The Share of 12-Year-Olds with Caries Fell from 53.21% in 2008 to 23.09% in 2025, and Decayed, Missing, or Filled Permanent Teeth per Child Fell from 1.54 to 0.47 — Of the Fall in Teeth (−1.187 in Logarithms), 0.70 Is Fewer Children with Caries and 0.30 Is Fewer Teeth per Child with Caries (2.894 → 2.036), So Caries Gathered in Fewer Children, but Those Children Also Have Fewer Teeth Affected [M105]

Ratio of teeth = ratio of the share with caries × ratio of teeth per child with caries ── What separates them is whether you count children (the share with caries) or teeth (the number per child)

Yuuki YAMAGISHI (山岸 勇輝) ／ Independent Researcher
ORCID 0009-0006-8587-3450
September 2026 ／ CC BY 4.0

Abstract

Using the Ministry of Education, Culture, Sports, Science and Technology's School Health Statistics Survey (yearly statistics Table 15, disease and abnormality rates by school type, school years 1948–2025; tables by age, 2008–2025), this paper looked at the yearly shape of caries (tooth decay) in children. Caries is counted in two ways: the share of children who have it and the number of teeth per child. It asks whether the number of teeth fell because fewer children had caries or because those who had it had fewer teeth affected. No new mathematical theorem and no new law are claimed.

First, **the share of children with caries was highest in 1970 in kindergarten (95.40%), 1979 in elementary school (94.76%), 1979 in junior high school (94.52%), and 1980 in senior high school (95.90%); in 2025 it was 19.44%, 30.83%, 25.23%, and 32.77%. It first fell below 50% in 2009, 2016, 2011, and 2016** (Section 4).

Second, this is the core of the paper. **Decayed, missing, or filled permanent teeth per child at age 12 fell from 1.54 in 2008 to 0.47 in 2025 (0.305 times; −1.187 in logarithms), and the share with caries fell from 53.21% to 23.09% (0.434 times; −0.835). Of the fall in teeth, 0.70 is fewer children with caries and 0.30 is fewer teeth per child with caries (2.894 → 2.036, 0.703 times). Teeth per child with caries fell between every pair of adjacent years among the 14 comparable years** (Section 5).

Third, **"caries has gathered in fewer children" splits into two meanings. In the sense that a smaller share of children hold the affected teeth, it holds (53.21% → 23.09% at age 12). In the sense that each child with caries has more teeth affected, it does not; the number fell** (Section 5).

Fourth, **among children with caries, the share whose treatment was complete rose from 1949 to 2025: 0.029 → 0.489 in elementary school, 0.115 → 0.601 in junior high, and 0.265 → 0.632 in senior high** (Section 4).

Fifth, **by age, in 2008, 2019, and 2025 alike, the share with caries is high at 8–9, and among ages 9–17 it is lowest at 12 (in 2025, 36.82% at 9, 23.09% at 12, and 36.91% at 17)** (Section 6).

Sixth, what separates them is **whether you count children (the share with caries) or teeth (the number per child)**. When you hear that "children's caries has decreased," check which way it was counted.

Scope note: **This paper claims no new mathematical theorem and no new law** — the share of children with caries and the number of teeth at age 12 are in public tables, and this paper only took ratios and logarithms. **This paper is a structural interpretation of the shape of numbers in public aggregate data; it is not medical advice, not a diagnosis, and not a treatment recommendation. The author is not a physician. Decisions about individual health should be discussed with a physician or a medical institution. This is a preprint that has not been peer reviewed. The numbers are values over groups of children and are not a standard for judging any one child's teeth. The reasons caries decreased (the effects of fluoride, toothbrushing, food, treatment, and so on) cannot be separated with these tables and are not discussed.** The share column does not state that it is limited to permanent teeth and may include caries in primary teeth. The number of teeth at age 12 counts permanent teeth only. So "teeth per child with caries" is a guide; the number per child with caries in permanent teeth is greater than or equal to it. Following the note to Table 10, 2020–2023 were excluded from the comparisons. The tables measure different children each year. **About the data**: the School Health Statistics Survey (Ministry of Education, Culture, Sports, Science and Technology) was taken from e-Stat and used under the Government of Japan Standard Terms of Use (Version 2.0); the ratios, logarithms, teeth per child with caries, and share with treatment complete in this paper were processed from it. What this paper adds: **splitting the fall in teeth at age 12 into the fall in the share of children with caries and the fall in teeth per child with caries**.

