The Inpatient Rate Doubles Every 11.24–12.10 Years at Ages 40–84, and from 1999 to 2023 the Speed of Doubling Hardly Moved While the Level at Age 60 Fell to 0.479 — the Outpatient Level Hardly Moved (0.868), While the Years to Double Lengthened from 16.38 to 20.68 and the Slope Flattened [M086]

Age shape of patient rates = level × slope —— What separates them is whether the level moved or the slope moved

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September 2026 ／ CC BY 4.0

Abstract

Using the Ministry of Health, Labour and Welfare's Patient Survey (Table 4: trend in patient rates, 9 surveys from 1999 to 2023; Table 71: 2023 by sex, age group, and inpatient/outpatient (first/return visit)), this paper looked at how inpatient and outpatient rates rise with age and how that shape moved over 24 years, using the same "years to double" as M002 (death rates) and M075 (per-capita medical expenditure). No new mathematical theorem and no new law are claimed.

First, the tables are consistent. Inpatient + outpatient = total (rounding difference at most 1), Table 71 for 2023 matches the 2023 column of Table 4, and first + return visits = outpatient (Section 3).

Second, the 2023 shapes differ. **The inpatient rate rises at every age group from 15–19 to 90+, and at 90+ 0.385 of the patient rate is inpatient. The outpatient rate peaks at 80–84 (12,010), falls at 90+ (10,021), and also has a high side at age 0 (6,467)** (Section 4).

Third, this is the core of the paper. **At ages 40–84, the years for the inpatient rate to double lie within 11.24–12.10 in all 9 surveys from 1999 to 2023, and the level at age 60 fell from 1,487 to 712**

(0.479). For outpatients the level at 60 hardly moved, from 6,868 to 5,959 (0.868), while the years to double lengthened from 16.38 to 20.68 (longer in 7 of the 8 transitions). Inpatients moved in level, outpatients in slope (Section 5).

Fourth, **the outpatient rate is higher in 2023 than in 1999 in the 11 age groups from 0 to 45–49 and at 90+; it is 1.636-fold at 10–14 and 0.681-fold at 70–74.** The fitted lines for 1999 and 2023 cross at age 43.9 (Section 6).

Fifth, **in 2023 the years to double are shorter for inpatients than for outpatients in both sexes (men 10.95 vs 17.05 years; women 11.64 vs 25.08 years), and the first-visit share of outpatients falls from 0.532 at age 0 to 0.105 at 90+.** Inpatient 11.32 years and outpatient 20.68 years are close to M075's per-capita medical expenditure, inpatient 11.71 and outpatient 19.67 years (Section 7).

Sixth, what separates them is **whether the level moved or the slope moved**. "Patient rates fell" calls two separate movements by one word: for inpatients the level fell at the same slope, and for outpatients the level was nearly kept while the younger side rose and the older side fell, flattening the slope.

Scope note: **This paper claims no new mathematical theorem and no new law** — patient rates are in public tables, and this paper only fitted their logarithm to age with a straight line and split it into level and slope. **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. It does not judge whether patient rates are high or low, how people use medical care, or the health care system.** A patient rate is the estimated number of patients who received care at a medical institution on the survey day (one day in October) divided by the population; it is not the share of people who are ill. Why the inpatient level fell and why the outpatient slope flattened cannot be separated with these tables. The years to double are from a straight line fitted to the 9 age groups 40–84, not to younger or older ages. 2011 excludes part of Miyagi Prefecture and Fukushima Prefecture (table note). Prefectures and medical institutions are not compared. **About the data**: the Patient Survey (Ministry of Health, Labour and Welfare) was taken from e-Stat and used under the Government of Japan Standard Terms of Use (Version 2.0); the years to double and ratios in this paper were processed from it. What this paper adds: **splitting the age shape of inpatient and outpatient rates into "years to double" and "level at age 60," showing that over 24 years the inpatient rate moved in level and the outpatient rate in slope, and showing that the first-visit share of outpatients falls with age.**

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1. Notation and question

- **Patient rate**: estimated number of patients who received care at a medical institution on the survey day ÷ population × 100,000 (per 100,000).
- **Years to double**: over the 9 age groups from 40–44 to 80–84, log2(patient rate) is fitted with a straight line against the middle age of each group, and the inverse of the slope is taken. Shorter means a steeper rise with age.

- **Level at age 60**: the value of that fitted line at age 60.
- **First-visit share**: the part of the outpatient rate made up of patients seen for the first time on the survey day (first visits).

Question: How do inpatient and outpatient rates rise with age? Over 24 years, did that shape move in level or in slope?

