iJournals: International Journal of Social Relevance & Concern (IJSRC)
ISSN:2347-9698, ijournals.in/ijsrc
Volume 14 Issue 10, October 2026

Children's Fruit Intake During Korea's 2024 Price Shock: Evidence from Home and Institutional Settings

Author: Sunwoo Min

Affiliation: Seoul Foreign School, Seoul, Republic of Korea

E-mail: sam.min.27@seoulforeign.org

DOI: 10.26821/ijsrc.14.10.2026.141005

ABSTRACT

The fresh fruit price index in Korea was 28% to 41% higher than 12 months before from January through April 2024 due to low harvests of apples and pears. This study focused on how much fruit children aged 1 to 9 consumed during the price shock, and whether fruit consumed at home and at school or childcare changed in the same way. We analysed single 24-hour dietary recalls from 6,225 children in the Korea National Health and Nutrition Examination Survey (KNHANES), 2015 to 2024. Using survey-weighted regressions adjusted for age and sex, we compared 2024 with the mean of 2022 and 2023 (the only years collected with the same methods) and two additional baselines, and conducted placebo tests on earlier years. Children ate 151.2 g/day of fruit in 2022 to 2023 and 112.6 g/day in 2024 (−39.6 g/day, 95% CI −63.7 to −15.4). Fruit eaten at home dropped by 40.9 g/day (−65.2 to −16.6). This drop was larger than in any previous year and was seen under all three baselines, while fruit consumption at school or childcare remained at approximately 15 g/day. The percentage of children eating any fruit hardly changed, and much of the decrease was due to apples. Exploratory results suggest the home decrease was more pronounced among children aged 6 to 9, but the age difference was not statistically significant. As fruit supply in childcare and schools was steady, regular fruit snacks with budgets that can match the price may help support children's diets when prices increase.

Keywords: Children; Fruit intake; Food prices; School meals; Childcare; KNHANES

1. INTRODUCTION

In 2023 and 2024, the price of fruit in Korea increased more than it had in decades. In the 2023 growing season, Korea suffered estimated losses of 25% of apple [1] and about 20% of pear production [2] due to bad weather, and fresh apples cannot be imported [1]. Fresh fruit prices were 28.5% higher in January 2024 than a year earlier [3]. The rise in February was 41.2%, the highest in 32 years and 5 months [4], and prices continued to be 40.9% higher in March [5] and 38.7% higher in April [6]. For 2024 as a whole, fresh fruit prices rose 17.1%, with apples up 30.2%, tangerines 46.2% and pears 71.9% [7]. The government responded by opening tariff-free import quotas for bananas, pineapples, mangoes and other fruits, which were to be in effect up until 30 June 2024 [8].

A price increase like this may be particularly harmful for young children. The World Health Organization recommends that children between the ages of 2 and 5 get at least 250 g of vegetables and fruit daily while those aged 6 to 9 should have at least 350 g [9]. Groups impacted the most by an increase in food prices are the groups with high nutritional demands, such as young children [10]. Children this young also have little control over what they eat, as their food intake is largely reliant on what adults purchase, prepare and place before them [11]. Childhood eating habits are likely to persist into adulthood [12] and a reduction in fruit consumption in childhood can have consequences long after the initial year.

Korean children have two sources of fruit. It is bought by the families at home and they pay the new prices immediately. Meals and snacks are provided on menus and budgets that are planned in advance in childcare centres and schools [13, 14]. If families reduced their purchases of fruit and these institutions continued to provide it, the reduction in children's intake of fruit would be mainly at home and partly offset by the institutions. In childcare and schools, policy can have a direct effect, in that public bodies do not dictate what parents buy, but can dictate what is served in those settings.

Little is known of what children ate in the 2024 shock. Most of the evidence concerns prices and household spending. The households' expenditure on fruit during the first quarter of 2024 was nominally 18.7% higher than a year earlier in Statistics Korea's household

survey, but 11.7% less in real terms [15]. Spending data are household-level data, however, and therefore do not provide information about what children ate or where they ate it. National statistics show that children aged 1 to 9 ate 153.8 g/day of fruit in 2023 and 112.6 g/day in 2024 [16]. They offer no indication of whether the drop occurred at home or in institutions, of which fruits were involved, or of whether it was greater than the normal change from one year to the next. This study addresses four research questions (RQs) using the microdata of the Korea National Health and Nutrition Examination Survey (KNHANES) from 2015 to 2024.

RQ1. Was there a change in the fruit consumption of children aged 1 to 9 in 2024?

RQ2. Was there a difference between the change in home fruit consumption and the change in school or childcare fruit consumption?

RQ3. Was this change different for children aged 1 to 5 than for children aged 6 to 9? This is an exploratory comparison.

RQ4. What do the results mean for provision of fruit in school meals and childcare?

This study adds three things to previous work. It measures the grams of fruit consumed by children in a national sample, rather than the fruit purchased by households. It divides that intake into the location of the fruit consumed and into the type of fruit consumed to reveal the location of the drop and which fruits were responsible for the drop. It also compares the 2024 change with a main baseline, two alternatives and the same comparison repeated for each previous year, which allows for an assessment of the magnitude of the change as compared to the usual year-on-year variation. Section 2 presents the relevant literature, Section 3 outlines the data and methodology, Section 4 details the results, Section 5 interprets the results and Section 6 concludes.

2. RELATED WORK

2.1 Food Prices and Children's Diets

An increase in food prices leads to a decrease in the quantity of food demanded [17]. A meta-regression of 136 studies revealed that the price elasticity of food demand was more negative in poorer countries and poorer households within countries [18]. As food prices increased during the late 2000s food and financial crisis, vulnerable households in low- and middle-income countries reduced the quality and quantity of food consumed, and also reduced the variety of foods consumed [10]. However, children are not always the first to be deprived. During the 1997 to 1998 crisis in Indonesia, households maintained children's energy consumption but reduced their consumption of higher-quality foods [19]. Children in primary schools in metropolitan areas with lower real prices of fruit and vegetables in the USA were found to have smaller gains in body mass index (BMI), but no data were available for what the children were eating [20].

The more recent evidence from high-income countries is primarily on the nature of what households purchase. This is seen in UK survey data from January 2024, when 60% of food-insecure households reported reducing their purchase of fruit, compared to 11% of food-secure households [21]. What a household purchases does not always go hand in hand with the consumption of food. In the Great Recession, household food expenditure in the UK decreased in real terms, but the number of calories and the nutritional quality of the food purchased remained the same as people changed their shopping habits [22]. Fruit prices in Iceland almost doubled after 2008, while the percentage of adults eating fruit daily only decreased from 37.1% to 34.9% [23]. We do not know whether children's diets follow the household's response or are protected from it because few of these studies consider children separately.

2.2 Home and Institutional Food Environments

In the home setting, parents and other adults make the choices of foods that are purchased and offered, which in turn influence how children eat and the quality of what is eaten [11]. In childcare and school, the school or childcare institution provides the food. Korean childcare centres provide lunch and a morning snack and afternoon snack, which is in line with children's foodservice guidelines [13]. The government also planned to review the cost of meals and snacks in its standard cost of childcare using the average consumer price inflation of the 3-year period prior to the review [14]. Household shopping is thus likely to react more quickly to prices than institutional menus and budgets, but institutional budgets do react. In April 2024, a childcare centre in Seoul reported serving fewer apples to comply with its snack budget, and one province increased its fruit snack allowance by 18% [24].

Fruit served at schools also can boost child consumption of fruit. In Norway, children at schools that provided free fruit consumed approximately 25% more fruit than children at schools that did not [25]. Korea had its own fruit snack programme in place for five years (2018 to 2022), providing approximately 227,000 primary school children, on average, per year in after-school care classes with a fruit snack [26]. The programme was discontinued due to budget cuts [27] and no national fruit snack programme for primary school children was in place during the 2024 price shock. In March 2026, the programme was restarted for first and second graders and is projected to serve approximately 600,000 children [26, 27].

