Pandemics and Peace: Unpacking Mortality Trends in Colombia (1982–2023) through an Actuarial Lens

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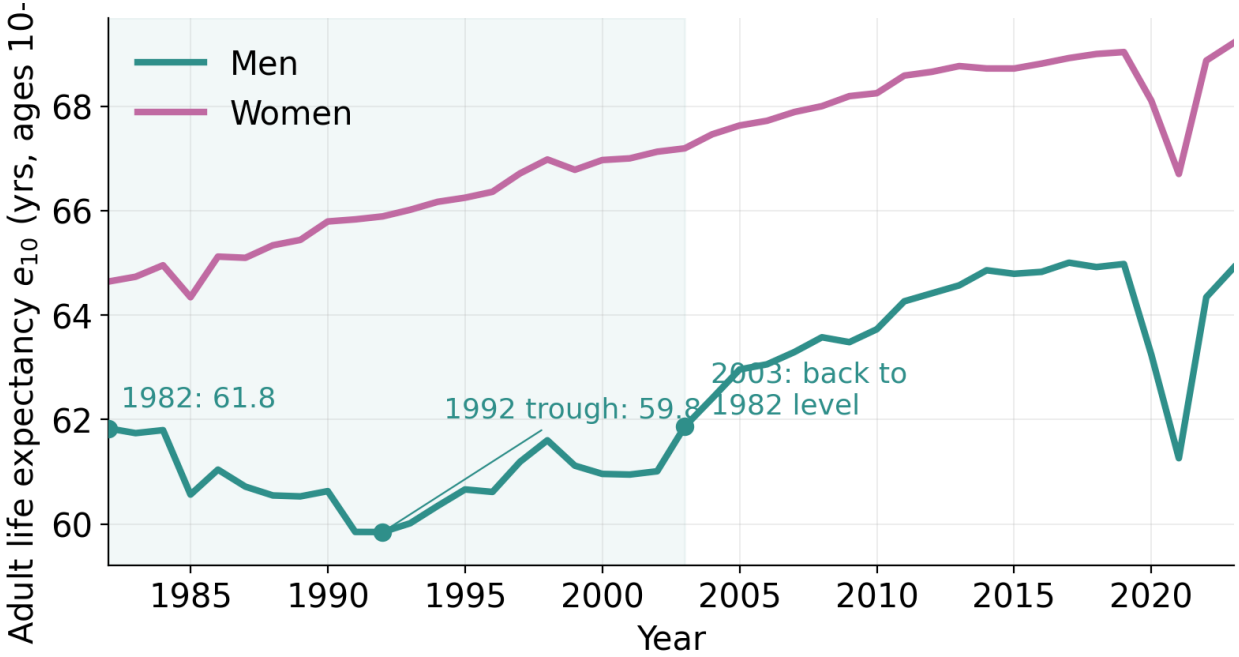


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A decade when men's survival ran backwards

The puzzle



Between 1982 and 1992, adult male life expectancy **fell** from 61.8 to 59.8 years.

It did not recover its 1982 level until **2003**: twenty-one years to return to the starting point.

Women show no such regression. What was happening to men?

Two shocks, two clocks

THE ACUTE CLOCK

COVID-19

- Sudden, severe, concentrated in time
- Large: −3.7 yrs of male e_{10} in two years
- Reversed almost entirely within one year
- Calls for emergency capacity & biomedical response

THE CHRONIC CLOCK

Violent mortality

- Persistent, structural, politically mediated
- Smaller in any year, but never goes away
- 42 years and the cost has not been paid off
- Calls for sustained security, justice & peace investment

The question, and what we add

When adult survival rises or falls, **what is that movement made of?**

42-year harmonised series

A single cause-specific mortality series 1982–2023, reconciling three successive coding systems (ICD-9 → PAHO 6/67 → ICD-10).

Cause × age decomposition

Arriaga decomposition plus cause-specific Lee–Carter models attribute every change in e_{10} to a cause and an age band, summing exactly to the total.

Two shocks, separated

We isolate the acute (COVID) and chronic (violence) dynamics and show why a single survival measure conflates them.

For actuaries & public health

A quantitative basis for pricing mortality risk and for evidence-based policy in Colombia.

One series, three coding systems, six causes

- DANE national death registries, one file per year, 1982–2023 (42 years).
- Colombia used three cause-of-death systems over the period:
  - ICD-9 based 56-group list, up to 1996
  - PAHO condensed 6/67 list, 1997–2009
  - Full ICD-10, from 2010
- A series crossing those borders unreconciled produces jumps that look like findings but are classification artifacts.
- Conservative rule: a category is admissible only if all three systems can rebuild it; otherwise it merges upward.

