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Estimating Childhood Homelessness Deaths in Australia

A Multi-Pathway Mortality Model for Quantifying Hidden Deaths Among Housing-Insecure Children

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Version History

Version	Date	Summary
1.0	January 2026	Initial multi-pathway model; central estimate 169 deaths/year
2.0	March 2026	Revised methodology; strengthened evidence base; added pathways; central estimate 155 deaths/year
3.0	**July 2026**	**Full data refresh; Monte Carlo simulation replaces scenario analysis; temporal escalation formalised inside the model; Indigenous sub-model and geographic variation added; Category C triangulated against independent anchors; central estimate 135 deaths/year (95% CrI 121–152)**

> **A full changelog detailing all modifications from Version 2.0 is provided in Appendix A.**

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Key Finding

> Our multi-pathway mortality model estimates **121–152 childhood deaths annually** (95% credible interval) in Australia are attributable to homelessness and housing instability. The central estimate of **135 deaths/year** represents approximately **3.7 times the official count** derived from administrative data linkage. These intervals come from a 50,000-iteration Monte Carlo simulation across all model parameters — the first version of this methodology to carry genuine probabilistic uncertainty rather than scenario bounds.

Metric	Value
Central Estimate (Deaths/Year)	**135**
90% Credible Interval	**123 – 149**
95% Credible Interval	**121 – 152**
Official AIHW-Linked Count (annualised)	**~35**
Undercount Factor	**3.7× (90% CrI 3.4–4.1×)**

The central estimate is lower than Version 2.0 (155). That reduction is not a finding that fewer children are dying — it is the result of three deliberate methodological corrections: consistent excess-deaths attribution across all pathways, a lower published national SUDI count, and the replacement of Version 2.0's post-hoc +29 adjustment with a parameterised temporal escalation factor inside the model. Each is documented in Appendix A. The core finding is unchanged and robust: **official statistics capture roughly a quarter of the children whose deaths are attributable to housing insecurity.**

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1. Introduction

1.1 The Problem of Invisible Deaths

In Australia, the deaths of homeless children are systematically undercounted. When a child dies, their housing status is rarely recorded in mortality data. The Australian Institute of Health and Welfare (AIHW) can only identify deaths linked to Specialist Homelessness Services (SHS) through complex administrative data linkage — and even this captures only a fraction of the true toll.

> "The work of services and researchers is hindered partly by the fact that housing or homelessness status is not, or at least not accurately, captured in typical mortality data sources such as government registries of deaths or coronial records."
>
> — Tuson et al. (2024), BMJ Open

This creates a fundamental measurement problem: we cannot accurately count deaths that the data system was never designed to capture. Children who die while couch surfing, living in overcrowded housing, or whose families avoided services due to fear of child protection intervention simply do not appear in official statistics.

The primary linked dataset used to generate Australia's official homeless mortality statistics — the NACS linked dataset — contains a structural exclusion that renders infant deaths almost entirely invisible. As detailed in Section 2.4, age at death in the NACS can only be calculated for people linked to the Medicare Consumer Directory, which systematically excludes infants who have not yet been enrolled in Medicare. The official baseline undercount for children is therefore even more severe than the headline linkage rate suggests.

Version 3.0 confirms that this measurement gap has not closed. As at July 2026, the AIHW's last-year-of-life analysis still covers 2012–13 to 2022–23 with no newer mortality data published; Australia still publishes no count of school students experiencing homelessness (unlike the United States under the McKinney-Vento Act); no national health-linkage study has quantified housing-insecure families outside the service system; and no national figure quantifies removals of children into out-of-home care where housing was the driving factor. Where this methodology relies on estimation, it is because the data system offers nothing better — and that absence is itself a policy finding.

1.2 Purpose of This Model

This methodology presents a **multi-pathway mortality model** designed to estimate the true number of childhood deaths attributable to homelessness and housing instability in Australia. Rather than applying a single risk multiplier, we estimate deaths through distinct causal pathways, each with different:

- Age distributions and risk mechanisms
- Degrees of visibility to administrative data systems
- Evidence bases and uncertainty levels
- Degrees of independence from one another (addressed through an explicit overlap adjustment)

The model is designed to be transparent about assumptions, conservative where evidence is ambiguous, and — from this version — fully probabilistic. Every parameter carries an explicit uncertainty distribution, and all results are reported as credible intervals from Monte Carlo simulation. The simulation code is published alongside this document (`Tools/lana_monte_carlo.py`) and is reproducible from a fixed random seed.

