Policy Evaluation Network (PEN)

D6.3.2.1 Protocol for review studies on evaluations and implementation of School Fruit Schemes

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Note: This systematic review (D6.3.2.1) is conducted as an action of the Policy Evaluation Network, as a first step in a case study of the implementation and impact of the EU School Fruit, Vegetables and Milk Scheme (with a focus on fruit and vegetables only). The case study is funded by the Norwegian Research Council.

Impact and implementation of school fruit and vegetables interventions: protocol for a systematic review of the literature

1. Introduction

According to estimates provided by the World Health Organization (WHO), 71% of deaths each year are due to noncommunicable diseases (NCDs) (WHO, 2018). Cardiovascular disease, cancer, chronic respiratory disease and diabetes account for 80% of all NCD related premature deaths (WHO, 2018). Evidence shows that disadvantaged and marginalized communities suffer from "higher mortality and morbidity rates due to noncommunicable diseases", when compared to the rest of the population (WHO, 2017). At the same time, a fruit and vegetable (FV) intake of at least 400 grams per day (or 5 portions) has been found to reduce the risk of NCDs (WHO, 2019). However, recommended FV intake levels are not reached, as people today consume high energy food with fat, free sugar and salt content, and not fruits, vegetables and whole grains (WHO, 2019).

One way to improve eating habits is to target children, as food preferences are easier to change when a person is younger, rather than later on in life. School schemes are a way to do so through 1) delivering fresh fruit and vegetables in preschools and schools, as well as 2) educating children about the benefits of healthy eating practices, origins of food and care for the environment in which food is produced. School schemes as such meet the call for action of the WHO, to 1) "ensure the availability of healthy, nutritious, safe and affordable foods in preschools, schools, other public institutions and the workplace", 2) "develop school policies and programmes that encourage children to adopt and maintain a healthy diet", as well as 3) "educate children, adolescents and adults about nutrition and healthy dietary practises" (WHO, 2019, p.25). Such school schemes are being presented by governments and respective stakeholders, and information pertaining to their impact and implementation is crucial in ensuring their improvement in the future.

In August 2017, the European Union introduced the new EU School Fruit, Vegetable and Milk Scheme (hereafter referred to as the EU School Scheme), which combined 2 previously existing school schemes –1) the school fruit and vegetable scheme, and 2) the milk scheme; in one unified action (Commission, 2019). The EU School Scheme provides funds to EU member states for the following: 1) distribution of fruit, vegetables, milk and certain milk products to kindergartens, primary and secondary schools 2) implementation of accompanying educational measures that would promote the consumption of fruit, vegetables, milk and certain milk products in aforementioned schools 3)

information measures that would ensure the visibility of the scheme (Commission, 2019). Although the scheme is ongoing and widely applied across all EU countries, its impact and implementation have yet to be evaluated.[1] What would be of particular interest also, is if EU countries are specifically targeting disadvantaged and marginalized communities, through the implementation of the scheme.

The Policy Evaluation Network (PEN)[2] has taken up the initiative to do exactly that – an impact and implementation evaluation of the EU School Scheme, at the European level. However, in order to properly design the implementation and impact evaluation plan for the EU School Scheme, what is necessary is a systematic review of literature available on impact and implementation processes of similar interventions.

A scoping study has already been conducted, and one particularly relevant systematic review and meta-analysis study was found: *Effectiveness of school food environment policies on children's dietary behaviours: A systematic review and meta-analysis* by Micha et al., (2018). The objective of Micha et al. is stated as: "to systematically review and quantify the impact of school food environment policies on dietary habits, adiposity, and metabolic risk in children" (p. 1). The types of policies included are 1) "direct provision of healthful foods or beverages outside of usual school meals" 2) "nutritional quality standards for competitive foods/beverages" and 3) "nutritional quality standards for school meals" (Micha et al., 2018, p.3). The primary outcome the study looked at was "change in habitual consumption of the targeted food, beverage, or nutrient", while secondary outcomes focused on were 1) "change in in-school meal nutrient content and intake", 2) total calorie intake, 3) adiposity and 4) metabolic measures (Micha et al., 2018, p.3). Only studies reporting on randomised or quasi – experimental interventions, with a quantitative outcome change, were included (Micha et al., 2018, p.4). The target group was children (2-18) in preschool, primary or secondary school, while the timeline of the review was from earliest available up to December 14, 2017 (Micha et al., 2018, Supplementary Materials). The review identified 6636 studies, out of which 91 were selected for inclusion (Micha et al., 2018). What is of particular relevance for the current Protocol, is the impact of direct provision policies, which Micha et al. (2018), found to increase fruit intake by 0.27 servings per day, and increase vegetable intake by 0.04 servings per day, with no impact on water intake. The study also found that none of the types of policies included in the review had impact on total calorie intake or adiposity (Micha et al., 2018). The impact found on metabolic factors was mixed (Micha et al., 2018).