Six exhaustive categories

- Circulatory
- Neoplasms
- Infectious + respiratory
- Violence
- COVID-19
- Residual (all other)

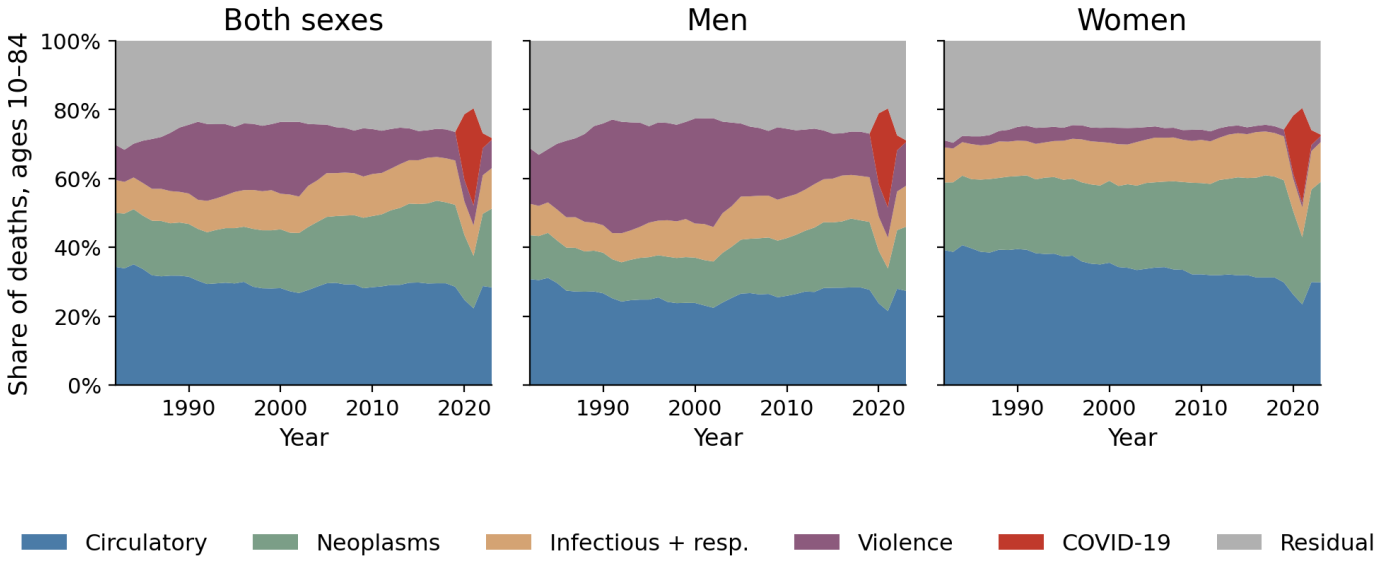
The measure: temporary adult life expectancy, e_{10}

e_{10}
ages 10–85

Average years lived, of the 75 between ages 10 and 85, under each year's mortality.

- We use adult life expectancy 10–85, not life expectancy at birth.
- Why bound the window? Comparability: the 1982 and 2023 figures then measure exactly the same thing across all 42 years.
- Technical bonus: the decomposition balances exactly, with no assumptions about mortality above the closing age.
- Caveat: these numbers are NOT comparable to the life-expectancy-at-birth declines in most international pandemic literature.