The amount each setting contributes can be identified from national dietary surveys, as the place where each food was eaten is recorded. Vegetable consumption has also been divided by eating place in Korea from 1998 to 2017 [28]; however, fruit consumption has not been analysed this way, and no study has compared the fruit consumption of children when eating at home versus in institutions during a price shock.

2.3 Research Gap

This results in three gaps. First, there has been no study which measured children's fruit consumption during the price shock in Korea in 2024. The current evidence consists of prices and household expenditure [15], and published intake statistics are only total values [16]. Second, whether meals in childcare and schools protected children's fruit consumption when prices rose remains unknown. A low-income country experiencing a shock in staple foods provides the strongest support for the protection of children [19], and the school fruit evidence is for a time of relatively normal food prices [25]. Third, even though institutions feed pre-school and school-age children differently, we do not know if they were affected differently. In 2024, primary schools did not have a national fruit snack programme [27], and lunch was provided, whereas in the childcare sector lunch and two snacks were provided [13]. Previous studies have also typically compared the shock year with one previous year only [23, 29], resulting in conclusions that are dependent on the typicality of that previous year [30]. This study addresses all three gaps and makes more than one comparison.

3. METHODOLOGY

3.1 KNHANES Data

KNHANES is a nationally representative survey of the Korean population and has been carried out since 2007, annually. The sample is taken in two stages: first the enumeration districts and then the households within the enumeration districts, in each of the strata; and each year's sample is surveyed throughout the year, and so every season is included [31, 32]. The public basic and 24-hour recall files for 2015 to 2024 were used. During the recall, trained interviewers document each food consumed on the recall day, quantity and location of consumption [31]. Until 2021 the interview took place at home and asked about the day before. It was conducted in the mobile examination centre from 2022 and asked about the day two days before, and the survey agency considered this to be a sufficiently small change to allow trends to be considered comparable [31]. The day of the week that was recalled also changed. In 2015 to 2020, Fridays and Saturdays made up 26.1% to 31.1% of children's recall days, but 6.4% or less in 2021 or later (Supplementary Table S1). The study is reported in accordance with the STROBE statement and the nutrition extension of the STROBE statement, STROBE-nut [33, 34].

3.2 Child Sample

Children between 1 and 9 years old with a positive nutrition-survey weight and a minimum of one food record were included. This gave 6,225 children over 2015 to 2024, of whom 3,167 were aged 1 to 5 and 3,058 were aged 6 to 9 (Supplementary Table S1). There were 913 children in the main baseline years (2022 and 2023) and 415 in 2024, 169 of them aged 1 to 5 and 246 aged 6 to 9. The official statistics use the age band 1 to 9 years old [16]. Ages 1 to 5 are roughly equivalent to childcare or kindergarten and ages 6 to 9 are roughly equivalent to primary school, although some 6-year-olds had not yet started school. Following the official statistics, we did not exclude any child for implausible energy intake. Children aged 1 to 5 made up a smaller weighted share of the 1 to 9 group in 2024 (42.5%) than in 2022 (45.4%) or 2023 (46.1%), so every model adjusts for single year of age.

3.3 Outcomes and Eating Place

The primary outcome was the total weight of fruit consumed on the recall day (fruit intake in g/day) for the KNHANES fruit group [31], with zero for those children who consumed no fruit. Fruit juice was analysed separately, since it is counted as a beverage in KNHANES. The food names of fruit items were used to classify them into types. Reported are apple, banana, pear and tangerine (pear and tangerine being domestic fruits whose prices increased even more than apple prices in 2024 [7]) as well as the imported fruits under tariff-free quotas (banana, pineapple, mango, orange, grapefruit and avocado) [8].

For each fruit item, the place of eating (at home, at school or childcare, or elsewhere, such as restaurants or other locations) was also determined. There is no separate code for childcare in the survey, and meals at school and at work are coded under the same code. In each year, at least 96% of all the group-catering food items consumed by children aged 1 to 5 were identified as belonging to this code, thus covering schools, kindergartens and childcare centres for children (Supplementary Note 1). Analyses by eating place use 2016 to 2024 due to the differences in eating-place codes between 2015 and 2016 [31]. Secondary outcomes were eating any fruit, eating any fruit at home and at school or childcare, fruit per 1,000 kcal and energy intake. The comparison of the contribution of vitamin C, dietary fibre and potassium from fruit was only possible in the period 2022 to 2024 as only one food composition database was used in this period [31].

3.4 Comparison Baselines

The size of the 2024 shock change will depend on what it is compared to, since there is only one shock year. For our primary comparison (baseline A) we used the mean of 2022 and 2023, as these were the only years that had the same interview setting and the same recall day as 2024. The limitation of this baseline is that it could already include the onset of the shock, as apple prices had begun to increase by August 2023 [1]. As robustness checks we used two other baselines. The 2019 to 2022 mean is presented as baseline B; this mean spans the 2022 change in methods and the COVID-19 years. Baseline C was a linear trend fitted to the years 2018 to 2022 and assumes that the years before the shock went up or down in a straight line. The analysis plan also provided for a fourth baseline, D, which was a linear trend from 2015 to 2022, but it did not fit the pre-shock level. It was found that the line decreased by 6.9 g/day per year for children's fruit, with a value 38.5 g/day (95% CI 10.9 to 66.0) less than that observed in 2023, so its results are only presented in Supplementary Table S2. We define a change to be consistent if its sign was the same with baselines A, B and C, and if its 95% confidence interval (CI) contained no zero with any of the three baselines.

3.5 Statistical Analysis

All estimates used the nutrition-survey weights, with Taylor-linearised standard errors that take account of the survey strata and clusters (268 strata, 1,884 clusters and 1,616 degrees of freedom). Children were analysed as a domain of the full sample. The primary model was a linear regression with a survey weight:

$$y_i = \beta_0 + \beta_1 D_i + \gamma^{\top} Age_i + \delta Female_i + \varepsilon_i$$

where D is an indicator for 2024, Age is a set of indicators for each year of age from 2 to 9 (with age 1 as the baseline), Female is an indicator for girls, and β_1 is the difference from the baseline for 2024. For baseline C, the model also included a linear year term and an indicator term for 2023, as this would have influenced the trend if not included in the model. Eating any fruit was modelled as a linear probability, thereby putting its departures in percentage points. Where there was a comparison between settings (RQ2), the outcome was the child's fruit at home minus the fruit at school or childcare. The single-year age indicators capture the overall effect of age group, and an interaction between D and an indicator for ages 6 to 9 was added for the age-group comparison (RQ3).

3.6 Placebo Tests and Sensitivity Analyses

The baseline A comparison was repeated for every earlier year, from 2017 to 2023 for all fruit and apple and from 2018 to 2023 for outcomes by eating place, to determine if the 2024 change was unusual. We repeated the same process for the baseline B comparison for 2020 to 2023 (2021 to 2023 for eating place). Due to the small number of years, these placebo tests demonstrate how abnormal 2024 was, rather than being a formal test. To test whether the results depended on model choices, we conducted some sensitivity analyses (Supplementary Table S2), which involved adjusting for sex alone, including household income rank, including the recalled weekday, and excluding the COVID-19 years (2020 and 2021).

3.7 Analysis Plan, Data Checks and Ethics

This article is a part of a broader analysis of the 2024 price shock. That work's analysis plan was written on 17 October 2026 before we analysed the microdata, and was not publicly registered. One of the secondary hypotheses of the plan was children's total fruit intake. The decrease in children's fruit consumption remained statistically significant following Holm correction under baseline A (adjusted p = 0.014) in that analysis, which accounted for sex, age group and income rank, although not under baselines B and C. The hypothesis came from previously published statistics [16], so the microdata tested a prior lead rather than producing an independent finding. The analyses of eating place, fruit type and age group and the adjustment for single year of age were not specified in the plan and are therefore considered exploratory. Our survey-weighted estimates were consistent with the ten published annual mean fruit consumption estimates for the 1 to 9 age group within a margin of 0.05 g/day, and were based on the same number of children (Supplementary Note 1). The Research Ethics Review Committee of the Korea Disease Control and Prevention Agency approved KNHANES, and the 2015 to 2017 surveys were exempted from review under the Bioethics and Safety Act [31] (Supplementary Note 2). This secondary analysis used only de-identified public data. Data are available on the website of KNHANES (knhanes.kdca.go.kr) following registration, and the analysis code is available from the author upon request.

