

1 How to evaluate the effect of seven years of The Norwegian School
2 Fruit Scheme (2007-14) on fruit, vegetables, snacks consumption and
3 weight status- A natural experiment.

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30 Abstract:

31 Background:

32 From August 2007 to June 2014, the Norwegian School Fruit Scheme (NSFS) legally established that
33 all pupils in junior high- and combined schools (275 000 pupils every year), but not those in primary
34 schools (343 000 pupils every year), were entitled to a free piece of fruit or vegetable every school
35 day. The NSFS is a natural experiment, unique in terms of scope and lengthiness. Such governmental
36 efforts to improve the diet of the public is rarely evaluated. Thus, an evaluation of the
37 comprehensive, well designed, NSFS is warranted. The aim is to describe how the NSFS can be
38 evaluated using existing datasets.

39 Methods:

40 Four datasets have been identified for the evaluation of the NSFS; (1) The Nord-Trøndelag Health
41 Study (2) The Norwegian Mother and Child Cohort Study, (3) The Norwegian Child Growth
42 Study/Growth in Teenagers and (4) Health Behaviour in School Aged Children. These comprehensive
43 studies have collected cross-sectional or longitudinal data providing information about children's
44 dietary consumption and/or weight status, which can be utilized in the evaluation of the NSFS. Both
45 short- and long-term effects of the NSFS related to dietary habits and weight status and the potential
46 effect of moderators such as socioeconomic status, sex, ethnicity, and age of children and
47 adolescents can be studied.

48 Conclusion:

49 Worldwide, there is a lack of well-designed, long-term studies evaluating the impact of governmental
50 efforts to improve public diet. The present study describes how the NSFS can be evaluated using data
51 from four large data sets on eating habits and weight status.

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53 Keywords: School fruit, vegetables, obesity, child, adolescents, natural experiment, HUNT, MoBa,
54 HBSC.

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63 Background

64 From August 2007, the free Norwegian School Fruit Scheme (NSFS) was implemented in all junior
65 high schools (grades 8-10) and combined schools (grades 1-10), but not in pure primary schools
66 (grades 1-7) in Norway. Thus, children attending junior high schools and combined schools received a
67 free fruit or vegetable (ready to eat) every school day, usually during lunchtime. By implementing the
68 NSFS, the Norwegian government aimed at increasing the fruit and vegetable (FV) intake among
69 children and adolescents. At the time of implementation, approximately 275 000 Norwegian children
70 attended a combined- or a junior high school, and thereby received a daily portion of FV at school.
71 About 343 000 children attended pure primary schools, thus not eligible for the NSFS. Because the
72 government wanted to prioritise other school initiatives, the scheme was abolished in June 2014.
73 While operating, the NSFS was estimated to have a yearly cost of ≈19 million EUR (1).

74 The NSFS was unique, in terms of scope and lengthiness. The NSFS was a “natural experiment” as the
75 allocation to intervention and control groups was a result of Norwegian health policies (2). Children
76 born in the period between 1992-2007 were exposed to the NSFS, thus some children attending
77 combined schools received 7 years of free school fruit. In order to ensure a long-term increase in FV
78 consumption, it has been suggested that intervention studies providing free FV should last for more
79 than a year (3). To our knowledge, most of the previously evaluated school fruit schemes have lasted
80 less than one year (4).

81 An adequate intake of fruit and vegetables (FV) reduces morbidity and mortality from non-
82 communicable diseases (5). On the other hand, an insufficient intake of FV is the fourth leading risk
83 factor leading to the global burden of diseases (6) and is associated with increased risk of adiposity
84 (7). Eating habits established in early childhood may track into adulthood, which points to the
85 importance of increasing consumption of FV among children and adolescents (8).

86 Despite an increased consumption of FV in Norway during the last decade, the consumption is still
87 not in line with recommendations (9, 10). Epidemiologic data show that FV consumption follows a
88 socioeconomic gradient; people with higher socioeconomic status (SES) and their children eat more
89 FV compared to people with SES and their children (11, 12).

90 Due to the possibility of reaching all children and their parents, schools have been described as an
91 optimal arena for promoting of health-related behaviours (13). So far, school-based intervention
92 studies including school fruit schemes, have shown promising effects in increasing the short-term
93 intake of FV/ fruit (4, 13). Results describing long-term effects are, however, limited and diverged
94 (14, 15).