Observation 1.1: M002 showed that the speed at which adult death rates double with age hardly moved and that what fell was the level (years to double in 2024: men 6.99, women 7.60). M075 measured the years for per-capita national medical expenditure to double at ages 40–84: inpatient 11.71, outpatient 19.67, total 16.52 years. This paper looks at patient rates with the same measure.

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2. Preview and design

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

	Content
Tables	Patient Survey 2023, national volume, Table 4 (trend in patient rates, inpatient/outpatient × age group, 9 surveys from 1999 to 2023) and Table 71 (2023, sex × age group (5-year) × inpatient/outpatient (first/return visit))
Noticed in the preview	The age-group rows of Table 4 are for both sexes combined; the age shape by sex was only in Table 71 for 2023. Table 71 also splits outpatients into first and return visits
Noticed in the preview (2)	I first set the outpatient trough at 15–19, the outpatient ages higher in 2023 as starting from 5–9, the first-visit share as below 0.1 above 80–84, and the transitions in which outpatient years to double lengthened as 6; all 4 failed on measurement. Sections 4–7 give the measured values
Comparison	The 2023 age shape, years to double at 40–84 and level at 60 (9 surveys), outpatient 2023 ÷ 1999 by age, sex, and first/return visits

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3. Data and checks

Calculation 3.1 The 2 retrieved files were fixed by SHA-256, and the following were checked.

- Table 4: columns for the 9 surveys, and in each of the three blocks (total, inpatient, outpatient) rows for total, men, women, and 20 age groups. Inpatient + outpatient = total (every year and age; rounding difference at most 1).
- Table 71: October 2023, with columns for total, men, and women. Total, inpatient, and outpatient by age group match the 2023 column of Table 4. First + return visits = outpatient (rounding difference at most 1).
- Notes to Table 4: the survey month has been October since 1984. From 2002, healthy newborns hospitalized with their mothers after delivery are not included in the estimated number of patients. 2011 excludes the Ishinomaki and Kesennuma medical areas of Miyagi Prefecture and Fukushima Prefecture.

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4. The age shape in 2023

Calculation 4.1 Patient rates (per 100,000, 2023)

Age	Inpatient	Outpatient	Inpatient share
0	1,237	6,467	0.161
1–4	153	6,291	0.024
10–14	87	3,680	0.023
20–24	137	2,367	0.055
40–44	258	3,501	0.069
60–64	838	6,320	0.117
80–84	2,952	12,010	0.197
85–89	4,413	11,483	0.278
90+	6,275	10,021	0.385

Observation 4.2: **The inpatient rate rises at every age group from 15–19 to 90+. The outpatient rate peaks at 12,010 at 80–84, is 0.834 of the peak at 90+, and has its trough at 2,367 at 20–24.** It first failed because I set the trough at 15–19 — 15–19 (1,920) was the trough in 1999. The inpatient share of the patient rate rises from 0.069 at 40–44 to 0.385 at 90+.