4. RESULTS

4.1 Children's Fruit Intake (RQ1)

Children's fruit intake was 151.2 g/day in 2022 to 2023 and 112.6 g/day in 2024, a fall of about a quarter (Table 1). Against baseline A the departure was −39.6 g/day (95% CI −63.7 to −15.4), and against baseline B it was −21.3 g/day (−42.0 to −0.5). Under baseline C it was −31.6 g/day, but the confidence interval was −64.4 to 1.2, which includes zero. Most of the decrease was in children eating less fruit, rather than none, as the share of children eating any fruit on the recall day barely changed (79.2% and 77.3%; −2.0 percentage points, −7.6 to 3.5). In the population as a whole, the level of intake in 2024 was 3% lower than

in 2022 to 2023 (128.8 g/day compared to 132.8 g/day), and the income gradient in fruit intake was not significantly different (Supplementary Note 3).

Much of this fall was in apples. There was a consistent decrease in children's apple consumption under the three baselines (13.6 to 16.2 g/day), which roughly halved from 33.4 to 17.0 g/day. The consumption of bananas remained at 10.9 g/day in both periods, while consumption of pear and tangerine and the imported fruits covered by the tariff cuts did not change significantly (Supplementary Table S3). The intake of fruit per 1,000 kcal was significantly reduced only under baseline A (from 101.0 to 79.1 g; −21.8 g, −38.1 to −5.6), and energy intake did not significantly change. Fibre from fruit fell by 0.86 g/day (−1.39 to −0.34), about 29% of the fibre that fruit provided in 2022 to 2023 (Supplementary Table S4).

4.2 Home and School or Childcare (RQ2)

The fall took place at home (Table 1 and Figure 1). The amount of fruit consumed at home decreased from 133.2 to 93.4 g/day, the lowest level in the 2016 to 2024 series. The departure was −40.9 g/day (−65.2 to −16.6) under baseline A, −24.7 g/day (−45.3 to −4.2) under B and −36.0 g/day (−68.9 to −3.1) under C. The home fall was therefore consistent and as much as the total fruit fall. Fruit eaten at school or childcare remained at approximately 15 g/day (14.9 and 15.3 g/day), with departures between +0.7 and +3.4 g/day, and all of their intervals included zero. The difference between home and school or childcare changed by −41.6 g/day (−67.2 to −16.0) under baseline A and was significant under all three baselines. The institutional measure does pick up change when it happens. The amount of fruit consumed in school or childcare dropped to 6.8 g/day in 2020, during the COVID-19 closures.

Table 1: Children's Fruit Intake in 2022 to 2023 and 2024, and the 2024 Departure from Three Baselines

Outcome	2022-2023 mean	2024 mean	A: 2022-2023 mean (main)	B: 2019-2022 mean	C: 2018-2022 trend
Fruit, all places (g/day)	151.2	112.6	−39.6 (−63.7 to −15.4)	−21.3 (−42.0 to −0.5)	−31.6 (−64.4 to 1.2)
Fruit at home (g/day)	133.2	93.4	−40.9 (−65.2 to −16.6)	−24.7 (−45.3 to −4.2)	−36.0 (−68.9 to −3.1)
Fruit at school or childcare (g/day)	14.9	15.3	+0.7 (−4.7 to 6.0)	+3.4 (−1.3 to 8.1)	+1.2 (−5.4 to 7.7)
Fruit elsewhere (g/day)	3.1	3.9	+0.7 (−3.5 to 4.8)	+0.1 (−3.9 to 4.0)	+3.2 (−2.0 to 8.5)
Home minus school or childcare (g/day)	118.2	78.1	−41.6 (−67.2 to −16.0)	−28.1 (−49.7 to −6.6)	−37.2 (−71.6 to −2.7)
Ate any fruit (%)	79.2	77.3	−2.0 (−7.6 to 3.5)	+0.6 (−4.6 to 5.8)	−1.3 (−9.4 to 6.7)
Ate any fruit at home (%)	62.8	54.6	−8.5 (−16.2 to −0.7)	−7.1 (−14.4 to 0.1)	−5.9 (−16.2 to 4.5)
Ate any fruit at school or childcare (%)	34.0	37.0	+3.5 (−5.0 to 12.1)	+7.5 (−0.4 to 15.4)	−2.1 (−13.0 to 8.8)
Apple, all places (g/day)	33.4	17.0	−16.2 (−26.3 to −6.2)	−13.6 (−22.3 to −4.9)	−15.5 (−30.7 to −0.3)
Apple at home (g/day)	29.6	14.6	−15.0 (−24.8 to −5.2)	−13.2 (−21.6 to −4.9)	−13.7 (−28.7 to 1.3)

Outcome	2022-2023 mean	2024 mean	A: 2022-2023 mean (main)	B: 2019-2022 mean	C: 2018-2022 trend
Banana, all places (g/day)	10.9	10.9	−0.2 (−5.1 to 4.6)	+2.2 (−2.0 to 6.3)	+4.7 (−1.3 to 10.6)
Fruit per 1,000 kcal (g)	101.0	79.1	−21.8 (−38.1 to −5.6)	−12.2 (−26.6 to 2.2)	−17.7 (−40.2 to 4.8)

Note: Children aged 1 to 9 (n = 913 in 2022 to 2023 and 415 in 2024). Means are survey-weighted. Departures are 2024 differences from each baseline with 95% CIs, from survey-weighted regressions adjusted for single year of age and sex; percentages are in percentage points. Eating-place outcomes use 2016 to 2024. Baseline D and alternative models are in Supplementary Table S2.

The percentage of children who ate any fruit at home decreased from 62.8% in 2022 to 2023 to 54.6% in 2024 (−8.5 percentage points, −16.2 to −0.7, under baseline A), but not significantly under B or C. There was no reduction in the proportion of those who ate fruit at school or childcare (34.0% and 37.0% respectively). The amount of apples consumed at home was significantly reduced (29.6 g/day to 14.6 g/day; −15.0 g/day, −24.8 to −5.2), accounting for more than a third of the fall at home, while the amount of apples consumed at school or childcare did not change significantly (3.6 and 2.4 g/day; Supplementary Table S3). Consequently, the percentage of children's fruit consumed in school or childcare rose from 9.9% to 13.6%, whilst that eaten at home decreased from 88.1% to 82.9%.

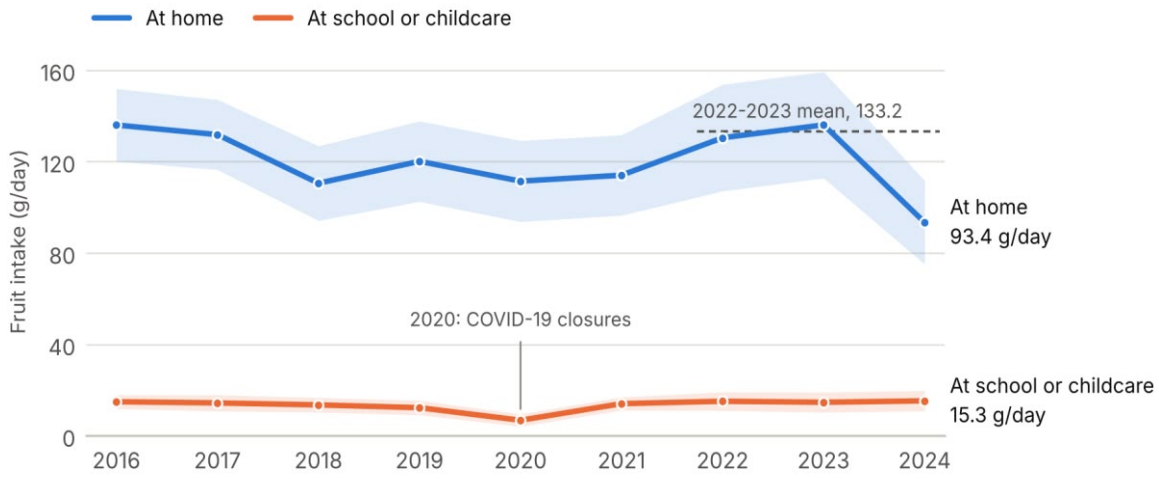


Figure 1: Fruit Intake of Children Aged 1 to 9 by Eating Place, 2016 to 2024

Survey-weighted means with 95% CIs. The dashed line is the 2022 to 2023 mean of fruit at home (baseline A). Fruit eaten elsewhere is not shown. Source: KNHANES microdata, author's estimates.