95 Preliminary studies have shown that the NSFS has resulted in an increased fruit intake, regardless of
96 gender and socioeconomic status (SES) (16) and decreased consumption of unhealthy snacks while
97 operating (17). A pilot study of the NSFS, indicated a sustained positive intervention effect; a higher
98 intake of FV and a lower intake of snacks among children who received free fruit compared to the
99 control group, respectively three and seven years after the intervention period (14, 18). The latter
100 study also found that 15% vs. 25% of the children who had participated in the free fruit group and
101 the control group, respectively, were overweight 7 years after the intervention period, however, this
102 was not significant in the final statistical model (19). Hypothetically, free fruit schemes might prevent
103 excessive weight gain, and the current weight epidemic is often used as the main argument for
104 increasing the FV intake in school children, as indicated by the implementation of the EU fruit
105 scheme (7). This hypothesis must be evaluated in datasets of higher quality.

106 Previously published intervention studies aiming to increase FV intake among school children are
107 hampered by methodological limitations such as a short intervention period, relatively few
108 participants (less than 1000) included in the studies, and few studies have included anthropometric
109 measurements to evaluate the possible effect of FV schemes on weight status (4, 13). It is evident
110 that the literature lacks well-designed studies assessing the potential effects of FV interventions.
111 Therefore, an evaluation of the comprehensive, well designed NSFS is warranted.

112 We have identified four data sets in which an evaluation of the NSFS can be conducted; (1) The Nord-
113 Trøndelag Health Study (HUNT) (2) The Norwegian Mother and Child Cohort Study (MoBa), (3) The
114 Norwegian Child Growth Study (NCG)/ The Growth in Teenagers study, and (4) The Health Behaviour
115 Among School Aged Children (HBSC) survey. These comprehensive studies have collected cross-
116 sectional or longitudinal data providing information about children's dietary consumption and/or
117 weight status, which can be utilized in the evaluation of the NSFS.

118 Aim

119 This article aims to outline how the NSFS, a nationwide natural experiment, can be evaluated by
120 utilizing existing data. We do not aim to describe details, but rather provide examples on how large
121 national cohorts and cross-sectional datasets may and should be used to evaluate the most
122 comprehensive governmental initiative to increase healthy eating habits in Norway. Thus, the aim of
123 this paper is to describe how HUNT, MoBa, NCG/Growth in Teenagers and HBSC data can be used to
124 evaluate the NSFS possible effects in children and adolescents' dietary intake (fruit, vegetables,
125 snacks) and weight status in relation to SES, gender, ethnicity and age.

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127 Methods

128 The Nord-Trøndelag Health Study (HUNT)/ the young HUNT-study

129 **Study design, study sample and data collection**

130 The Young-HUNT study is the adolescent part of The Nord-Trøndelag Health Study (HUNT), which is a
131 large population-based health study in the county of Nord-Trøndelag, Norway (20). The Young-HUNT
132 study includes three large cross-sectional surveys conducted in 1995-1997 (Young-HUNT1), 2000-
133 2001 (Young-HUNT2) and in 2006-2008 (Young-HUNT3). In both Young-HUNT1 and Young-HUNT3,
134 adolescents aged 13-19 years were invited.

135 Schools have been used as the main arena for the collection of data in all Young-HUNT surveys. All
136 adolescents and parents of adolescents under the age of 16 years gave a written consent to
137 participate in the study.

