliminary analysis was published, on the Choices website, on logo-carrying products over the past 10 years, illustrating that criteria updates over time resulted in gradually reduced levels of the key-nutrients for most of the product groups[33]. It must be noted that both these reports, of the Consumentenbond and of the Dutch Choices Programme, were not peer-reviewed publications.

Conclusion

The WHO called upon the food industry to 'Make the healthy choice the easy choice'[1]. Although FOP labelling could be one of the measures to achieve this, it can never be the one single solution to the present epidemic of diet related non-communicable diseases. However, FOP labelling can be part of a food policy intervention. Hawkes and colleagues proposed mechanisms through which food interventions should work[34]. Two of those mechanisms can be attributed to FOP labelling. Firstly, 'providing enabling environments' can be achieved by helping consumers with nutrition labelling or FOP labelling. Secondly, 'enhancing a food system response', can be achieved through stimulation of reformulation and improving product composition, thus improving the food supply. Experiences of countries such as the Netherlands with FOP labelling resulted in defining factors that may contribute to a successful FOP labelling system. It can be concluded from the discussion of six of these factors for the Dutch FOP labelling system that despite a good scientific basis of the underlying nutrient profiling system, the health logo has been discontinued. The following shortcomings might explain this recent discontinuation of the health logo: with regard to governance, there has been lack of broad ownership and lack of government leadership; with regard to the labelling itself, this has been inconsistent, unclear and not apparent on all foods. In addition, monitoring of effectiveness should have been continued and published, especially after the introduction of the two different colours for basic product groups and discretionary product groups. The question remains whether it is possible to combine promoting product improvement with promoting logical healthy consumer choices in one single nutrient profiling system. These two goals probably need to be addressed separately. However, science-based nutrient criteria will remain important. New technology-based data collecting initiatives, such as a nutrition-app might offer new opportunities to address this question.

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A. R. wrote the paper.

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