What we would like to do is take the Micha et al. (2018) systematic review and meta-analysis as a starting point, to further:

[1] At present the scheme is monitored and evaluated by relevant government bodies of each implementing country separately and independently. However, to the best of our knowledge, a European wide evaluation of the impact and implementation of the scheme has not been conducted to date.

[2] PEN is a multi-disciplinary research network consisting of 28 research centers from Europe and New Zealand, established with the aim "to build capacity and to evaluate policy interventions regarding their level of impact on dietary, physical activity and sedentary behaviors at population levels" (PEN, 2018, p.18)

1. Conduct a systematic review of literature on the impact of school fruit and vegetables interventions[3] (thus a more narrow focus than the Micha et al. review) from earliest available to present. In the case that few or no new studies are found in order to adequately update the existing Micha et al. (2018) review, we will focus on a systematic review of implementation studies of school fruit and vegetables interventions (please see next point (2)).
2. Conduct a systematic review of literature on implementation of school fruit and vegetables interventions. In the case that few such studies are found through a systematic search, we will contact the authors of the relevant impact studies (where fruit and vegetables were directly provided and/or made more available as a direct result of an intervention) identified in the Micha et al. (2018) review, in order to request information in regard to intervention implementation.

Objectives

- Systematically review and narratively[4] describe studies on the impact of school fruit and vegetable interventions on 1) fruit and vegetable intake of children (Micha et al., 2018), 2) caloric intake (Micha et al., 2018) 3) adiposity (Micha et al., 2018), 4) metabolic risks (Micha et al., 2018) and 5) physical activity (AG, 2012) 6) change in intake of fruit and vegetables by parents and/or teachers (AG, 2012). Particularly highlighted will be a) whether or not impact differs depending on the duration of the intervention b) whether or not impact is in the short/medium/long run after the intervention has ended and c) if impact depends on socioeconomic status of the target group (deprived, marginalised populations) or certain characteristics of the target group.
- Systematically review and narratively[5] describe qualitative literature on the implementation of school fruit and vegetables interventions. Particularly highlighted will be cases where implementation of the intervention occurs in schools located in disadvantaged socio economic areas, targeting deprived, marginalised groups and ethnic minorities.

Research questions

In order to meet the above stated objectives, the systematic literature review will answer the following questions:

1. What is the impact of school fruit and vegetable interventions on 1) fruit and vegetable intake, 2) caloric intake 3) adiposity, 4) metabolic risks and 5) physical activity of children enrolled in kindergarten, primary and secondary schools, compared to children enrolled in

[3] All interventions which provide fresh fruit and vegetables to children free of charge, on school property, at any time during the school day
[4] Depending on the number of studies selected for inclusion in the Review, conducting a meta-analysis will be considered
[5] Depending on the number of studies found, and the quality of the data, conducting a meta-ethnography will be considered

kindergarten, primary and secondary schools which are not implementing fruit and vegetable interventions?

Sub-questions:

- To what extend does impact differ depending on the duration of the intervention?

- To what extent does impact differ in the short/medium and long run after the intervention has ended? (when such information is provided by the study)

- To what extent does impact differ depending on socioeconomic status and/or ethnic background of the target group? (when such information is provided by the study)

- What is the impact of school fruit and vegetable interventions on change in intake of fruit and vegetables by parents and/or teachers?

2. How are fruit and vegetables interventions implemented in kindergartens, primary and secondary schools? (ex. focusing on influencing factors on implementation, focusing on implementation outcomes[6])

Sub-questions:

- What factors (facilitators, barriers) are found to influence implementation of fruit and vegetable interventions?

- How do identified factors determine implementation success and implementation outcomes of fruit and vegetables interventions?

- What are the relevant implementation outcomes identified in evaluations of the implementation of fruit and vegetables interventions?