138 **MEASUREMENTS**

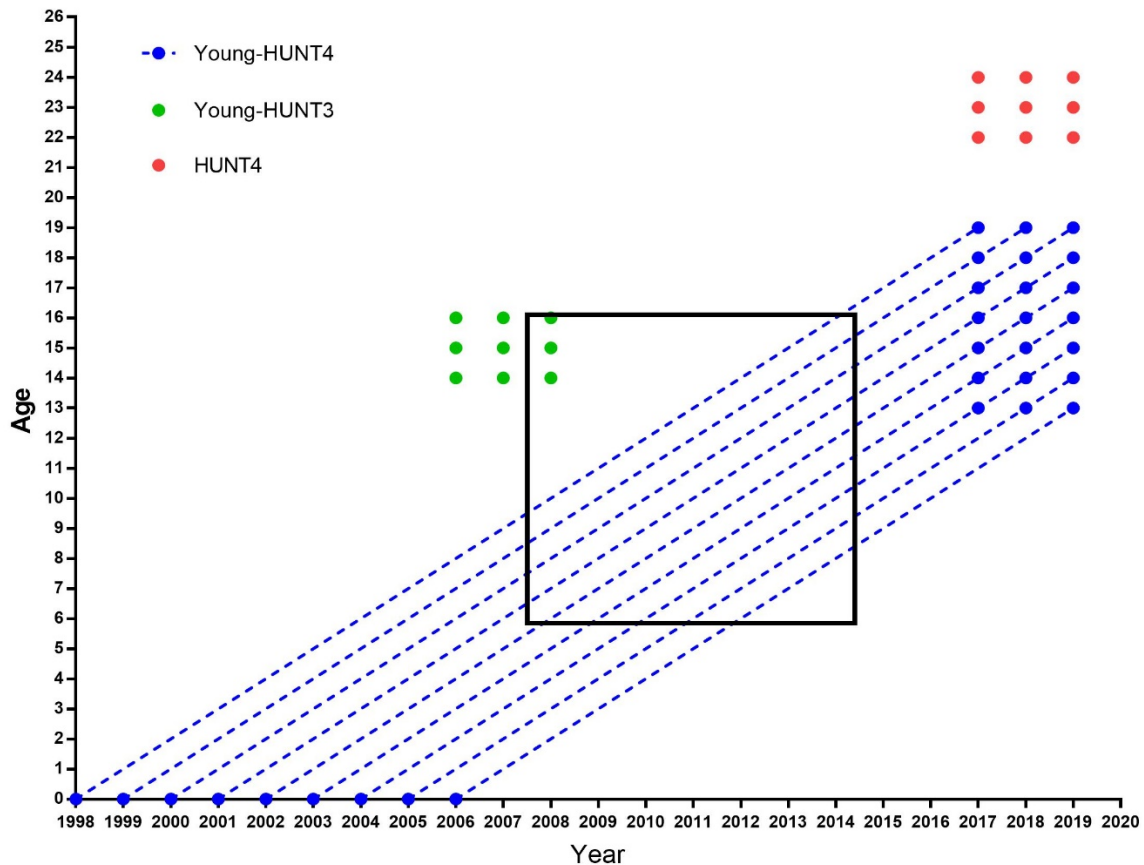
139 HUNT collected data including adolescents' anthropometrics, dietary habits, age and sex (see table 1
140 for all relevant variables). The participants Norwegian identification numbers were registered, thus,
141 by linkage to national registers indicators of parental SES are available.

142 **YOUNG-HUNT AND FREE SCHOOL FRUIT**

143 The 8-10 graders who completed the questionnaire from August 2007 to July 2008 (n=1892) can be
144 considered as the "intervention group", figure 1. Adolescents who answered the questionnaire
145 before autumn 2007 (spring 2006 to spring 2007, n=2855) can be considered as the "control group".

146 **Future data collection**

147 HUNT-4 (2017-2019), will provide the opportunity of two long-term evaluations of the NSFS; 1) an
148 11-year follow-up of the long-term effect of the NSFS on 8-10 graders in 2019 regarding dietary
149 intake and weight status as adults, and 2) an evaluation of possible long-term effect of 3-7 years of
150 free school fruit 3-5 years after the program period (figure 1).



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152 Figure 1. HUNT data. The black square displays the NSFS. Green dots display the Young-HUNT3 study.
 153 The red dots depict when the HUNT4 data will be collected. The blue dots indicate when the Young-
 154 HUNT4 study will be collected and the blue dots on the x-axis display the measurement of birth
 155 weight.

156

157 The Norwegian Mother and Child Cohort Study (MoBa)

158 **Study design, study sample and data collection**

159 The Mother and Child Cohort Study (MoBa) is a prospective population-based pregnancy cohort
 160 study conducted by the Norwegian Institute of Public Health (NIPH) (21). The recruitment period
 161 started in 1999 and finished in 2008. The participants (mothers) answered questionnaires 6, 12, 36
 162 months and 5, 7- and 8-years post-pregnancy.

163 **MEASUREMENTS**

164 Data on the child’s weight and height were collected from birth to 6, 15-18, and 36 months, 5, 7 and
 165 8 years after birth. Dietary intake was registered by using a validated food frequency questionnaire