4.3 Age Groups (RQ3, Exploratory)

Children aged 1 to 5 years consumed 18.2 g/day of fruit at school or childcare compared with 12.1 g/day for children aged 6 to 9 years in 2022 to 2023 (Table 2). Fruit at home in the older group decreased from 139.6 g/day to 83.2 g/day and this decrease was seen for all three baselines (A: −56.9 g/day; B: −36.7 g/day; C: −58.1 g/day). There was no fall in fruit at school or childcare (12.1 and 16.3 g/day). As for the younger group, their fruit at home decreased from 125.5 to 107.2 g/day, although the confidence interval included zero under every baseline (−20.0 g/day, −54.5 to 14.5, under baseline A). With baseline A, the difference in the change at home between age groups was −36.8 g/day (−82.1 to 8.5), and this difference was not significant with any baseline. The fall at home was therefore more obvious in older children but the data do not show a true difference between the two age groups.

Table 2: Children's Fruit Intake by Age Group and Eating Place (Exploratory Analysis)

Group and outcome	2022-2023 mean	2024 mean	A: 2022-2023 mean (main)	B: 2019-2022 mean	C: 2018-2022 trend
Aged 1-5: fruit all places	147.6	123.3	−25.7 (−59.5 to 8.0)	−10.1 (−38.8 to 18.6)	−13.9 (−57.1 to 29.2)
Aged 1-5: fruit at home	125.5	107.2	−20.0 (−54.5 to 14.5)	−9.0 (−38.2 to 20.2)	−9.7 (−53.2 to 33.8)
Aged 1-5: fruit at school or childcare	18.2	14.1	−3.7 (−10.9 to 3.4)	+1.7 (−4.3 to 7.7)	−3.3 (−12.1 to 5.5)
Aged 6-9: fruit all places	154.1	104.7	−50.0 (−82.6 to −17.4)	−29.5 (−57.0 to −2.0)	−46.2 (−91.5 to −0.9)
Aged 6-9: fruit at home	139.6	83.2	−56.9 (−88.8 to −25.0)	−36.7 (−63.1 to −10.2)	−58.1 (−102.8 to −13.4)
Aged 6-9: fruit at school or childcare	12.1	16.3	+4.1 (−2.3 to 10.6)	+4.8 (−1.1 to 10.6)	+5.2 (−3.3 to 13.6)
Difference, 6-9 minus 1-5: all places			−24.2 (−69.8 to 21.5)	−19.3 (−57.5 to 19.0)	−32.3 (−92.1 to 27.5)
Difference, 6-9 minus 1-5: at home			−36.8 (−82.1 to 8.5)	−27.6 (−65.0 to 9.8)	−48.4 (−107.2 to 10.4)
Difference, 6-9 minus 1-5: at school or childcare			+7.9 (−0.6 to 16.5)	+3.1 (−4.0 to 10.2)	+8.5 (−2.7 to 19.7)

Note: Means and departures as in Table 1 (g/day). The difference rows are the interaction between 2024 and ages 6 to 9: a negative value means a larger fall among children aged 6 to 9. In 2024, n = 169 aged 1 to 5 and 246 aged 6 to 9.

4.4 Placebo Tests and Sensitivity Analyses

The reduction in children's intake of fruit at home was also much larger in 2024 than in previous years (Figure 2 and Supplementary Table S5). In the baseline A comparison, departures for fruit at home varied from −24.2 g/day in 2018 to +17.5 g/day in 2022 and the 2024 departure (−40.9 g/day) was a larger fall than all of them. Total fruit (−39.6 g/day against a range of −30.8 to +22.9) and apple (−16.2 against −6.0 to +6.9) showed the same pattern, while fruit at school or childcare (+0.7 g/day) stayed within its earlier range (−6.1 to +4.9). In the baseline B comparison, fruit at home (−24.7 g/day) and apple again exceeded any previous year, but total fruit did not (−21.3 g/day, compared with −37.5 g/day in 2020). In both comparisons the fall at home was larger than in all previous years for children aged 6 to 9. Among children aged 1 to 5, the fall at home did not clearly exceed earlier years (−20.0 g/day under baseline A, compared to a previous low of −18.0).

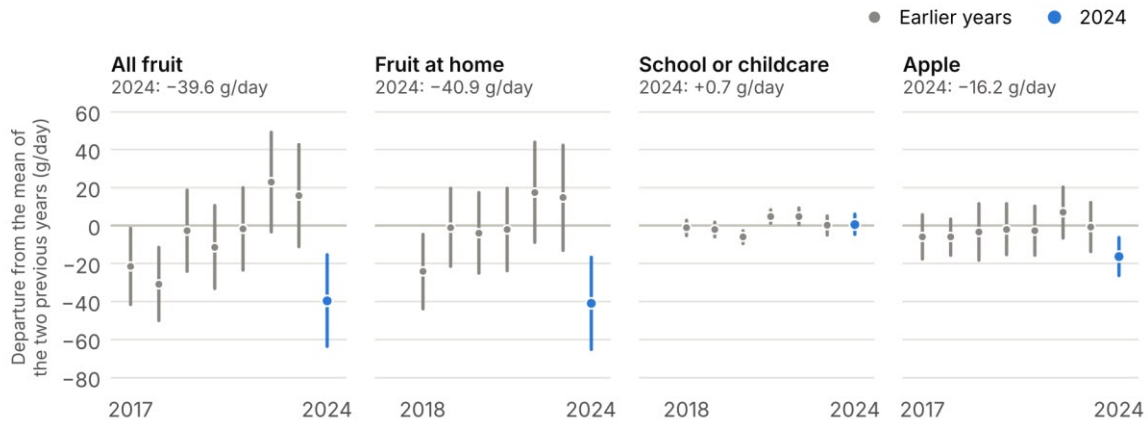


Figure 2: Placebo Tests: Each Year Compared with the Mean of the Two Preceding Years

Children aged 1 to 9. The baseline A comparison applied to each year, with 95% CIs, adjusted for single year of age and sex. All panels share one scale; eating-place panels start in 2018. Source: KNHANES microdata, author's estimates.

Changing the model did not greatly affect the home result (Supplementary Table S2). Under baseline A, the departure in fruit at home ranged from −39.8 to −41.6 g/day when the model was adjusted for sex only, when household income rank was added and when the recalled weekday was added. Leaving out 2020 and 2021 gave −31.2 g/day under baseline B and −46.4 g/day under baseline C. Baseline D, which did not fit the pre-shock level, gave −17.2 g/day (−44.3 to 9.9). There were insufficient data for a meaningful comparison by food sufficiency in 2024 as only 65 children from households with food constraints were surveyed (Supplementary Table S6).

5. DISCUSSION

5.1 Interpreting the Results

Children aged 1 to 9 consumed approximately 25% less fruit than in 2022 to 2023 during Korea's 2024 fruit price shock, and the fall happened at home. Fruit consumption at school or childcare held steady, whilst the drop in home consumption was greater than the departure in any of the six previous years we tested. Fewer children ate fruit at home and those who did ate less fruit at home, but the percentage of children who ate any fruit at all hardly changed. When children and the population as a whole were compared, the former's consumption declined 26%, whereas the latter's did by 3%, so the population average hides a large change among children.