The composition of mortality, 1982–2023

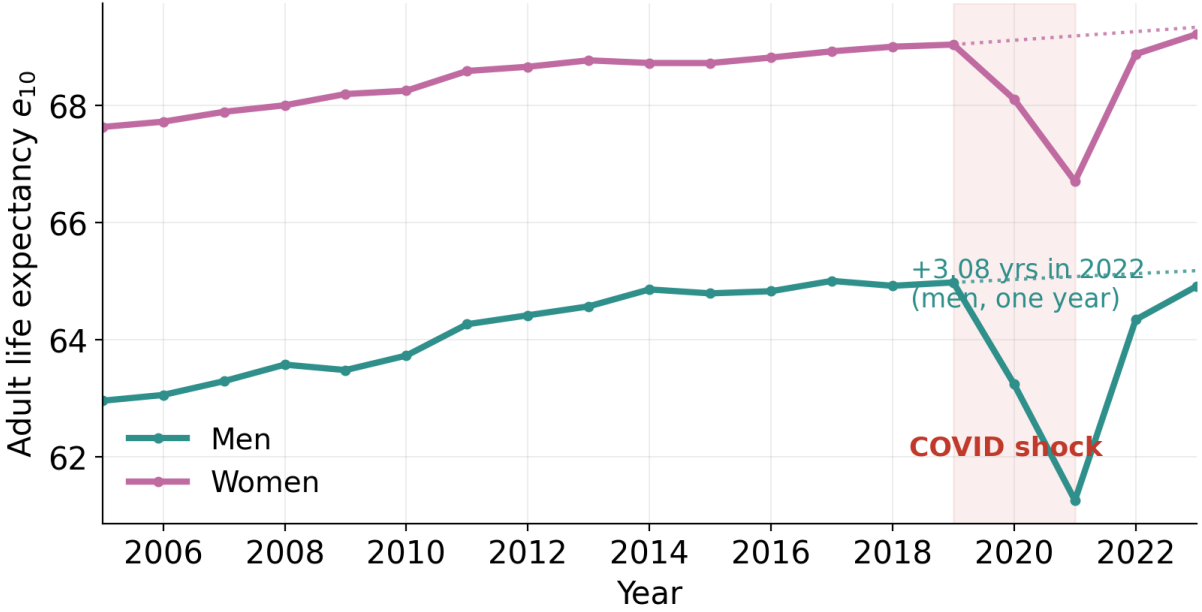


At its 1991 peak, violence was **33% of all male deaths** at ages 10–84 (one in three). COVID reached **28% of all deaths in 2021**, then effectively vanished by 2023.

COVID-19: a large shock that reversed almost entirely

THE ACUTE CLOCK

The pandemic contraction, 2019 → 2021



−3.72 yrs
male e_{10} lost, 2019→2021

−2.34 yrs
female e_{10} lost

84% / 88%
of the loss is COVID itself (men / women)

The recovery: almost the whole shock, in one year

83% / 93%
of the contraction recovered in the single year 2021→2022 (men / women)

≈22×
the 2022 male gain vs a normal pre-pandemic year (0.14 yr/yr)

−0.07 / +0.18
2023 e_{10} vs 2019 level (men / women): the level is back

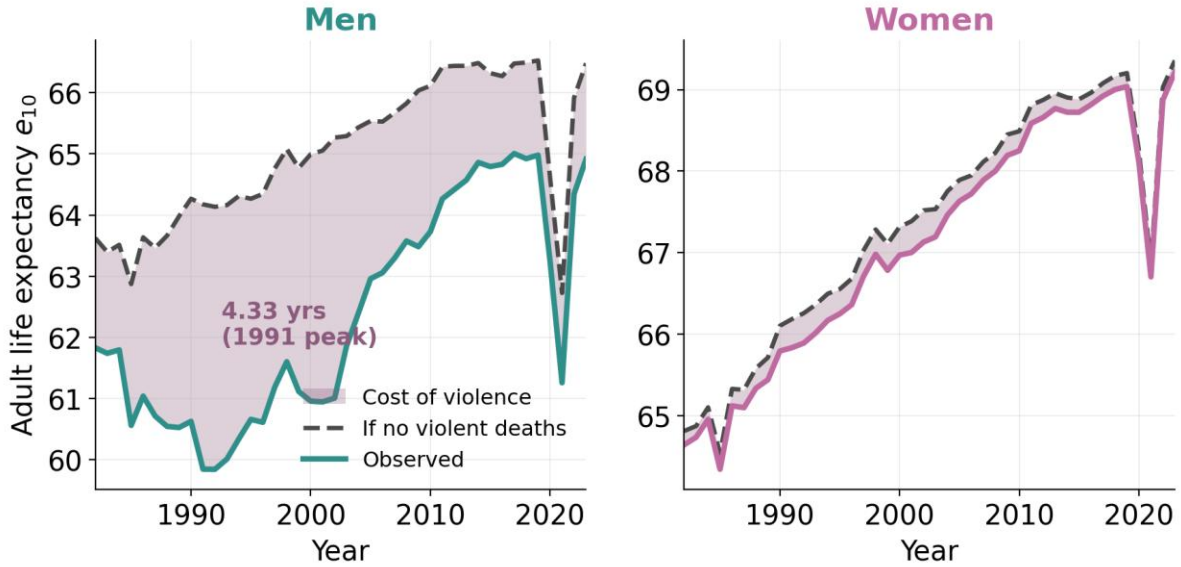
Why so fast? Nothing improved at 22× its normal rate. A cause was added to the mortality schedule for two years and then removed; when it left, the schedule returned to roughly where it had been. The number measures that return.

The same rebound appears in the violence-deleted counterfactual, confirming the recovery is a pandemic phenomenon and owes nothing to violent mortality.