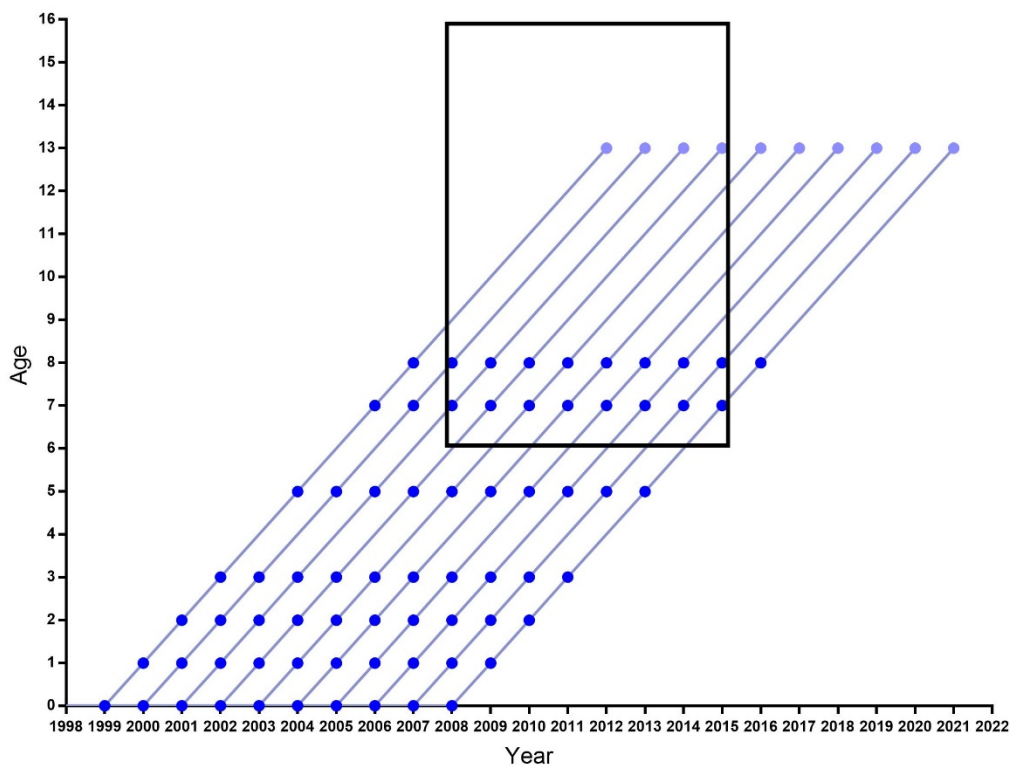
166 (22) at the age of 36 months and 7 years, respectively. The MoBa study includes several indicators for
167 parental SES and ethnicity, see table 1 for all relevant variables.

168 **MoBa AND FREE SCHOOL FRUIT**

169 Children born in the period between 1999 and 2007 have received different levels of exposure to the
170 NSFS. Children participating in the MoBa study at the age of 7 and 8, had received between 1-3 years
171 of free school fruit at the time of data collection, figure 2. Currently, it is possible to identify who
172 attended a combined- or a primary school for a subsample of 6000 MoBa participants, born between
173 2007-2009. Thus, it is possible to evaluate one year of the NSFS (23).

174 **Future data collection**

175 A new questionnaire will be issued to MoBa children at age 13. Within the MoBa study, the
176 children that attended combined schools did receive 1-7 years of the NSFS, figure 2. These
177 children will be compared to those born in the same period, who attended primary schools
178 (grades 1-7). By linking MoBa data to the national education register it is possible to identify who
179 attended primary schools (control group) and who attended combined schools (intervention
180 group). Thus, possible long-term effects of the 7 years of NSFS can be conducted in near future.



181
182 Figure 2. MoBa data. The black square displays the NSFS. The blue lines represent MoBa children
183 born from 1999 to 2008, and dots measurements at weeks 6, 12, 36 months and 7 and 8 years. The
184 purple dots depict the planned survey at age 13.

185 The Norwegian Child Growth study (NCG) and the Growth in Teenagers study

186 **Study design, study sample and data collection**

187 In 2008, the Childhood Surveillance Initiative (COSI) was established to monitor the development of
188 obesity among children and adolescents in Europe (24). Thus, the Norwegian Child Growth study
189 (NCG) was established by the Norwegian Institute of Public Health (NIPH) to monitor the weight of
190 children in Norway (25).

191 According to guidelines, all Norwegian 3rd graders are to be measured by school nurses, therefore,
192 3rd graders were chosen as the study population in the NCG. NCG followed the protocol from the
193 COSI for data collection (24) and used a stratified two-stage sampling design to ensure national
194 representativeness for 3rd graders in Norway. In 2008 (cohort 2000), 2010 (cohort 2002), 2012
195 (cohort 2004) and 2015 (cohort 2007), 3rd graders in the same 125 schools have been measured,
196 approximately 3400 children in each cohort. For the cohorts 2002, 2004 and 2007, routine
197 measurements of weight and height have been collected (at birth, 6 weeks, 3, 6, 9, 12, 15, 18 and 24
198 months, and 3, 4 and 6 years) making these cohorts longitudinal.

199 The Growth in Teenagers study implemented by NIPH, aims to understand the development of
200 height and weight among adolescents in Norway. In October 2017, height and weight were measured
201 among a representative sample of 13-year-old in Norway. Further, routine measurements of weight
202 and height were collected (at birth, 6 weeks, 3, 5, 12, 15, and months, and 2, 4 and 6 years, and 8
203 years) from health records, making this cohort longitudinal.