We would expect this pattern as a result of the difference between the two settings in Section 2.2. Households are provided with price information immediately, and there is a degree of flexibility in changing the food bought from week to week, while institutional menus and budgets are predetermined [13, 14]. Apples accounted for over one third of the fall at home, and there was no way to replace apples with imports [1]. In institutions, total fruit consumption held steady and apple consumption changed little (3.6 and 2.4 g/day). This is in line with menus where the amount of fruit was not changed, but fewer apples were offered, and one childcare centre reported reducing the number of apples served to meet its snack budget [24]. Children did not change to bananas either. Banana consumption remained unchanged in their group, but increased by 1.9 to 3.9 g/day in the population as a whole at this time, when bananas were more affordable [6] (Supplementary Note 3). A possible reason is that young children eat the fruit that adults prepare for them [11]. Households might have reduced their allocation of apples to children if they were higher in price, but not necessarily replaced them with some other fruit. These explanations are interpretations and not findings, as our data indicate where the fall occurred but not why.

This is akin to the Indonesian experience during the 1997 to 1998 crisis, when households managed to protect children's energy consumption while reducing intake of higher-quality foods [19]. In Korea, also, the energy intake of children was not significantly different, while fruit intake, a food that is easy to cut back on, was down. This study was different from purchase surveys [15, 21] in that it measured the amount of food consumed and the location of eating. An assessment of the size of the fall was also affected by the comparison. The fall in fruit at home was estimated at 40.9 g/day against 2022 to 2023 and 24.7 g/day against 2019 to 2022, indicating that use of only one comparison year [29] can yield a different conclusion.

5.2 Policy Implications (RQ4)

The findings have three implications for policy, but each of these needs to be evaluated. First, the fruit provided in childcare and in schools was more stable during the shock than fruit at home, which suggests that serving fruit through these settings may help buffer children's exposure to market shocks when fruit

prices go up. This can only go so far, however. In 2022 to 2023, only 9.9% of children's fruit was being provided in school or childcare, which means that even if this supply was fully protected, the large drop in fruit at home would not be offset. That share could be increased by providing fruit as a regular snack, as well as at lunch. In Norway, children at schools that gave out free fruit ate about 25% more fruit than children at schools without a scheme [25]. The revived fruit snack programme for first and second graders in Korea [26, 27] might be assessed in the same manner, such as using the eating-place data of KNHANES from 2026 onwards.

Second, if institutional food budgets follow past inflation, as proposed for childcare [14], institutional providers have to absorb sudden rises in the price of fruit and provide less fruit or cheaper fruit [24]. In a fruit price shock, a rule of raising fruit allowances as prices rise, such as the 18% hike in one province in 2024 [24], may help to maintain portions during a price shock.

Third, school-age children may require special consideration. There was a smaller amount of fruit eaten at school by children aged 6 to 9 than by younger children in childcare in 2022 to 2023 and the fall at home was more obvious, but the difference between age groups in the fall at home was not statistically significant. The national fruit snack programme for primary school children had already terminated prior to the shock [27] and the 2026 programme is only for the first two grades [26]. This study may raise questions about the need for the same type of support for older children in primary school but cannot answer them.

5.3 Limitations

The major drawback is that only one shock year is available. The results reflect changes in children's intake of fruit over the course of the shock, rather than the cause of the change, as other changes in 2024 (such as general food inflation and the tariff cuts themselves) cannot be separated out. The survey month was not included in the public files, so we were not able to link month of intake with the monthly price or compare the months prior to and following the 2024 harvest, which produced 10.4% more apples and pears than 2023 [35]. The change made in 2022 in the interview setting and the recall day, and the shift in recalled weekdays from 2021, may impact on comparisons across 2022. Baseline A does not include the change in 2022, and its estimated falls might be smaller because the shock might already have been included in that baseline. A single 24-hour recall refers to average group behaviours rather than to individual behaviours. For younger children, it is dependent on what parents or caregivers can tell the interviewers, and food consumed away from home, such as at school or childcare, may be reported less fully than food consumed at home, although the school or childcare measure did detect the 2020 closures. The eating-place code does not make a distinction between schools, kindergartens and childcare centres. The sample size for the children was also quite small (415 children in 2024), there were many outcomes analysed and the analyses by eating place, fruit type and age group were not pre-specified. For these reasons, we have focussed on the results that were consistent across baselines and which were prominent in the placebo tests. Last, price levels are based on official statistics as reported in the press, not on item-level price series.

6. CONCLUSION

Children aged 1 to 9 consumed approximately a quarter less fruit in 2024 (the year of the fruit price shock in Korea) than in 2022 to 2023 (RQ1). The fall was at home and was larger than in previous years, and fruit consumption at school or childcare remained at about 15 g/day (RQ2). The fall in children's intake was mostly due to a decrease in the amount of fruit they consumed rather than to children eating none, and apples accounted for a large proportion of the fall, while, unlike the population as a whole, children did not consume more bananas. In an exploratory comparison, the fall at home was more pronounced in children aged 6 to 9, who received less fruit in institutions than younger children in 2022 to 2023, but the difference between age groups was not significant (RQ3). The results indicate a change in children's consumption during the shock. They do not indicate that prices led to the change.

For policy (RQ4), the findings indicate that when prices increase, fruit in childcare and schools can help to keep part of children's diets stable, but institutions provide too small a portion of children's fruit intake to compensate for a large decline at home. That buffer would be enhanced by regular fruit snacks in these settings, as well as by budgets that adjust when there is a spike in fruit prices.

This could be followed up in four ways. Fruit consumption in children will be reported in the 2025 KNHANES microdata, due to be released in December 2026 [36], which will indicate if children's fruit consumption recovered following the 2024 harvest. A comparison of years would provide a less direct test of price effects than would the linking of the survey dates in the research-use files to monthly fruit prices. The fruit snack programme that re-started in 2026 could be assessed using eating-place data, to see if the programme has an impact on children's fruit consumption at home as well as at school. Finally, institutional menus and budgets for snacks would indicate whether or not childcare centres and schools maintained fruit on their menus during the shock, something that survey data cannot reveal.

ACKNOWLEDGMENTS

The author thanks the Korea Disease Control and Prevention Agency and the KNHANES participants for the data. This research received no funding, and the author has no competing interests.

Author contribution and use of AI tools. The author chose the topic, downloaded the data, wrote the manuscript and is responsible for the paper. Claude (Anthropic), an AI system, generated the figures at the author's request and checked the statistics reported in the text against the data and the cited sources so that none were misstated. The author reviewed every figure and correction before including it in the paper.

REFERENCES

[1]. S. Choi, "Korea's apple update," USDA Foreign Agricultural Service, Seoul, GAIN Rep. KS2023-0022, Dec. 21, 2023. [Online]. Available: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Korea's+Apple+Update_Seoul_Korea+-+Republic+of_KS2023-0022.pdf

[2]. USDA Foreign Agricultural Service, "South Korea: fresh deciduous fruit annual," GAIN Rep. KS2023-0021, 2023. [Online]. Available: https://www.fas.usda.gov/data/south-korea-fresh-deciduous-fruit-annual-6

[3]. Newsis, "Consumer prices in January 2024" (in Korean), Feb. 2, 2024. [Online]. Available: https://www.newsis.com/view/NISX20240130_0002610288

[4]. Newsis, "Consumer prices in February 2024" (in Korean), Mar. 7, 2024. [Online]. Available: https://www.newsis.com/view/NISX20240306_0002650761

[5]. Aju Business Daily, "Consumer prices in March 2024" (in Korean), Apr. 2, 2024. [Online]. Available: https://www.ajunews.com/view/20240402082730690

[6]. Hankyung Business, "Consumer prices in April 2024" (in Korean), May 2, 2024. [Online]. Available: https://magazine.hankyung.com/business/article/202405020985b

[7]. Jaegyeong Ilbo, "Consumer prices in 2024" (in Korean), Dec. 31, 2024. [Online]. Available: https://news.jkn.co.kr/post/850278

[8]. Jeonbuk Ilbo, "Tariff-free quotas for imported fruit" (in Korean), Mar. 18, 2024. [Online]. Available: https://www.jjan.kr/article/20240318580262

[9]. World Health Organization, "WHO updates guidelines on fats and carbohydrates," News release, Jul. 17, 2023. [Online]. Available: https://www.who.int/news/item/17-07-2023-who-updates-guidelines-on-fats-and-carbohydrates

[10]. H.-J. Brinkman, S. de Pee, I. Sanogo, L. Subran, and M. W. Bloem, "High food prices and the global financial crisis have reduced access to nutritious food and worsened nutritional status and health," *J. Nutr.*, vol. 140, no. 1, pp. 153S-161S, 2010.