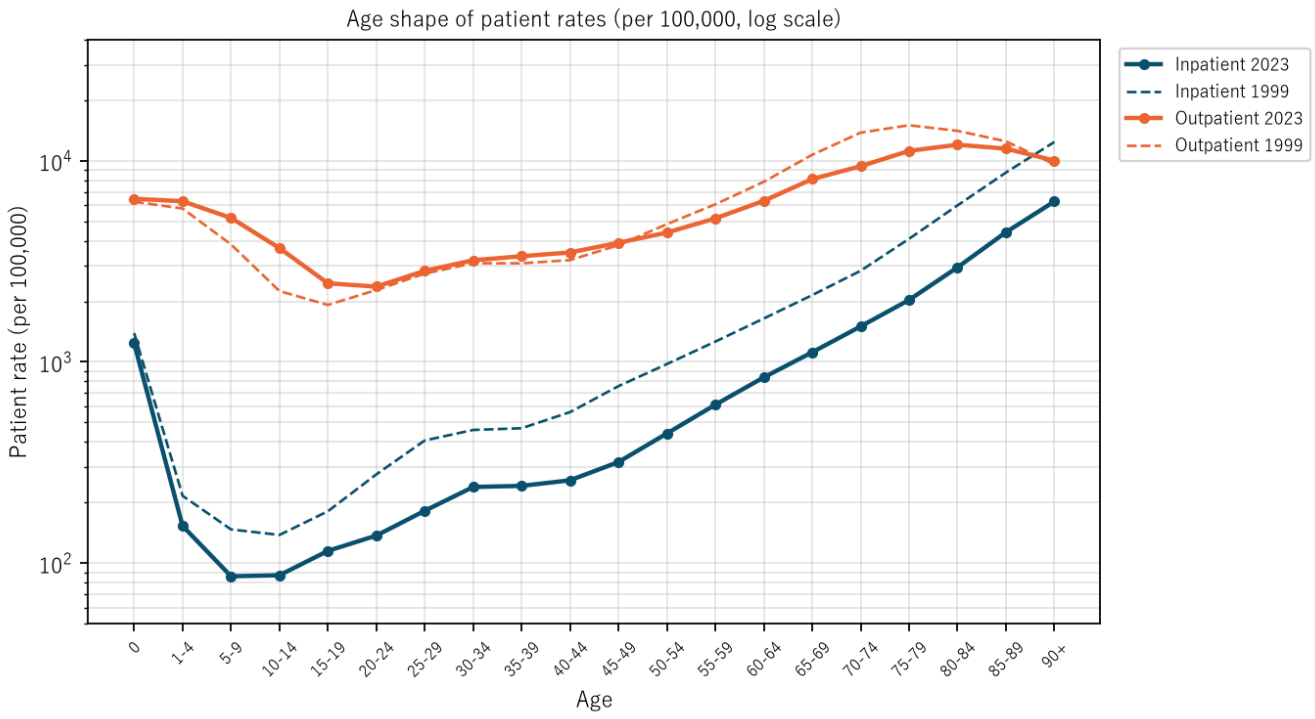


Figure 1: Age shape of patient rates (per 100,000, log scale). Navy is inpatient and orange is outpatient; solid lines are 2023 and dashed lines 1999.

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5. The core — did the level move, or the slope?

Calculation 5.1 Years to double at ages 40–84 and level at age 60

Year	Inpatient years to double	Inpatient level at 60	Outpatient years to double	Outpatient level at 60
1999	12.10	1,487	16.38	6,868
2002	11.75	1,320	16.91	6,267
2005	11.45	1,215	17.20	6,547
2008	11.30	1,075	18.03	6,145
2011	11.24	986	17.95	6,360
2014	11.47	913	19.07	6,173
2017	11.50	863	19.24	6,000
2020	11.30	765	20.11	5,882
2023	11.32	712	20.68	5,959

Observation 5.2: **For inpatients, the years to double lie within 11.24–12.10 in all 9 surveys (ratio 1999 → 2023: 0.936), and the level at age 60 fell from 1,487 to 712, 0.479-fold. At every age group from 40 to 84, the inpatient rate is 0.420–0.529 times its 1999 value.** The level fell at the same slope — the same type as M002's death rates. The coefficient of determination of the fitted lines is 0.9949–0.9985.

Observation 5.3: **For outpatients, the level at age 60 hardly moved, from 6,868 to 5,959 (0.868-fold), while the years to double lengthened from 16.38 to 20.68 (ratio 1.263). They lengthened in 7 of the 8 transitions and shortened only once, from 2008 to 2011.** It first failed because I set 6. The

level was nearly kept while the slope flattened — the opposite type from inpatients. For the total, the years to double went from 15.24 to 18.84.

Observation 5.4: Comparing the 2023 years to double with M075's per-capita medical expenditure, inpatient 11.32 ÷ 11.71 = 0.967 and outpatient 20.68 ÷ 19.67 = 1.051; both are close. Because what is counted (patient rates versus expenditure) and the period (October 2023 versus FY2023) differ, this paper does not connect them further.