Violent mortality: smaller each year, never paid off

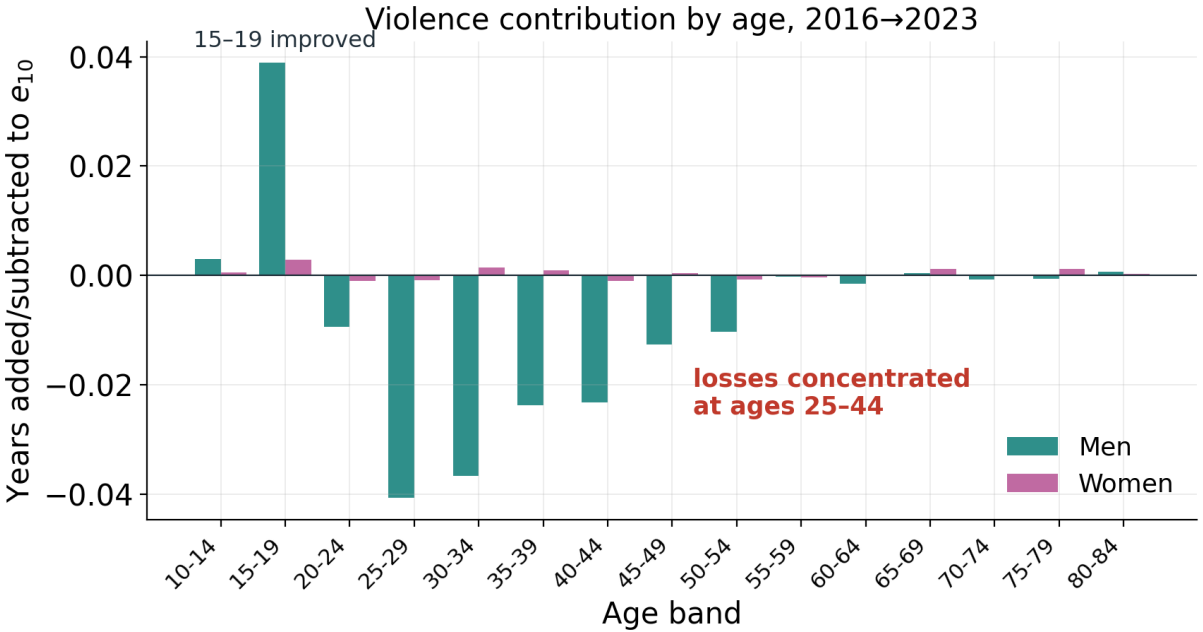
THE CHRONIC CLOCK

The cost of violence made visible



Peak cost **4.33 yrs (1991)**; in 42 years it has **never fallen below 1.37 yrs**; still 1.57 yrs in 2023. The male 'lost decade' is violence — and nothing else.

A reversal after 2016 — in one sex only



- 2016→2023: violence subtracts 0.12 yr from male e_{10}; female contribution ≈ 0.
- The only cause in the whole decomposition whose sign differs between the sexes.
- Losses concentrate at ages 25–44, not adolescents — 15–19 actually improved.

The two dynamics demand different instruments

Acute shock (COVID)

- Large, abrupt, largely transitory.
- Needs emergency capacity in the health system.
- Needs rapid biomedical response.
- Success measured in months.

Chronic condition (violence)

- Smaller yearly, but persistent & structural.
- Needs sustained security & justice investment.
- Needs implementation of the peace process.
- Success measured in decades.

Every change in e_{10}, by cause: the full ledger

Comparison	Total Δe_{10}	of which COVID	of which Violence
Long run 1982→2023	+3.08 / +4.57	−0.02 / −0.02	+0.36 / +0.05
Pandemic 2019→2021	−3.72 / −2.34	**−3.14 / −2.05**	−0.06 / +0.01
Recovery 2021→2023	+3.65 / +2.51	**+3.11 / +2.03**	+0.05 / +0.02
Post-agreement 2016→2023	+0.08 / +0.40	−0.03 / −0.02	**−0.12 / +0.00**

Values are men / women, in years. Every row's six causes sum exactly to the total. *COVID dominates the pandemic columns; violence is the sign-split, order-of-magnitude-smaller chronic term.*

Conclusion: separate the clocks, and the answer changes

- The acute shock (COVID) cost 3.72 / 2.34 yrs of e_{10} and was essentially recovered by 2023.
- The chronic shock (violence) is an order of magnitude smaller each year, splits the sexes, concentrates at ages 25–44, and shows no sign of reversing.
- Their magnitudes aren't comparable — and the argument doesn't need them to be. It rests on how differently they behave over time.
- A cause- and age-specific decomposition clarifies both the magnitudes and the distinct policy responses they demand.

Two clocks on the same population; only by reading them separately can we price the risk and choose the instrument.

Thank you

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