2. Methods

1. Eligibility criteria

Intervention

The type of intervention which we would include in the review would promote the intake of fresh and unprocessed fruit and vegetables (fruit and vegetable beverages will not be included) by children, free of charge, in kindergartens, primary and secondary school environments (referred to here as the school fruit and vegetable intervention). We include all interventions which provide fresh

[6] Example is based on relevant literature from implementation science and implementation of interventions in school environments: Damschroder et al., 2009; Domitrovich et al., 2008; Durlak and DuPre, 2008; Meyers, 2012; Nilsen and Bernhardsson, 2019; Proctor et al., 2011; Saunders et al., 2005

fruit and vegetables to children on school property, at any time during the school day. The intervention would entail 1) the free provision of fruit and vegetables in classrooms 2) free provision of fruit and vegetables in cafeteria, school yard and elsewhere within school property (ex. vending machines) 3) free provision of fruit and vegetables –outside of usual school meals and/or during usual school meals. The intervention would be with a duration of at least 4 weeks (Micha et al., 2018). What are of particular interest are studies with a 1) long term (more than 12 months) follow up period, 2) studies focusing on the implementation and impact of school fruit and vegetables interventions in deprived, marginalised or communities of ethnic minority composition. We would not include interventions that introduce menu change to contain more fruit and vegetables (ex. dishes with a higher vegetable content).

In cases where the school fruit and vegetable intervention is part of a multi – component intervention, studies are included only when fresh fruit and vegetables are provided 1) continuously for at least 4 weeks, and 2) independently, as opposed to only being a part of an educational measure (ex. tasting, cooking lesson, demonstration).

Participants

All children age 2-18 years, attending kindergarten, primary or secondary school where a fruit and vegetable intervention is implemented.

Comparators

All children age 2-18 years, attending kindergarten, primary or secondary school where a fruit and vegetable intervention is not implemented.

Key outcomes/implementation elements

1. When looking at impact studies, we will focus on change in intake of fruit and vegetables by the target group (short – up to 3 months, medium – 3 to 12 months and long term – more than 12 months; depending on target group composition). As secondary outcomes we will focus on 1) change in caloric intake 2) change in adiposity measures (body mass index, overweight/obesity) 3) change in metabolic measures (blood lipids, blood glucose, blood pressure) (as per the guidelines in Micha et al., 2018, Supplementary Materials) 4) physical activity (as per EU guidelines). Finally, we will also look at impact studies which report on change in intake of fruit and vegetables by parents and/or teachers.
2. When looking at implementation studies, we will focus on information in regard to 1) influencing factors – barriers and facilitators to implementation 2) implementation outcomes.

Timing

We will look at short (up to 3 months) medium (3 to 12 months) and long (more than 12 months) term impact in relation to the end of the school fruit and vegetables interventions. The minimum duration of implementation of an intervention should be at least 4 weeks. There are no limitations in regard to frequency of distribution of intervention, or time of day it is distributed, provision should be during and/ or outside of usual school meals.

Setting

We will look at kindergarten and school settings.

Study design

1. When looking at research reporting on impact of school fruit and vegetables interventions, randomized controlled trials (RCTs) and quasi – experimental studies will be included.
2. When looking at research reporting on implementation of school fruit and vegetables interventions, pre-experimental designs and qualitative studies will also be included.

Timeframe

1. Although the scoping study already produced a relevant review of high quality (Micha et al., 2018), the focus of our review is more narrow, and incorporates a different search strategy (to be elaborated in the following sections). Thus, the timeframe of the review of impact studies will be from earliest available to present.
2. The time frame of the review of implementation studies will be from earliest available to present.

Type of publications

Only (1) full text (2) peer reviewed and (3) published, articles/book chapters will be included in the review. However, in case the initial search does not provide sufficient number of implementation studies (minimum of 10 studies), unpublished material and/or grey literature may be searched as a follow up step.

Language

There will be no language limitations in the search implemented as part of this systematic review.

Location

There are no limitations in regard to the geographical location in which the school fruit and vegetable intervention was implemented.

2. Information sources

Databases

The following databases will be systematically searched: Medline (Ovid), PsycINFO (Ovid), Trials (Cochrane Library), EMBASE (Ovid), ERIC (Ovid). In addition, a manual reference search of selected studies will be done (backward (reference and author) and forward (reference and author) search). A manual search of the journal Implementation Science will be conducted. Finally, the first 20 studies identified as relevant by PubMed to the final studies selected for inclusion, will also be reviewed (as recommended by Micha et al., 2018).

In case the systematic search does not yield a sufficient number of implementation studies, we will contact the authors of the studies included in the Micha et al., 2018 review, asking for unpublished material regarding the interventions, pertaining to implementation. In addition and if necessary, databases of grey literature will be searched (for instance, Open Grey database).