[11]. H. Patrick and T. A. Nicklas, "A review of family and social determinants of children's eating patterns and diet quality," *J. Am. Coll. Nutr.*, vol. 24, no. 2, pp. 83-92, 2005.

[12]. V. Mikkilä, L. Räsänen, O. T. Raitakari, P. Pietinen, and J. Viikari, "Consistent dietary patterns identified from childhood to adulthood: the Cardiovascular Risk in Young Finns Study," *Br. J. Nutr.*, vol. 93, no. 6, pp. 923-931, 2005, doi: 10.1079/BJN20051418.

[13]. S. I. Won, "Investigation of facility directors and parents' awareness of some childcare center meal service in Chungcheongnam-do," *J. FoodService Safety*, vol. 4, no. 1, pp. 29-34, 2023 (in Korean), doi: 10.22960/JFSS.2023.4.29.

[14]. Newsis, "Standard childcare cost last year 760,000 won, up 21% from three years earlier" (in Korean), Mar. 30, 2023. [Online]. Available: https://www.newsis.com/view/NISX20230330_0002248003

[15]. Pressian, "Real income falls by the most in seven years in the first quarter as high prices continue" (in Korean), May 23, 2024. Reporting Statistics Korea's Household Income and Expenditure Survey. [Online]. Available: https://pressian.com/pages/articles/2024052314430090705

[16]. Korea Disease Control and Prevention Agency, *Korea Health Statistics 2024*, ch. 9, Food intake, trend tables 9-9 and 9-11, Dec. 31, 2025. [Online]. Available: https://www.korea.kr/briefing/pressReleaseView.do?newsId=156737607

[17]. T. Andreyeva, M. W. Long, and K. D. Brownell, "The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food," *Am. J. Public Health*, vol. 100, no. 2, pp. 216-222, 2010.

[18]. R. Green, L. Cornelsen, A. D. Dangour, R. Turner, B. Shankar, M. Mazzocchi, et al., "The effect of rising food prices on food consumption: systematic review with meta-regression," *BMJ*, vol. 346, Art. no. f3703, 2013.

[19]. S. A. Block, L. Kiess, P. Webb, S. Kosen, R. Moench-Pfanner, M. W. Bloem, et al., "Macro shocks and micro outcomes: child nutrition during Indonesia's crisis," *Econ. Hum. Biol.*, vol. 2, no. 1, pp. 21-44, 2004.

[20]. R. Sturm and A. Datar, "Body mass index in elementary school children, metropolitan area food prices and food outlet density," *Public Health*, vol. 119, no. 12, pp. 1059-1068, 2005.

[21]. The Food Foundation, "Families stuck in food insecurity are buying less fruit and veg," Press release, Feb. 27, 2024. [Online]. Available: https://foodfoundation.org.uk/press-release/families-stuck-food-insecurity-are-buying-less-fruit-and-veg-uks-health-divide-widens

[22]. R. Griffith, M. O'Connell, and K. Smith, "Shopping around: how households adjusted food spending over the Great Recession," *Economica*, vol. 83, no. 330, pp. 247-280, 2016, doi: 10.1111/ecca.12166.

[23]. T. L. Ásgeirsdóttir, H. Corman, K. Noonan, Þ. Ólafsdóttir, and N. E. Reichman, "Was the economic crisis of 2008 good for Icelanders? Impact on health behaviors," *Econ. Hum. Biol.*, vol. 13, pp. 1-19, 2014.

[24]. Herald Economy, "Apples disappear from daycare centres and fruit replaces flowers as gifts: fruit prices change how people buy" (in Korean), Apr. 4, 2024. [Online]. Available: https://www.heraldk.com/article/2024040416002637976

[25]. A. Øvrum and E. Bere, "Evaluating free school fruit: results from a natural experiment in Norway with representative data," *Public Health Nutr.*, vol. 17, no. 6, pp. 1224-1231, 2014, doi: 10.1017/S1368980013002504.

[26]. Kyeonggi Ilbo, "Government resumes fruit snacks for first and second graders, covering about 600,000 children" (in Korean), Mar. 9, 2026. [Online]. Available: https://www.kyeonggi.com/article/20260309580121

[27]. Financial News, "Cup fruit snacks for primary school pupils to resume next year, covering 600,000 first and second graders" (in Korean), Aug. 26, 2025. [Online]. Available: https://www.fnnews.com/news/202508260530566453

[28]. S. Y. Kim, J. H. Freeland-Graves, and H. J. Kim, "Twenty-year trends in vegetable consumption by preparation method and eating location for Korean population from 1998 to 2017," *Br. J. Nutr.*, vol. 126, no. 5, pp. 747-756, 2021.

[29]. K. Oh, S. Park, S. Park, S. Yun, H. Choi, and E. K. Jeong, "Changes in food and nutrient intakes in Korean adults before and during the COVID-19 pandemic: data from the 2011-2020 Korea National Health and Nutrition Examination Survey," *Epidemiol. Health*, vol. 45, 2023.

[30]. J. L. Bernal, S. Cummins, and A. Gasparrini, "Interrupted time series regression for the evaluation of public health interventions: a tutorial," *Int. J. Epidemiol.*, vol. 46, no. 1, pp. 348-355, 2017.

[31]. Korea Disease Control and Prevention Agency, *Korea National Health and Nutrition Examination Survey Raw Data User Guides*, 6th (2013-2015), 7th (2016-2018), 8th (2019-2021) and 9th (2022-2024) cycles.

[32]. S. Kweon, Y. Kim, M. J. Jang, Y. Kim, K. Kim, S. Choi, et al., "Data resource profile: the Korea National Health and Nutrition Examination Survey (KNHANES)," *Int. J. Epidemiol.*, vol. 43, no. 1, pp. 69-77, 2014.

[33]. E. von Elm, D. G. Altman, M. Egger, S. J. Pocock, P. C. Gøtzsche, and J. P. Vandenbroucke, "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies," *Lancet*, vol. 370, no. 9596, pp. 1453-1457, 2007.

[34]. C. Lachat, D. Hawwash, M. C. Ocké, C. Berg, E. Forsum, A. Hörnell, et al., "Strengthening the Reporting of Observational Studies in Epidemiology-Nutritional Epidemiology (STROBE-nut): an extension of the STROBE statement," *PLoS Med.*, vol. 13, no. 6, Art. no. e1002036, 2016.

[35]. Ministry of Agriculture, Food and Rural Affairs, "Apple and pear production in 2024 up 10.4% on the previous year" (in Korean), Press release, Dec. 23, 2024. [Online]. Available: https://www.mafra.go.kr/bbs/home/792/583978/download.do

[36]. Diplomacy Journal, "Korea Disease Control and Prevention Agency announces results of the 2025 Korea National Health and Nutrition Examination Survey" (in Korean), Sep. 30, 2026. [Online]. Available: https://www.djournal.co.kr/news/article.html?no=120849

[37]. J. P. Mackenbach and A. E. Kunst, "Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe," *Soc. Sci. Med.*, vol. 44, no. 6, pp. 757-771, 1997.

Appendix: Supplementary Material

Section, table and figure numbers without the prefix S refer to the main text.

Supplementary Note 1: Data Processing and Checks

Before the analysis, our survey-weighted estimates were checked against the published annual means. For children aged 1 to 9, the ten published fruit means for 2015 to 2024 were reproduced to within 0.05 g/day, with the same sample sizes in every year [16]; for the whole population, all 150 published fruit means by year, income quintile and age group were reproduced to within 0.3 g/day. The analysis code was first run on simulated data with planted effects, and the variance estimator was checked against published standard errors. Analyses were done in Python 3 with pandas, NumPy and SciPy.