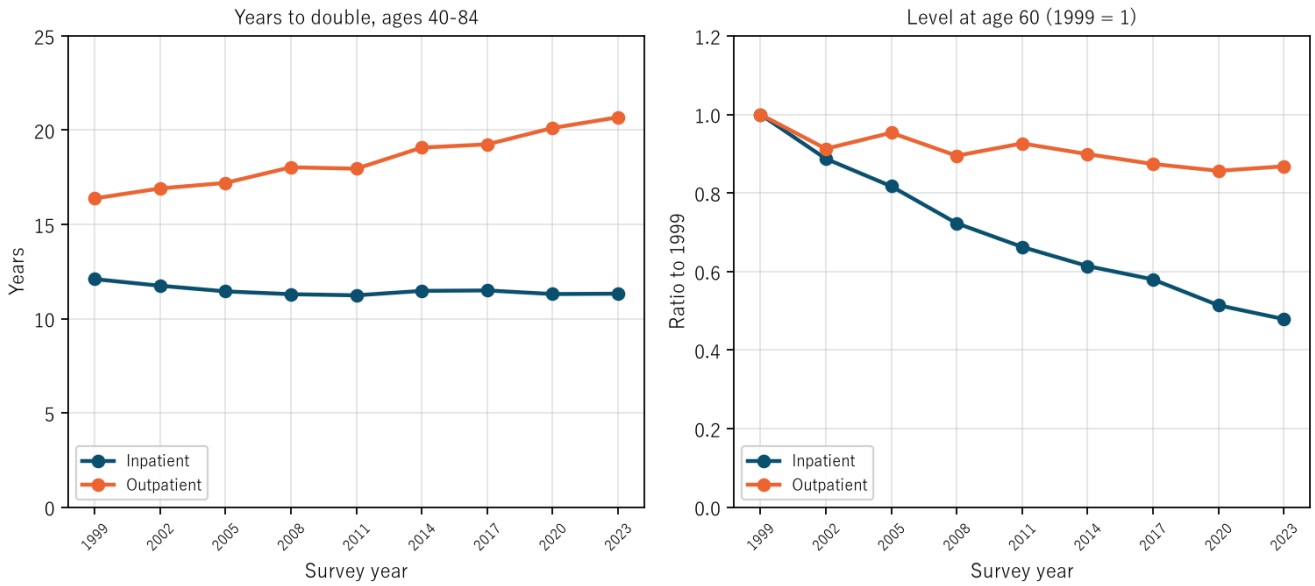


Figure 2: Years to double at ages 40–84 (left) and the level at age 60 relative to 1999 (right). Navy is inpatient and orange is outpatient.

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6. The ages where outpatient rates moved

Calculation 6.1 Outpatient rate, 2023 ÷ 1999

Age	2023 ÷ 1999
0	1.033
5–9	1.354
10–14	1.636
15–19	1.281
40–44	1.092
45–49	1.028
50–54	0.908
70–74	0.681
85–89	0.920
90+	1.045

Observation 6.2: **The outpatient rate is higher in 2023 in the 11 age groups from 0 to 45–49 and at 90+.** It first failed because I set it as starting from 5–9. The largest rise is at 10–14 (1.636-fold) and the largest fall at 70–74 (0.681-fold). The fitted lines (ages 40–84) for 1999 and 2023 cross at age 43.9; below it 2023 is higher and above it lower. Within the fitted ages 40–84, the two age groups at 40–49 rose and the seven at 50–84 fell.

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7. Sex, and outpatient first and return visits (2023, Table 71)

Calculation 7.1 Years to double at ages 40–84 and level at age 60 (2023)

	Inpatient years to double	Inpatient level at 60	Outpatient years to double	Outpatient level at 60
Men	10.95	790	17.05	5,180
Women	11.64	636	25.08	6,699

Observation 7.2: **In both sexes the years to double are shorter for inpatients than for outpatients. The outpatient slope for women (25.08 years) is flatter than for men (17.05 years).**

Observation 7.3: **The first-visit share of outpatients is highest at age 0 (0.532) and falls — 0.490 at 1–4, 0.448 at 10–14, 0.300 at 40–44, 0.187 at 60–64, 0.125 at 80–84 — to its lowest at 90+ (0.105).** It first failed because I set it below 0.1 above 80–84. At ages 40–84 the years to double are 17.94 for return visits (coefficient of determination 0.9939) and 53.52 for first visits (0.8125); it is return visits that have a shape rising with age at 40–84, and first visits also fit a straight line poorly.