204 In the NCG, information about the study and a declaration of consent was sent to all parents of 3rd
205 graders by “satchel mail”. In the Growth in teenagers’ study information and a declaration of consent
206 was sent to both adolescents and their parents during the autumn of 2017.

207 **MEASUREMENTS**

208 In the NCG surveys, measures of height, weight and waist circumference were collected by school
209 health nurses. Additionally, the data includes routine measurements conducted by health personnel
210 from birth and at the age of 6 weeks, 3, 6, 9, 12, 15, 18 and 24 months, and 3, 4 and 6 years. These
211 measures are available for the 2002, 2004 and 2007 cohort (see table 1 for additional information).

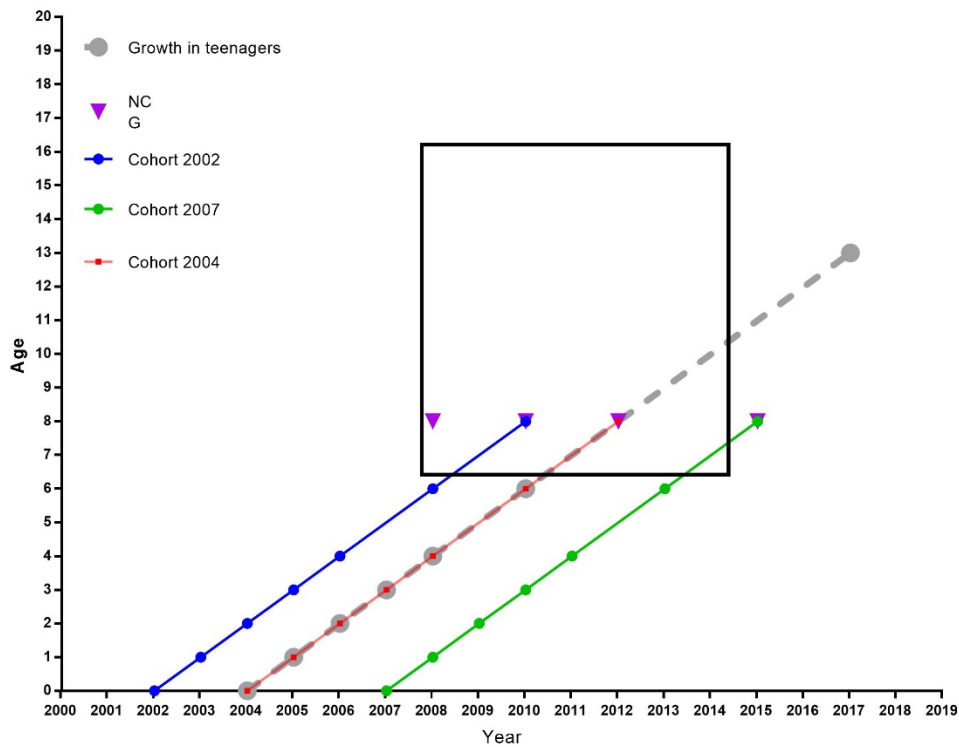
212 The Growth in Teenagers study collected height and weight of 8th graders in 2017. The adolescents
213 drawn to participate in this study are born in 2004 but are not the same sample who participated in
214 NCG in 2012 as third graders, as a new sample were drawn to this study. The same routine
215 measurements of weight and height will be collected in this study as the NCG.

216 Personal identification numbers have been registered in all surveys, thus, through linkage to national
217 registers, information of SES and country of origin is available.

218 In the Growth in Teenagers study, parents were asked to specify their child's former primary school
219 in the consent form. This makes it possible to identify those attending the NSFS schools (grades 1-10)
220 and the control schools (grades 1-7), respectively.

221 THE NCG/GROWTH IN TEENAGERS AND FREE SCHOOL FRUIT

222 Within the NCG cohorts, the children at combined schools received various exposure to the NSFS. For
223 the 3rd grade surveys, the respective cohorts (intervention schools) have received one (2007 cohort),
224 1-1,5 (2000 cohort) or 2-2,5 years of free school fruit (2002 and 2004 cohorts). The 8th graders in the
225 Growth in Teenagers (born in 2004) have received five years of free fruit, figure 3.



226

227 Figure 3. Schematic illustration of the intervention period and the data material in NCG and Growth
228 in Teenagers. NCG four cross-sectional studies of 8-year olds in 2008, 2010, 2012 and 2015 of height
229 weight and waist circumference (purple). Longitudinal height and weight of the cohorts 2002 (blue),
230 2004 (red), 2007 (green) from birth to 8 years of age. The Growth in Teenagers study (grey) data
231 collection of height and weight among 13-year olds and routine measurements. The Black square
232 depicts the NSFS.