3. Search strategy

Example search strategy for MEDLINE:

1. Fruit/ or Vegetables/ or (fruit* or vegetable*).tw,kw,kf.
2. Schools/ or Schools, Nursery/ or (school* or kindergarten*).tw,kw,kf.
3. exp Policy/ or exp Health Promotion/ or Program Evaluation/ or Implementation Science/ or (intervention* or scheme* or policy or policies or promoti* or promote* or program* or implement* or "process evaluation").tw,kw,kf.
4. and/1-3

4. Study records

Data management

The results of the systematic literature search will be exported to Endnote, and subsequently imported to Rayyan. Rayyan will be used as the screening tool.

Duplicates will be removed prior to importing to Rayyan. In addition, after selection based on title and abstract review is complete, inclusion of duplicate publications (multiple reports of the same study) will be avoided by reading of full text, comparison of author names, intervention, target group, intervention description and outcomes.

Selection process

In order to evaluate if articles will be included in the review, the title and abstract of all articles resulting from the search will be screened (using Rayyan) against the inclusion criteria by two reviewers. The full article will be reviewed, if title and abstract screening are not sufficient to determine if the article should be included in the study. At this stage, selected articles will also be labelled as ‘impact’, ‘implementation’ or ‘both’, using Rayyan.

The full text of the articles will be retrieved for all articles selected for inclusion by the initial screening of title and abstract. The full text will then be evaluated, by two reviewers independently, to see if inclusion criteria are indeed met. If an article is excluded at this stage, a record will be kept of the reasons for exclusion. Any disagreements between the two reviewers will be resolved through discussion with a third co-author. The final selection process will be recorded in a PRISMA flow diagram.

Data collection process

Data will be systematically extracted in Excel (with the possibility of using Nvivo for the qualitative implementation articles). Data extraction will be done by two reviewers independently, after which

the data will be compared. Any disagreements will be resolved through discussion with a third co-author.

5. Data items

Of the articles to be included in the review, the following information will be extracted from each identified article: 1) author(s), 2) publication date 3) geographical location 4) methods 5) population (including socio economic status) 6) fruit and vegetable intervention description (including: duration, frequency, multi/single component program, setting and any additional intervention design factors found as relevant)

1. Specific to impact studies: a) outcome data on intake (child, parent, teacher), caloric intake (child), adiposity measures (child), metabolic measures (child), physical activity (child) b) indication if outcome was evaluated at multiple or single time (Micha et al., 2018 was consulted)
2. Specific to implementation studies: 1. Influencing factors: barriers and facilitators to implementation 2) implementation outcomes.

6. Assessment of study quality

Since this review incorporates both impact (quantitative) and implementation (both quantitative and qualitative) studies, QATSSD – a 16 item quality assessment tool may be used, to grade the quality of the included studies on a scale of 1 to 3, for each of the 16 criteria (Sirriyeh et al., 2011).[7] QATSSD was specifically designed and tested in assessing both qualitative and quantitative studies according to the same criteria. Quality assessment will be done by two reviewers. Any disagreement will be resolved through a discussion with a third co-author.

In case we do not review both impact and implementation studies, tools specific to assessment of study quality of quantitative or qualitative studies will be used.

7. Data analysis

Whether a meta-analysis will be conducted, will depend on several factors/questions to be considered:

- Are the studies found (as the search strategy differs from the search strategy of Micha et al., 2018) different than those identified and included by Micha et al., 2018; and are there many new studies published after the end of the Micha et al., 2018 search period (2017);
- Related to the previous point – are the newly identified studies of good quality, and with results that are different than the findings of Micha et al., 2018;

[7] Subject to change

- Are any newly identified studies presenting data that was missing from the Micha et al., 2018, review – for instance, do they distinguish impact of FV consumption depending on socio – economic or ethnic background of the target group;

If the answer to all of the above presented questions is yes, a meta-analysis will be conducted. However, depending also on the number and quality of newly identified relevant studies (and if the answer is yes to only some of the above posed questions) – a narrative synthesis of the data will be done, with tables providing an overview of the information from each of the included studies.

If meta-analysis is conducted of the impact studies, then STATA[8] would be used for the analysis of data.

Depending on the quality of selected implementation articles, we will aim to conduct a qualitative meta-synthesis following the methodological guidelines outlined by Malterud (2019) and Noblit and Hare (1988).

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[8] Subject to change – R may be used instead of STATA

16671.pdf

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