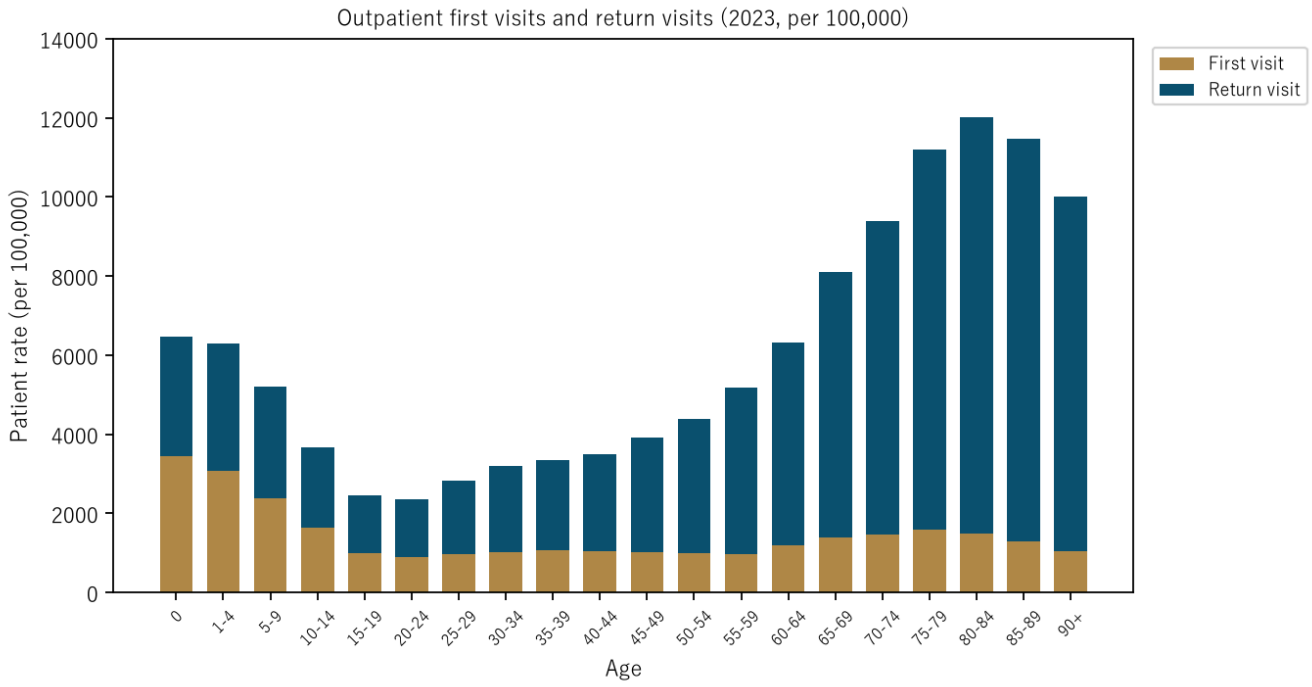


Figure 3: Outpatient rates for first visits (gold) and return visits (navy) (2023, per 100,000).

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8. Limitations

1. **Why the inpatient level fell and why the outpatient slope flattened cannot be separated with these tables.**
2. A patient rate is the estimated number of patients on the survey day (one day in October) divided by the population; it is neither the share of people who are ill nor the share who received care in a year.
3. The years to double are from a straight line fitted to the 9 age groups 40–84. Outpatient first visits fit a straight line poorly (coefficient of determination 0.8125).

4. The age shape in Table 4 is for both sexes combined, and the shape by sex was examined only for 2023. 2011 excludes part of Miyagi Prefecture and Fukushima Prefecture. The 2020 survey falls in the period of the COVID-19 epidemic, but this paper does not separate its effect.
5. The paper does not judge whether patient rates are high or low, nor evaluate medical institutions or the system.

Conclusion

From 1999 to 2023, the inpatient rate hardly changed its slope of doubling every 11.24–12.10 years at ages 40–84, while its level at age 60 fell 0.479-fold. The outpatient level at age 60 hardly moved (0.868-fold), while its years to double lengthened from 16.38 to 20.68 — the younger side rose and the older side fell, and the slope flattened.

What separates them is one thing — whether the level moved or the slope moved.

When you hear "patient rates fell," **check together whether it is about the level falling at the same slope or about the slope flattening while the level is kept.**

Data and reproduction

Data	Patient Survey 2023, national volume, Tables 4 and 71 (Ministry of Health, Labour and Welfare, e-Stat) (retrieved 26 September 2026)
Terms of use	e-Stat follows the Government of Japan Standard Terms of Use (Version 2.0). The years to double and ratios in this paper were processed from it and are not numbers produced by the government
Coverage	Japan, 9 surveys from 1999 to 2023 (survey day in October), inpatient and outpatient rates, age groups
Verification	`検算/M086.py` (`--zu` also draws the figures). Every number in the text is taken from `検算/M086_output.txt`
Raw data	`data/` holds the retrieved files and `SOURCES.md` (URLs, retrieval date, SHA-256, terms of use, definitions and how the calculations were set up)
Figures	`図/M086_zu1`, `図/M086_zu2`, `図/M086_zu3` (png, svg, English versions)

References

- Ministry of Health, Labour and Welfare. Patient Survey 2023, national volume, Tables 4 and 71 (in Japanese). e-Stat (accessed 26 September 2026). https://www.e-stat.go.jp/
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- Yamagishi, Y. (2026). Per-Capita National Medical Expenditure Doubles Every 16.52 Years at Ages 40–84, More Than Twice as Long as Death Rates (Men 6.99, Women 7.60 Years) — From FY2000 to FY2023 the Total Rose 1.596-Fold, the Age Composition Alone Would Have Raised It 1.337-Fold, and Per-Capita Growth Was 1.738-Fold at Ages 0–14 Against 1.051-Fold at 70–74 [M075]. Zenodo. https://doi.org/10.5281/zenodo.22978553