1. Notation and question

- **Share with caries P**: the total of "caries" = treatment complete + with untreated teeth (%).
- **Teeth at age 12, M**: decayed, missing, or filled permanent teeth per child at age 12 (missing, filled, and untreated teeth summed and divided by all children).
- **Teeth per child with caries, K**: $K = M \div (P \div 100)$. A guide to the number per child with caries.

- **Splitting in logarithms**: ln(ratio of M) = ln(ratio of P) + ln(ratio of K). The two sum exactly to the logarithm of the ratio of teeth.
- **Share with treatment complete**: treatment complete ÷ total.

Question: Did the number of teeth at age 12 fall because fewer children had caries, or because those who had it had fewer teeth affected?

---

2. Preview and design

Written honestly: the design was decided after looking at the tables.

	Content
Tables	Yearly statistics Table 15, disease and abnormality rates by school type (1948–2025); tables by age (18 tables, 2008–2025); Table 10 (only to read its note)
Noticed in the preview	Only the junior high sheet of Table 15 has a column "decayed, missing, or filled permanent teeth per child," and it matches the value at age 12 in the tables by age
Noticed in the preview (2)	The share P and teeth M at age 12 sit in the same year and age in the tables by age (2008–2025)
Noticed in the preview (3)	The distribution of teeth among children (Survey of Dental Diseases) has small numbers of children per age and many cells under 10, so it is not used
Comparison	Long-term shares by school type, the share with treatment complete, M, P, and K at age 12 with the split in logarithms, and the shape by age

---

3. Data and checks

Calculation 3.1 The 20 retrieved files were fixed by SHA-256, and the following were checked.

- The note to Table 10 says that Reiwa 2–5 include data measured at different times and cannot be compared with past values, and that the same applies to the following tables. Table 15 comes after Table 10, so 2020–2023 were excluded from the comparisons.
- On the four total sheets of Table 15, the three caries columns are headed total, treatment complete, and with untreated teeth. Total = treatment complete + with untreated teeth holds within rounding to 0.01, and the only exception is 0.1 in senior high school in 1970, which is listed to one decimal place (92.8 against 23.5 + 69.4).
- In all 18 tables by age, the three caries columns can be read for the 13 ages 5–17, and the same equation holds within rounding to 0.01.
- Teeth at age 12 agree between Table 15 (junior high sheet) and the tables by age in all 18 years. Table 15 has values for 1984–2025 (42 years). Total = missing + caries total, and caries total = filled + untreated hold within rounding to 0.01.

---

4. Long-term series by school type

Calculation 4.1 Share of children with caries (%), and the share with treatment complete

Year	Kindergarten	Elementary	Junior high	Senior high	Elementary, treated	Junior high, treated
1949	31.04	42.08	39.37	58.79	0.029	0.115
1970	95.40	93.60	90.50	92.80	0.129	0.252
1980	86.54	93.98	93.91	95.90	0.237	0.360
1990	80.41	89.54	89.96	93.65	0.405	0.460
2000	64.43	77.87	76.85	85.03	0.486	0.566
2010	46.07	59.63	50.60	59.95	0.490	0.554
2025	19.44	30.83	25.23	32.77	0.489	0.601

Observation 4.2: **The maximum was in 1970 in kindergarten (95.40), 1979 in elementary (94.76), 1979 in junior high (94.52), and 1980 in senior high (95.90). The share first fell below 80% in 1992, 2000, 2000, and 2003, and below 50% in 2009, 2016, 2011, and 2016.** The younger school types began falling first, but the order of falling below 50% is reversed between elementary and junior high school.