233 Health Behaviour in School Aged Children (HBSC)

234 **Study design, study sample and data collection**

235 The Health Behaviour in School Aged Children (HBSC) is an international collaboration network
236 (www.hbsc.org). In Norway, HBSC cross-sectional data has been collected every fourth year (26). The
237 Department for Health Promotion and Development at the University of Bergen has been
238 responsible for conducting nine surveys among 11, 13 and 15-year olds and six surveys among 16-
239 year olds. To ensure nationally representative samples, a stratified standard cluster sampling
240 procedure was used with school classes being the primary sampling unit (27). At schools, only one
241 class per age group was selected to participate.

242 **MEASUREMENTS**

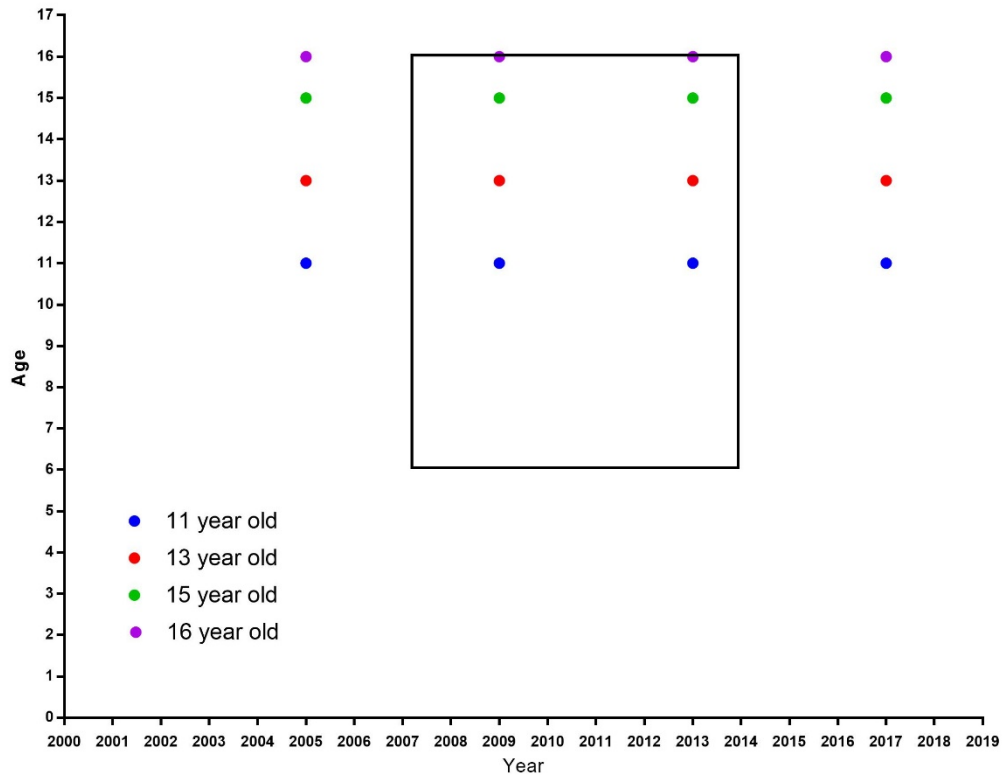
243 Two questionnaires were used, one school-level- (principals reported school type) and one student-
244 level questionnaire. Both questionnaires were based on the international protocol and were
245 translated into Norwegian. Participation was based on passive parental consent and was anonymous.
246 The children and adolescents were to self-report their weight, height and diet (26). The
247 questionnaire contains questions regarding the child's sex, ethnicity, grade, month- and year of birth
248 (26). The children were asked to report their parents' profession. In addition, HBSC uses the family
249 affluence scale (FAS), table 1.

250 **HBSC and free school fruit**

251 Children and adolescent who attended combined- or junior high schools and answered the survey in
252 2009/2010 and 2013/2014 received 1-2 and 2-6 years of free school fruit, respectively.

253 **Future data collection**

254 The future HBSC survey in 2017/2018 will enable a long-term evaluation of the NSFS 3-4 years after
255 the program ended, among children who received 2-7 years of free fruit.



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257 Figure 4. HBSC data. The blue, red, green and purple dots represent cross-sectional data
 258 collected/future data collection among 11, 13, 15 and 16-year-old children and adolescents in the
 259 Norwegian part of HBSC. The black square depicts the NSFS.