1.3 Scope and Definitions

Age Range

This model covers children aged 0–17 years. We use age stratification because mortality risk varies significantly across childhood, and different pathways affect different age groups. Some pathways (notably the neonatal/perinatal pathway) require consideration of maternal housing status during pregnancy, which extends the analytical frame to the prenatal period.

Definition of Homelessness

We adopt a broad definition encompassing:

- **Primary homelessness:** Rough sleeping, living in improvised dwellings
- **Secondary homelessness:** Crisis accommodation, couch surfing, temporary arrangements
- **Tertiary homelessness:** Severe overcrowding (requiring 4+ additional bedrooms)
- **Housing instability:** Frequent moves, imminent risk of homelessness, service-avoidant families

Definition of "Attributable" Death

A death is considered attributable to homelessness or housing instability if adequate, stable housing would have materially reduced the probability of that death occurring. This counterfactual framing is applied consistently across all pathways. We do not require that housing was the sole or primary cause — only that it was a significant contributing factor.

From Version 3.0, attribution is consistently reported as **excess deaths**: the deaths beyond those expected at baseline mortality rates, across every population-rate pathway. Version 2.0 applied this correction to Pathway 5 but not Pathway 3; Version 3.0 closes that inconsistency (see Appendix A, Change 3).

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2. Methodology

2.1 Conceptual Framework

Our approach recognises that deaths attributable to childhood homelessness fall into two categories:

Visible deaths: Those captured by AIHW through linkage of SHS records to the National Death Index. These represent the minimum confirmed count but are limited by:

- Structural data exclusions (infants not enrolled in Medicare — see Section 2.4)
- Data linkage failure (~21% of SHS records cannot be linked to the Enhanced Medicare Spine)
- Historical data coverage gaps (pre-2017–18 data were not weighted for the NACS project)
- Requirement that families accessed SHS within 12 months of death
- Correct recording of Statistical Linkage Key (SLK) data

Hidden deaths: Those occurring in populations invisible to administrative systems, including:

- Children in families who never access SHS due to fear, stigma, or barriers
- Young people couch surfing without service contact
- Infants excluded from the NACS linked dataset due to Medicare enrolment timing
- Deaths occurring more than 12 months after last SHS contact
- Deaths where housing status is not recognised or recorded

- Children whose housing-related removal into out-of-home care contributed to their death
- Neonatal deaths attributable to maternal homelessness during pregnancy

2.2 Data Sources

Source	Data Used	Reference
AIHW NACS Linked Dataset	SHS-connected deaths, linkage rates, age distribution	AIHW (2025a; 2026a)
AIHW SHS Annual Report 2024–25	Client numbers, unmet requests, persistent homelessness, First Nations clients	AIHW (2025b)
ABS Census 2021	Homeless population counts by age; Indigenous homelessness; remoteness	ABS (2023a; 2023b)
ABS Deaths, Australia 2024	Infant deaths (957), child deaths by age band	ABS (2025a)
ABS Perinatal Deaths 2024	Neonatal deaths (719)	ABS (2025b)
QFCC / ANZCDR&PG	National child deaths 0–17 (1,594 in 2023); Indigenous share of deaths	QFCC (2026)
Red Nose / ABS Causes of Death	SUDI deaths (100 in 2024)	Red Nose (2026)
NSW Child Death Review Team	SUDI modifiable risk factors; deaths known to child protection	NSW Ombudsman (2025)
ANROWS / ADFVDRN	Filicide data 2010–2018 (national)	ANROWS (2024)
AIC NHMP	Homicide in Australia 2024–25: child victims, filicide incidents	Bricknell & Miles (2026)
AIHW Suicide Monitoring	Suicide among SHS clients (last-year-of-life study)	AIHW (2026b)
AIHW Housing Assistance 2026	Social housing stock decline	AIHW (2026c)
Impact Economics and Policy	Uncounted unmet demand modelling	Impact Economics (2024)
Mission Australia	Youth Survey homelessness prevalence	Mission Australia (2024)
ABS General Social Survey	Help-seeking rates among people who experienced homelessness	ABS (2014)
AIHW Indigenous HPF	Indigenous infant and child mortality	AIHW (2026d)
AIHW Child Protection Australia 2023–24	Substantiations by type; OOHC; Indigenous overrepresentation	AIHW (2025c)
State child death review reports (NSW, Qld, Vic)	Deaths of children known to child protection	NSW DCJ (2025); QFCC (2025); CCYP (2025)
AHURI / City Futures	Hidden homelessness composition and trends	Launch Housing (2024); Brackertz (2020)

> **Data currency note (July 2026):** ABS *Deaths, Australia 2025* is due 2 October 2026; the AIHW SHS Annual Report 2025–26 is due ~December 2026; AIHW *Child Protection Australia 2024–25* and the *Australian Homelessness Monitor 2026* are forthcoming. Each will allow direct parameter updates via the published simulation script.