Observation 4.3: **Among children with caries, the share whose treatment was complete rose from 1949 to 2025: 0.029 → 0.489 in elementary school, 0.115 → 0.601 in junior high, and 0.265 → 0.632 in senior high.** In kindergarten it was 0.040 (1949) → 0.399 (2010) → 0.359 (2025).

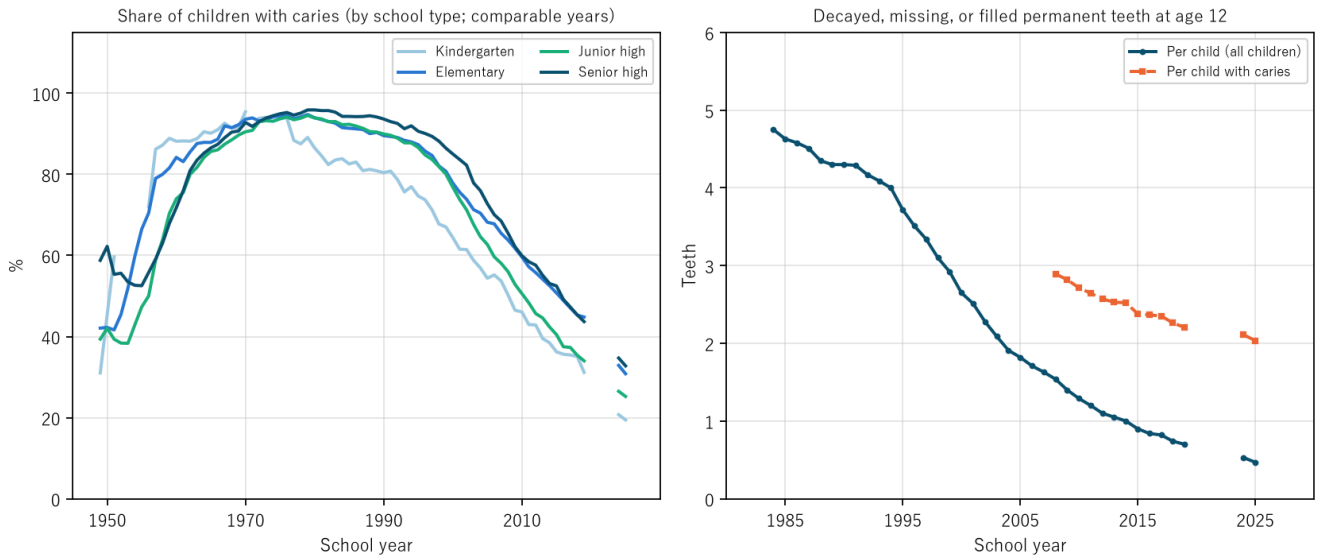


Figure 1: Left, the share of children with caries by school type (comparable years only). Right, decayed, missing, or filled permanent teeth at age 12; navy is per child (divided by all children, 1984–2025), orange is per child with caries (2008–2025).

---

5. The core — counting children or counting teeth

Calculation 5.1 Age 12 (tables by age)

Year	Share P (%)	Teeth M	Teeth per child with caries K	Treatment complete (%)	With untreated teeth (%)
2008	53.21	1.54	2.894	28.96	24.25
2010	47.52	1.29	2.715	26.35	21.17
2012	42.78	1.10	2.571	24.05	18.73
2015	37.82	0.90	2.380	21.07	16.75
2019	31.76	0.70	2.204	18.69	13.07
2024	25.11	0.53	2.111	15.12	9.99
2025	23.09	0.47	2.036	13.44	9.65

Calculation 5.2 Splitting the fall in teeth in logarithms

Period	Ratio of teeth (log)	Ratio of share (log, part)	Ratio of teeth per child with caries (log, part)
2008→2025	0.305 (−1.187)	0.434 (−0.835, 0.70)	0.703 (−0.352, 0.30)
2008→2019	0.455 (−0.788)	0.597 (−0.516, 0.65)	0.762 (−0.272, 0.35)
2019→2025	0.671 (−0.398)	0.727 (−0.319, 0.80)	0.924 (−0.080, 0.20)