260 Statistics

261 Each dataset will be analysed separately. To evaluate the potential effect of the NSFS mixed models
 262 will be used. Mixed models can be used to account for multiple levels within the data (school,
 263 county, region etc) and account for that repeated measures within a person is correlated. In all
 264 analysis we will assess potential differential effect of the NSFS according to SES, gender and age.
 265 Some children may have changed school e.g. from exposed to unexposed schools during the 7 years
 266 the NSFS was operating. By connecting the individuals in the datasets (except HBSC) to the national
 267 school register in Norway, we will be able to identify how many years/months an individual was
 268 exposed to the NSFS- before changing to an unexposed school. To account for different exposure to
 269 the NSFS, we will make a continuous exposure variable identifying the number of years/months an
 270 individual was exposed to the NSFS.

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273 Discussion

274 It is crucial to develop and implement effective policies and programmes for preventing non-
275 communicable diseases. Public health interventions are, however, rarely evaluated, leaving
276 policymakers and partitions little information of the effectiveness of the interventions (28). Major
277 strengths associated with research evaluating the NSFS-project is that the initiative was implemented
278 nationwide, it is possible to identify who was exposed to the scheme or not, and the high-quality of
279 available data sets that can be used to evaluate the effect of the NSFS.

280 The four datasets complement each other, as they have collected data in various age groups and
281 with different instruments. All datasets contain data on height and weight, but with different
282 accuracy, i.e. objectively measured or self-reported. Young-HUNT3, MoBa and HBSC include
283 measurements of the child dietary intake, but NCG and Growth in Teenagers does not.

284 The possibility of evaluating NSFS in relation to dietary habits and weight status and the potential
285 effect of moderators such as SES, sex, ethnicity, and age of children and adolescents will provide
286 additional knowledge of the short-term, and new knowledge of the long-term effects of free FV
287 schemes. It is essential to evaluate the long-term effect to assess the costs against the benefits. A
288 cost-benefit analysis of the NSFS implies that it may be beneficial to prevent rather than treat disease
289 (1).

290 Previous evaluations of NSFS are hampered by limitations, such as lack of baseline data and relatively
291 small samples. Further, the possible effect of the NSFS on weight status has not yet been evaluated,
292 the exception being the pilot version of NSFS that indicated a possible association (19). Currently, it is
293 possible to evaluate 1-12 months of the NSFS by using Young-HUNT3, 2-5 years by using the NCG and
294 1-3 years by using MoBa data on weight status. In a few years, new data will be collected in both
295 MoBa and HUNT, which will enable an evaluation of the 7 years of the NSFS with 1-5 years of follow-
296 up on weight status. As will the new HBSC repeated cross-sectional survey, thus enabling a
297 comparison of children and adolescents FV intake, before, during and after the NSFS, and between
298 intervention and control schools at various times.

299 Strengths and limitations

300 Given that NSFS is a natural experiment, care must be taken in regards of interpreting, reporting and
301 drawing causality of the results (2). There are several limitations to the mentioned datasets, as they
302 were not designed to study the effects of the NSFS.

303 A confounding bias of the evaluation of the NSFS could be the Norwegian subscription scheme or
304 other fruits schemes in schools not eligible for NSFS. A municipality or school could initiate their own
305 FV scheme, by planning the logistics and covering the expenses. Children who attended primary
306 school could be part of the Norwegian subscription scheme as all schools in Norway are offered to
307 participate, but participation has been low, about 15 % subscribed while the NFSF was operating.
308 Primary schools participating in the Norwegian subscription scheme in the NSFS period (2007-14) has
309 been logged and can be considered in the analyses. However, other arrangements in municipalities
310 or schools might have occurred, that are not logged, thus effects might be underestimated.

311 MoBa data has potentially been biased due to selective recruitment and self-reported measures (21,
312 29). Currently, a subsample of 6000 children within the MoBa cohort can be separated into an
313 “intervention group” and “control group”, due to a variable identifying if the participants attended a
314 combined school or a primary school. In the near future, it is possible to use the entire MoBa sample
315 in the evaluation of the NSFS by linking MoBa data to the education register. HUNT data may not be
316 representative of Norway regarding social inequalities (30). In Young-HUNT3, data collection was
317 completed in one municipality before moving on to the next. Therefore, urbanity may not be equally
318 represented in the “intervention group” and “control group”.

319 The county Nord-Trøndelag, where the HUNT data has been collected, has been considered as
320 representative for Norway regarding several sociodemographic variables (20). MoBa had a long
321 recruitment period and included participants from different geographical areas (21). Samples in NCG
322 and HBSC was drawn to be nationally representative for the age(s) included (25). Anthropometrical
323 data collected in NCG/ Growth in Teenagers and HUNT were obtained by trained nurses. All studies
324 have a high number of participants. A strength of the HBSC is that data has been collected in several
325 age groups before, during, and after the NSFS, which opts the opportunity of evaluating different
326 exposures to the program.