The eating-place variable records where each food was eaten, and its codes distinguish home, school or workplace meals, elderly centres, restaurants and other places. The codes were the same from 2016 to 2024 but differed in 2015, so eating-place analyses use 2016 to 2024 [31]. The codebook has no separate code for childcare. For children aged 1 to 5, however, at least 96% of food items recorded as group catering were coded as eaten at school or workplace in every year, so for children this code covers childcare centres and kindergartens as well as schools. In the main text it is called school or childcare.

The recalled day is the day before the interview until 2021 and the day two days before the interview from 2022 [31]. Table S1 shows that Fridays and Saturdays made up 26.1% to 31.1% of children's recall days in 2015 to 2020 but 6.4% or less from 2021, so a sensitivity analysis adjusted for the recalled weekday (Table S2). From 2022, a single food composition database (the 10th revision of the national standard table) was used for all three years of the survey cycle [31]. Food composition affects nutrient estimates but not the weight of food eaten, so nutrients are compared only within 2022 to 2024 (Table S4). Dietary supplements were not included.

Supplementary Note 2: Ethics Approvals

KNHANES was approved by the Research Ethics Review Committee of the Korea Disease Control and Prevention Agency (2018-01-03-P-A for 2018, 2018-01-03-C-A for 2019, 2018-01-03-2C-A for 2020, 2018-01-03-5C-A for 2021, 2018-01-03-4C-A for 2022, 2022-11-16-R-A for 2023 and 2022-11-16-R-03 for 2024). The 2015 to 2017 surveys were carried out without review because they qualified as research conducted by the government for public welfare under the Bioethics and Safety Act [31]. Survey procedures, including consent, are described in the survey documentation [31, 32].

Supplementary Note 3: Whole-Population Context

For context, Table S7 reports the same comparisons for the whole population aged 1 year and over, from the wider analysis of which this article is part. These models adjusted for sex and age group and included household income rank and its interaction with 2024, so level departures are estimated at the middle of the income distribution. Total fruit intake changed little, apple intake fell and banana intake rose under all three baselines, and the slope index of inequality (SII), the difference in fruit intake between the top and the bottom of the income distribution [37], did not depart from any baseline. Children's intake therefore fell much more than the population average, and unlike the population as a whole, children did not eat more bananas.

Supplementary Tables

Table S1: Children Aged 1 to 9 by Survey Year: Sample Sizes, Age Composition and Recalled Weekday

Year	Aged 1-9, n	Aged 1-5, n	Aged 6-9, n	Aged 1-5, % of 1-9	Friday or Saturday recalled, %	Sunday recalled, %
2015	641	346	295	55.9	30.9	16.5
2016	934	528	406	55.4	31.1	16.7

Year	Aged 1-9, n	Aged 1-5, n	Aged 6-9, n	Aged 1-5, % of 1-9	Friday or Saturday recalled, %	Sunday recalled, %
2017	812	435	377	55.2	28.5	14.7
2018	756	418	338	54.6	26.1	14.3
2019	736	357	379	50.6	28.1	11.8
2020	535	274	261	50.6	28.9	20.1
2021	483	227	256	51.4	1.2	17.6
2022	445	197	248	45.4	1.6	14.6
2023	468	216	252	46.1	3.3	23.3
2024	415	169	246	42.5	6.4	20.3
Total	6,225	3,167	3,058			

Note: Participant numbers are unweighted; percentages are survey-weighted. Recalled weekday is the day of the week whose food intake was recalled.

Table S2: Departure of Children's Fruit Intake in 2024 under Alternative Models and Baseline D

Model and outcome	A: 2022-2023 mean	B: 2019-2022 mean	C: 2018-2022 trend	D: 2015-2022 trend
Main model (single year of age and sex): fruit all places	−39.6 (−63.7 to −15.4)	−21.3 (−42.0 to −0.5)	−31.6 (−64.4 to 1.2)	+3.9 (−22.3 to 30.1)
Main model (single year of age and sex): fruit at home	−40.9 (−65.2 to −16.6)	−24.7 (−45.3 to −4.2)	−36.0 (−68.9 to −3.1)	−17.2 (−44.3 to 9.9)
Main model (single year of age and sex): fruit at school or childcare	+0.7 (−4.7 to 6.0)	+3.4 (−1.3 to 8.1)	+1.2 (−5.4 to 7.7)	+3.8 (−1.9 to 9.5)
Sex only: fruit all places	−38.5 (−63.1 to −14.0)	−22.0 (−42.8 to −1.2)	−32.4 (−65.2 to 0.5)	+3.2 (−23.1 to 29.4)
Sex only: fruit at home	−39.8 (−64.4 to −15.1)	−25.4 (−46.0 to −4.7)	−36.9 (−69.8 to −3.9)	−18.2 (−45.3 to 8.9)

Model and outcome	A: 2022-2023 mean	B: 2019-2022 mean	C: 2018-2022 trend	D: 2015-2022 trend
Sex only: fruit at school or childcare	+0.4 (−4.9 to 5.7)	+3.3 (−1.4 to 8.0)	+1.3 (−5.3 to 7.8)	+3.8 (−1.9 to 9.4)
Adding household income rank: fruit all places	−39.0 (−63.2 to −14.9)	−20.8 (−41.5 to −0.1)	−30.8 (−63.4 to 1.7)	+3.9 (−22.2 to 30.0)
Adding household income rank: fruit at home	−40.5 (−64.8 to −16.2)	−24.3 (−45.0 to −3.7)	−35.4 (−68.1 to −2.6)	−16.9 (−43.9 to 10.1)
Adding household income rank: fruit at school or childcare	+0.7 (−4.6 to 6.1)	+3.5 (−1.2 to 8.2)	+1.2 (−5.3 to 7.8)	+3.9 (−1.8 to 9.6)
Adding recalled weekday: fruit all places	−39.3 (−63.9 to −14.8)	−21.1 (−42.2 to −0.1)	−33.5 (−66.6 to −0.4)	+3.1 (−23.3 to 29.4)
Adding recalled weekday: fruit at home	−41.6 (−66.1 to −17.0)	−24.2 (−45.1 to −3.2)	−39.3 (−72.3 to −6.3)	−19.4 (−46.4 to 7.7)
Adding recalled weekday: fruit at school or childcare	+1.6 (−3.2 to 6.4)	+3.2 (−1.0 to 7.4)	+3.1 (−3.0 to 9.1)	+5.4 (0.3 to 10.6)
Excluding 2020 and 2021: fruit all places	Not applicable	−30.6 (−53.8 to −7.4)	−45.7 (−85.6 to −5.9)	−5.5 (−37.2 to 26.2)
Excluding 2020 and 2021: fruit at home	Not applicable	−31.2 (−54.1 to −8.4)	−46.4 (−86.3 to −6.6)	−26.5 (−59.8 to 6.7)
Excluding 2020 and 2021: fruit at school or childcare	Not applicable	+1.8 (−3.3 to 6.9)	−0.6 (−8.2 to 7.0)	+1.4 (−5.2 to 8.0)

Note: Departures in g/day with 95% CIs, children aged 1 to 9. Baseline D (the 2015 to 2022 trend named in the analysis plan) does not fit the pre-shock level (Section 3.4), so its estimates are not interpreted. Baseline A contains no 2020 or 2021 data, so the exclusion does not apply to it. Household income rank is the midpoint of the published household income quintile (0.1 to 0.9).