Observation 5.3: **From 2008 to 2025, teeth at age 12 became 0.305 times as many. Of this, 0.70 is the share with caries becoming 0.434 times, and 0.30 is teeth per child with caries going from 2.894 to 2.036 (0.703 times). K fell between every pair of adjacent years among the 14 comparable years.** From 2019 to 2025 the share's part is larger, 0.80.

Observation 5.4: **"Caries has gathered in fewer children" splits into two meanings.** The share of children holding the teeth fell from 53.21% to 23.09% at age 12, so in that sense it gathered. In the sense that each child with caries has more teeth affected, it does not hold, because K fell.

Observation 5.5: Teeth at age 12 go back to 4.75 in 1984 in Table 15 (4.30 in 1990, 2.65 in 2000, 1.54 in 2008). However, the share in Table 15 is for junior high school (ages 12–14), and the share at age 12

alone exists only from 2008 in the tables by age, so the split was made only from 2008 onward. In the comparable years, the share at 12 ÷ the junior high share is 0.915–0.950.

---

6. The shape by age

Calculation 6.1 Share of children with caries (tables by age, %)

Year	Age 5	Age 9	Age 11	Age 12	Age 13	Age 17
2008	50.25	69.84	55.56	53.21	55.53	70.25
2019	31.16	50.39	35.66	31.76	33.20	47.95
2025	19.44	36.82	24.56	23.09	25.03	36.91

Observation 6.2: **In 2008, 2019, and 2025 alike, the highest among ages 5–11 is 8 or 9 (9 in 2008, 8 in 2019 at 51.05%, 9 in 2025), and the lowest among ages 9–17 is 12.** The trough at 12 stays in the same place regardless of the year. Because this share may include caries in primary teeth, the reason for the trough cannot be separated with these tables.