327 Moreover, during the 7-year period the NSFS was operating a number of societal changes have most
328 likely affected FV consumption, such as governmental health campaigns and food prizes of FV that
329 we cannot control for.

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334 Conclusion

335 In Norway, the NSFS was implemented nationwide from 2007 to 2014. This was carried out as a
336 natural experiment; thus, it is possible to identify who were exposed to the NSFS and who were not.
337 By using the four large data sets described; HUNT, MoBa, NCG/Growth in Teenagers and HBSC, the
338 effect of NSFS can be evaluated on dietary intake and weight status. It will also be possible to assess
339 potential moderators of potential effects, such as SES, gender, and ethnicity.

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357 **Authors` contributions:**

358 E.B. had the initial idea of this paper. I.M.H wrote the manuscript with input from E.B and T.H.S. All
359 authors have reviewed the manuscript critically, revised the manuscript, and approved the final
360 version.

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	HUNT-study	MoBa-study	HBSC	NCG Growth in Teenagers
Type of data	Cross-sectional and longitudinal	Longitudinal	Cross-sectional	Longitudinal and cross-sectional Longitudinal cohorts: 2002, 2004 (two samples), and 2007. Cross-sectional sample: born 2000
Sample	Young-HUNT3: 4747 ^a HUNT4: data collection ongoing	103 219 children ^b	7000 children each survey	NCG: 3400 each survey Growth in Teenagers: 3750
Exposure to the NSFS	Young-HUNT3-exposure up to 10 months	Questionnaire 7 or 8:1-3 years	Sample 2009/2010: 1-2 years Sample 2013/2014: 2-6 years Sample 2017/2018: 2-7 years	Cohort 2000 and 2007: 1-1,5 years Cohort 2002 and 2004: 2-2,5 years Cohort 2004 Growth in teenagers: 5 years
	Young-HUNT4: 3-7 years, 3-5 years after the program ended. HUNT4: long-term evaluation of up to 10 months- (linkage Young-HUNT3)	Questionnaire 13 years: 1-7 years		
Dietary method	FFQ	FFQ	FFQ	Not available
Reported by:	Self-reported	Reported by mother/self-reported age 13	Self-reported	
	How often do you consume the items listed below? 1	How often do you does your child normally eat: 3	How many times a week do normally eat the following items 5	
	Fruit	Fruit	Fruit	
	Vegetables	Vegetables	Vegetables	
	Candy	Potato chips	Candy	
	Potato chips	Chocolate and sweets		
	How often do you drink the items listed below? 2	How often does your child normally drink 4:	How often do you normally drink the following items: 6	
	Soda	Soda	Soda	
	Diet Soda	Diet Soda	Diet soda	

Anthropometrical measurements	Objectively measured	Reported by mother	Self-reported	Objectively measured
Reported by:	Objectively measured by nurse	What is your child weight and height?	How much do you weigh without clothes? How tall are you without shoes?	Objectively measured at; birth, 6 weeks, 3, 6, 9, 12, 15, 18 and 24 months, and 3, 4 and 6 years all cohorts + 13 years 2004 (Growth in teenagers)
Other variables				
School type-	School-registered in survey	School type- linkage to school registry	School type- reported by principal (“Elementary school”, “Secondary School”, “Combined elementary and secondary school”, and “Upper secondary school”)	Yes- Growth in teenagers
Date the questionnaire was answered	Yes	Yes	N.a	N.a
Grade	Yes		Yes	Yes
Date of birth	Yes	Yes	Month/year	N.a
Age	Yes	Yes	N.a	N.a
Planned education	Yes	N.a	N.a	N.a
Gender	Yes	Yes	Yes	Yes
Municipality	Yes	Yes	N.a	Urban, somewhat urban, rural
SES indicator	Educational intentions	Parental education	Family affluence scale (FAS)/ parental employment	NCG: Mothers education
Country of birth	N.a	Norway	Yes	N.a
Parents ethnicity	N.a	Yes	Yes	N.a
Possible linkage by ID	Yes	Yes	N.a	Yes

458 ^a number of participants attending junior high school, ^b participants who are sent questionnaires and can be invited to sub-studies per 2015.

459 1: reply options: The reply options were: several times a day, once a day, every week but not every day, less than once a week and never.

460 2: reply options: The reply options were: seldom/never, 1-6 glasses a week, 1 glass a day, 2-3 glasses a day, 4 or more glasses a day.

461 3-4: The reply options were: never, 1-3 times a month, 1-2 times a week, 3-4 times a week, 5-6 times a week or once a day or more often.

462 4-6: The reply options were: never, less than once a week, once a week, 2-4 times a week, 5-6 times a week, once a day or several times a day

463 Not available: N.a

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