2.3 Establishing the Visible Baseline

The AIHW's last-year-of-life analysis was page-updated in October 2025 but its data window and figures are unchanged from those used in Version 2.0 — the study period remains 2012–13 to 2022–23, and AIHW notes it will update "when causes of death data for later years is finalised." The baseline arithmetic therefore carries over:

- **2012–13 to 2022–23 (11-year period):** Among the 14,000 people who received SHS support in the last year of life, around 1 in 77 (1.3%) were children aged 0–14 years — approximately 180 deaths (AIHW 2025a).

Annualised visible deaths (0–14): 180 ÷ 11 = **16.4 deaths/year**

For ages 15–17, we extrapolate from the under-25 data. The AIHW reports 6.2% of deaths were among people under 25 — approximately 868 deaths over the study period (14,000 × 0.062). Subtracting the 0–14 cohort (180) yields 688 deaths among 15–24 year-olds. Assuming 15–17 represents approximately 30% of this age band (based on population share and SHS presentation age profiles):

Annualised visible deaths (15–17): 688 × 0.30 ÷ 11 ≈ **18.8 deaths/year**

Total visible child deaths (0–17): ≈ 35 deaths/year (range 35–39 depending on reporting period used)

Combined Linkage and Coverage Adjustment

> "A total of 1,262,977 records were linked from the Specialist Homelessness Service Collection cohort, which accounts for 79.25% of the 1,593,584 cohort SLKs."
>
> — AIHW (2026a), NACS Technical Notes (v19.0, May 2026)

The overall linkage success rate is approximately 79%, confirmed unchanged in the May 2026 technical notes. Children's records — particularly infants and very young children — are likely to have higher linkage failure rates due to less complete SLK data. We estimate child-specific linkage success at approximately 75%. Additionally, SHSC data for years before 2017–18 were not weighted for the NACS linkage project, systematically undercounting clients and therefore deaths in that period (estimated further 5–8% undercount).

Combined adjustment factor: 0.70 (range 0.65–0.75), as in Version 2.0.

Coverage-and-linkage-adjusted visible deaths: 35 ÷ 0.70 = **50 deaths/year** at study-period-average conditions. Section 2.7 describes how this is escalated to current-year conditions inside the model.

2.4 Critical Data System Exclusions

A structural limitation of the NACS linked dataset has significant implications for infant mortality estimation:

> "Age at death is estimated using the 15th of the month as the estimated day of birth, as only month and year of birth data variables are available in the NACS dataset. The month and year of birth information is sourced from the Medicare Consumer Directory (MCD), and therefore age at death is only able to be calculated for people who link to the MCD. **This excludes groups such as infants (who do not have an MCD listing as they are not yet enrolled in Medicare)**, overseas visitors and temporary residents, asylum seekers and refugees."
>
> — AIHW (2026a), NACS Linked Dataset Technical Notes

This means that **the NACS linked dataset structurally excludes most infant deaths** from age-based analysis. Two critical implications follow:

1. The "180 children aged 0–14" figure almost certainly undercounts infants, as many infant deaths fall into the "age unknown" category rather than being classified as child deaths.
2. The SUDI pathway (Pathway 2) and the neonatal/perinatal pathway (Pathway 8) operate almost entirely outside the visible data system — they are not merely undercounted but structurally invisible.

This exclusion is addressed in the model by treating infant and neonatal pathways as substantially independent from the visible baseline.

2.5 Estimating the Hidden Homeless Child Population

Census Baseline

The ABS Census 2021 identified approximately 29,000 children aged 0–18 experiencing homelessness on Census night. This remains the most recent national enumeration (Census 2026 homelessness estimates are not yet published) and significantly undercounts several populations:

Category A: Couch Surfing (Secondary Homelessness)

> "The population of young couch surfers can be underestimated when a person filling out the Census form on behalf of the young person does not know that they are unable to return home or do not have a home."
>
> — AIHW, Australia's Youth: Homelessness and Overcrowding

We apply a **3× multiplier** to census couch-surfing counts for children (~8,000), reflecting systematic undercount, consistent with international literature on secondary homelessness enumeration gaps. Recent SHS monthly data recording 18,600 clients couch surfing at a point in time (Launch Housing 2024) — service-connected cases alone — supports the scale of this adjustment.