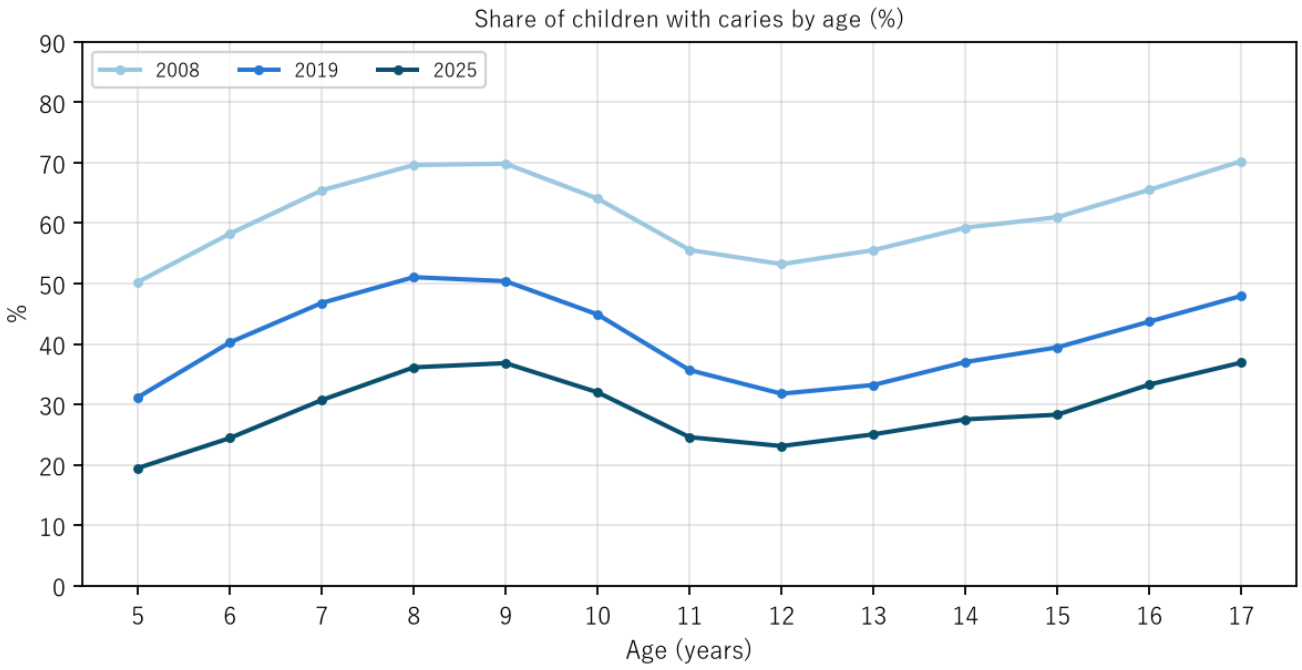


Figure 2: Share of children with caries by age in 2008, 2019, and 2025 (tables by age).

7. Limitations

1. **The numbers are values over groups of children and are not a standard for judging any one child's teeth. The reasons caries decreased (the effects of fluoride, toothbrushing, food, treatment, and so on) cannot be separated and are not discussed.**
2. The share column may include caries in primary teeth, while teeth at age 12 count permanent teeth only, so K is a guide. The number per child with caries in permanent teeth is greater than or equal to K.
3. The share and teeth at age 12 sit at the same age only from 2008 onward. Earlier years were not split.
4. The distribution of teeth (how many children have how many teeth) was not examined. The second meaning of "gathering" was examined only through the average (K).
5. 2020–2023 were excluded following the note to Table 10. The tables measure different children each year, not the same children.
6. The share is the share of children recorded as having caries at the health check; differences in how checks were done cannot be known from these tables.

Conclusion

Decayed, missing, or filled permanent teeth per child at age 12 fell from 1.54 in 2008 to 0.47 in 2025. Of that fall, 0.70 was fewer children with caries and 0.30 was fewer teeth per child with caries. Caries gathered in fewer children, but those children also have fewer teeth affected.

What separates them is one thing — whether you count children (the share with caries) or teeth (the number per child).

When you hear that "children's caries has decreased," **check which way it was counted and how the other one moved.**

Data and reproduction

Data	School Health Statistics Survey, yearly statistics Table 15, disease and abnormality rates by school type (1948–2025), and Table 10, mean height by age (for its note); School Health Statistics Survey, national tables, disease and abnormality rates by age, city size, and school establishment (18 tables, 2008–2025) (Ministry of Education, Culture, Sports, Science and Technology, e-Stat) (retrieved 26 and 27 September 2026)
Terms of use	e-Stat follows the Government of Japan Standard Terms of Use (Version 2.0). The ratios, logarithms, teeth per child with caries, and share with treatment complete in this paper were processed from it and are not numbers produced by the government
Coverage	Japan; 1948–2025 (by school type); 2008–2025 (ages 5–17)
Verification	`検算/M105.py` (`--zu` also draws the figures). Every number in the text is taken from `検算/M105_output.txt`
Raw data	`data/` holds the retrieved files and `SOURCES.md` (URLs, retrieval dates, SHA-256, terms of use, definitions and how the calculations were set up)
Figures	`図/M105_zu1` and `図/M105_zu2` (png, svg, English versions)

References

- Ministry of Education, Culture, Sports, Science and Technology. School Health Statistics Survey, yearly statistics, Table 15: Disease and abnormality rates by school type (1948–2025) (in Japanese). e-Stat (accessed 27 September 2026). https://www.e-stat.go.jp/
- Ministry of Education, Culture, Sports, Science and Technology. School Health Statistics Survey, national tables, Table 5 (2008–2015) and Table 4 (2016–2025): Disease and abnormality rates by age, city size, and school establishment (in Japanese). e-Stat (accessed 26 September 2026). https://www.e-stat.go.jp/