Table S3: Additional Outcomes for Children Aged 1 to 9 and by Age Group

Outcome	2022-2023 mean	2024 mean	A: 2022-2023 mean (main)	B: 2019-2022 mean	C: 2018-2022 trend
Apple at school or childcare (g/day)	3.6	2.4	−1.0 (−3.4 to 1.3)	+0.0 (−2.0 to 2.1)	−1.6 (−4.8 to 1.6)

Outcome	2022-2023 mean	2024 mean	A: 2022-2023 mean (main)	B: 2019-2022 mean	C: 2018-2022 trend
Banana at home (g/day)	8.1	8.1	−0.2 (−4.6 to 4.1)	+1.2 (−2.6 to 5.1)	+2.8 (−2.7 to 8.3)
Banana at school or childcare (g/day)	2.7	2.5	−0.2 (−2.2 to 1.8)	+0.8 (−0.9 to 2.5)	+1.3 (−1.3 to 3.8)
Pear and tangerine (g/day)	31.7	24.9	−6.9 (−19.6 to 5.8)	−1.4 (−12.1 to 9.3)	+4.1 (−12.3 to 20.6)
Imported fruits covered by tariff cuts (g/day)	20.0	19.7	−0.7 (−8.7 to 7.2)	+3.9 (−2.7 to 10.5)	+2.6 (−7.9 to 13.1)
Vegetables other than kimchi (g/day)	81.0	74.9	−6.7 (−16.8 to 3.3)	−7.8 (−16.9 to 1.2)	−9.0 (−23.1 to 5.1)
Fruit juice (g/day)	31.7	34.2	+3.4 (−10.0 to 16.7)	+3.5 (−8.5 to 15.5)	+5.4 (−10.0 to 20.8)
Energy (kcal/day)	1541.6	1501.8	−53.0 (−123.9 to 17.8)	−19.4 (−86.6 to 47.8)	−55.2 (−144.8 to 34.5)
Aged 1-5: apple (g/day)	36.2	19.5	−16.6 (−32.1 to −1.2)	−13.1 (−26.1 to −0.1)	−18.1 (−39.3 to 3.2)
Aged 1-5: apple at home (g/day)	31.4	16.1	−15.4 (−29.9 to −0.9)	−12.8 (−24.3 to −1.2)	−16.1 (−36.6 to 4.4)
Aged 1-5: fruit per 1,000 kcal (g)	115.5	101.7	−15.4 (−42.2 to 11.5)	−4.4 (−27.9 to 19.1)	−6.3 (−41.4 to 28.8)
Aged 1-5: ate any fruit at home (%)	65.8	57.2	−9.3 (−20.0 to 1.4)	−8.5 (−18.2 to 1.2)	−4.9 (−19.1 to 9.3)
Aged 6-9: apple (g/day)	31.1	15.2	−15.9 (−28.3 to −3.5)	−13.6 (−23.7 to −3.5)	−12.7 (−32.6 to 7.2)
Aged 6-9: apple at home (g/day)	28.1	13.4	−14.7 (−26.8 to −2.5)	−13.3 (−23.2 to −3.3)	−11.2 (−30.4 to 8.0)
Aged 6-9: fruit per 1,000 kcal (g)	88.8	62.4	−26.7 (−44.6 to −8.9)	−17.9 (−33.4 to −2.4)	−27.0 (−52.8 to −1.1)
Aged 6-9: ate any fruit at home (%)	60.4	52.6	−7.8 (−17.4 to 1.8)	−6.1 (−14.8 to 2.6)	−7.2 (−20.1 to 5.8)

Note: Means and departures as in Table 1. Imported fruits covered by tariff cuts: banana, pineapple, mango, orange, grapefruit and avocado. Percentages are in percentage points.

Table S4: Nutrients Supplied by Fruit, Children Aged 1 to 9, 2022 to 2024

Nutrient	2022-2023 mean	2024 mean	A: 2022-2023 mean
Vitamin C from fruit (mg/day)	28.5	26.8	−2.3 (−11.5 to 6.8)
Dietary fibre from fruit (g/day)	2.97	2.12	−0.86 (−1.39 to −0.34)
Dietary fibre, all foods (g/day)	14.79	13.64	−1.24 (−2.32 to −0.15)
Potassium from fruit (mg/day)	251.5	199.6	−54.2 (−96.9 to −11.6)

Note: Baseline A only, because a single food composition database was used from 2022 (Supplementary Note 1). Departures with 95% CIs, adjusted for single year of age and sex.

Table S5: Placebo Tests: Departure of Each Year from Its Own Baseline (g/day)

Comparison and outcome	2017	2018	2019	2020	2021	2022	2023	2024
A: Aged 1-9: fruit, all places	−21.4	−30.8	−2.7	−11.3	−1.6	+22.9	+15.8	−39.6
A: Aged 1-9: fruit at home		−24.2	−1.0	−3.8	−2.0	+17.5	+14.7	−40.9
A: Aged 1-9: fruit at school or childcare		−1.2	−1.9	−6.1	+4.6	+4.9	+0.2	+0.7
A: Aged 1-9: apple	−5.9	−6.0	−3.3	−1.9	−2.7	+6.9	−0.7	−16.2
A: Aged 1-5: fruit at home		−18.0	+4.6	−9.1	−7.1	+14.5	+13.7	−20.0
A: Aged 6-9: fruit at home		−31.7	−6.9	+1.8	+3.2	+20.7	+16.0	−56.9
B: Aged 1-9: fruit, all places				−37.5	−17.6	+11.5	+24.3	−21.3
B: Aged 1-9: fruit at home					−11.5	+11.0	+22.3	−24.7
B: Aged 1-9: fruit at school or childcare					+0.4	+3.3	+3.1	+3.4
B: Aged 1-9: apple				−10.0	−6.2	+2.1	+1.1	−13.6

Comparison and outcome	2017	2018	2019	2020	2021	2022	2023	2024
B: Aged 1-5: fruit at home					−14.6	+4.4	+13.8	−9.0
B: Aged 6-9: fruit at home					−8.2	+17.1	+29.9	−36.7

Note: For each year T, A compares T with the mean of T−2 and T−1, and B compares T with the mean of T−5 to T−2, using the main model. Blank cells could not be estimated because their baseline years fall before 2015 (before 2016 for eating-place outcomes). Figure 2 shows the A estimates for children aged 1 to 9 with 95% CIs.

Table S6: Difference in the 2024 Departure by Household Food Sufficiency, Children Aged 1 to 9

Outcome	A: 2022-2023 mean	B: 2019-2022 mean	C: 2018-2022 trend	D: 2015-2022 trend
Fruit all places: constrained minus enough	+9.2 (−51.6 to 70.0)	+2.9 (−49.1 to 55.0)	−20.6 (−112.7 to 71.6)	+26.8 (−36.9 to 90.4)
Fruit at home: constrained minus enough	−7.9 (−67.7 to 51.9)	−9.6 (−60.7 to 41.5)	−38.4 (−128.7 to 52.0)	+6.5 (−57.9 to 70.8)
Fruit at school or childcare: constrained minus enough	+13.6 (−0.7 to 27.9)	+12.1 (−1.3 to 25.5)	+15.8 (−2.0 to 33.7)	+13.0 (−1.9 to 27.9)

Note: Children in households that could not always eat enough food or a variety of foods in the past year, minus children in households with enough food and a variety of foods (g/day, 95% CIs). Only 65 children in food-constrained households were surveyed in 2024. Food sufficiency is missing for 2018.

Table S7: Whole Population Aged 1 Year and Over: Fruit Intake and the 2024 Departure from Three Baselines

Outcome	2022-2023 mean	2024 mean	A: 2022-2023 mean (main)	B: 2019-2022 mean	C: 2018-2022 trend
Fruit (g/day)	132.8	128.8	−4.7 (−13.7 to 4.3)	−8.9 (−17.2 to −0.6)	+1.8 (−10.3 to 13.9)
Ate any fruit (%)	62.4	62.2	−0.1 (−2.1 to 1.8)	−0.3 (−2.1 to 1.5)	+2.8 (−0.2 to 5.7)
Apple (g/day)	43.9	35.7	−8.7 (−13.4 to −4.1)	−5.9 (−9.8 to −1.9)	−7.5 (−14.1 to −0.8)
Banana (g/day)	8.7	10.8	+2.2 (0.5 to 3.8)	+1.9 (0.3 to 3.4)	+3.9 (1.7 to 6.2)
Income gradient in fruit intake (SII, g/day)			−3.5 (−31.8 to 24.7)	−11.5 (−37.4 to 14.5)	+13.4 (−25.1 to 51.8)

Note: Models adjusted for sex and age group and included household income rank and its interaction with 2024; level departures are at the middle of the income distribution. SII: slope index of inequality; a positive value means a wider income gap. Percentages are in percentage points.