Category B: Severe Overcrowding

> "The majority (62% or 12,000) of children experiencing homelessness were living in severely overcrowded dwellings."
>
> — AIHW, Australia's Children: Homelessness

We estimate an additional 50% beyond census-captured overcrowding due to unreported arrangements, yielding a 1.5× multiplier on the known overcrowding figure.

Category C: Service-Avoidant Families — Triangulated

This remains the most significant hidden population and the least directly enumerated parameter. Version 3.0 tests the estimate against every independent data anchor available in published Australian data.

The known child SHS client base has grown to **78,800 children under 18 (27% of all SHS clients)** in 2024–25 (AIHW 2025b), up from the ~76,000 used in Version 2.0. Retaining the 0.8× service-avoidance multiplier yields **~63,000 children**.

Anchors that exist:

1. **Uncounted unmet demand.** Independent modelling for Homelessness Australia estimates that beyond the ~53,000 people officially recorded as turned away in 2023–24, a further 75,277 people are turned away uncounted each year and **48,195 never make it through the door at all** — 123,472 people missing out annually (Impact Economics 2024). The "never make it through the door" population is the closest published analogue to service avoidance, and it counts only people deterred by service capacity — not those deterred by fear of child protection involvement.

2. **Help-seeking rates.** The ABS General Social Survey found that **around two-thirds (67%) of people who experienced homelessness in the previous ten years did not seek assistance** during their most recent episode (ABS 2014). A 67% no-help-sought rate implies a hidden population near 2× the service-connected population across all cohorts. Families with children plausibly seek help at higher rates than single adults, but a 0.8× family multiplier sits well below this ceiling.

3. **Youth self-report prevalence.** Mission Australia's Youth Survey found **close to 1 in 10 respondents aged 15–19 had experienced homelessness in the previous year** — rough sleeping, refuge stays, or couch surfing (Mission Australia 2024). This prevalence vastly exceeds the SHS youth client rate and is consistent with a large non-service-connected segment.

4. **Direct child turn-aways.** In 2022–23, 19,833 children who sought SHS help received no assistance at all (Homelessness Australia 2024); single parents made 30% of unassisted requests in 2024–25 (AIHW 2025b).

Anchors that do not exist — a data-system finding:

- Australia publishes **no count of school students experiencing homelessness**. No ACARA or state education dataset records student housing status. The United States has counted this population under the McKinney-Vento Act for decades.
- **No Australian health-linkage study** has quantified housing-insecure families presenting to health services without SHS contact. Tuson et al. (2024) explicitly note their Perth cohort excludes people who never engaged with participating services and is "likely an undercount," but cannot say by how much.
- Fear of child protection involvement as a service barrier is documented qualitatively (HRW 2025; Centre for Excellence 2025) but **no Australian study quantifies it**. (Figures circulating online such as "housing a factor in 9% of removals" trace to United States sources and must not be cited as Australian.)

Assessment: every anchor that exists is consistent with 0.8× and none pushes it lower; the GSS help-seeking rate and the uncounted-demand modelling both suggest it is conservative. We retain **0.8×** with the estimate now bounded by evidence on both sides rather than asserted.

Total Hidden Population Calculation

Category	Census/Known	Multiplier	Hidden Estimate
A: Couch surfing (0–17)	~8,000	3.0×	24,000
B: Additional overcrowding	12,000	1.5×	18,000
C: Service-avoidant families	78,800 known	0.8× additional	63,000
Total Hidden			**105,000**

Total homeless/housing-insecure children: 29,000 + 105,000 = **134,000**

This represents approximately **2.3% of Australia's ~5.8 million children** aged 0–17.

2.6 Age-Stratified Risk Multipliers

Child mortality risk varies dramatically by age and cause. We derive homelessness risk multipliers from AIHW data and research evidence:

> "Annually, the death rate of SHS clients was up to 1.7 times the rate of non-SHS clients; around 1.7–2.3 times for males and 1.0–1.4 times for females."
>
> — AIHW (2025a)

For the *visible* (service-connected) population, the AIHW-documented 1.4–1.7× overall mortality elevation provides a direct evidence base. For the *hidden* (non-service-connected) population, we apply higher multipliers on the rationale that those outside service systems face compounding disadvantages: no safe sleep education for infants, no healthcare referrals, no crisis intervention, and no safety planning.

Age Band	Base Mortality (per 100,000)	Visible Multiplier	Hidden Multiplier	Rationale
0–1 (Infants)	~327	2.5×	4.0×	SUDI risk in overcrowding; no safe sleep education; MCD exclusion from data
1–4	~15	2.0×	3.0×	Reduced healthcare access; accident risk; environmental hazards
5–11	~8	1.8×	2.5×	Lower overall risk; some school-based safety net
12–14	~12	3.0×	4.0×	Emerging mental health risks; family breakdown
15–17	~35	3.5×	4.5×	Suicide/overdose primary causes; high couch-surfing rates

Base rates are anchored to the latest published national data: the infant rate reflects the 2024 infant mortality rate of 3.27 per 1,000 live births (ABS 2025a); the 2023 national all-cause child rate of 27.7 per 100,000 (ages 0–17; QFCC 2026) and jurisdictional band rates in that report support the retained band values, as no newer national per-100,000 band rates are published.

The hidden multipliers are unchanged from Version 2.0 and are the model's most consequential extrapolation. In the Monte Carlo simulation each is sampled across its full plausible range (e.g. the

adolescent hidden multiplier is sampled from 3.0–6.0 with mode 4.5), so the reported credible intervals carry this uncertainty rather than hiding it.

> **New supporting evidence for the SUDI mechanism:** the NSW Child Death Review Team's biennial report found that of 66 SUDI deaths in NSW in 2022–2023, **97% involved at least one modifiable risk factor, 83% occurred on bedding not designed for infants, and 68% involved sharing a sleep surface** — with consistent overrepresentation of infants from the most disadvantaged areas and infants with a child protection history (NSW Ombudsman 2025). These are precisely the mechanisms through which housing insecurity elevates SUDI risk.

2.7 Temporal Escalation Factor

New in Version 3.0. Version 2.0 acknowledged that its baseline data (averaged over 2012–2023) understates current-year mortality given documented deterioration in housing conditions — but handled this with an unstructured +29 deaths/year adjustment added after the pathway sum. That was the model's weakest component: it sat outside the pathway logic, carried no explicit uncertainty, and conflated a temporal trend with an unquantified "sub-clinical" allowance.

Version 3.0 replaces it with a **parameterised temporal escalation factor (T_esc)** applied inside the model to the pathways anchored to study-period-average conditions (Pathways 1, 3, 5 and 6). The factor is sampled in the Monte Carlo simulation like every other parameter.

Evidence base for the distribution (low 1.05, mode 1.15, high 1.30):

Indicator	Change	Period	Source
Persistent homelessness (SHS clients)	29,500 → 41,100 (**+39%**)	2018–19 to 2024–25	AIHW (2025b)
Unassisted requests for SHS help	110,000 → 129,000 (**+17%**)	2023–24 to 2024–25	AIHW (2025b)
Social housing share of households	4.8% → **4.0%**	2011 to June 2025	AIHW (2026c)
Homelessness growth vs population growth	~2×	to 2023	Launch Housing (2024)

The NACS baseline period (2012–13 to 2022–23) has a midpoint around 2018. If the housing-insecure child population and its mortality exposure have grown on the order of 15–40% since that midpoint — as the persistent-homelessness trajectory indicates — then pathways calibrated to period-average conditions understate current-year deaths by a comparable proportion. The distribution's mode (1.15) is deliberately set below the persistent-homelessness trend (+39% over six years) because that series partly reflects service-capacity dynamics rather than population growth alone.

Pathways using current-year inputs (Pathway 2: 2024 SUDI count; Pathway 4: current filicide data; Pathway 7: current OOHC data; Pathway 8: 2024 neonatal count) receive **no escalation** — their inputs already reflect present conditions.

Version 2.0's separate "sub-clinical pathway deaths" allowance is **dropped**. No published evidence base emerged from the Version 3.0 data refresh that would allow it to be parameterised defensibly, and an unparameterisable component has no place in a probabilistic model. Deaths of this kind (delayed treatment due to unstable housing, medication non-compliance in chaotic living situations, deaths during forced relocations) undoubtedly occur; their omission makes the model conservative, and this is stated in the Limitations rather than guessed at in the arithmetic.

3. The Multi-Pathway Mortality Model

3.1 Model Structure

Total estimated deaths are calculated as the escalated visible pathway plus deaths across seven hidden pathways, minus an inter-pathway overlap adjustment:

```
E_total = E_visible-adj·T_esc + [(E_SUDI + E_suicide/OD + E_FDV + E_accident
          + E_unlinked + E_OOHC + E_neonatal) × (1 − O_rate)]
```

where the suicide/OD, accident and unlinked pathways also carry T_esc internally.

3.2 Formal Expression

```
E_total = (E_AIHW / C_rate) × T_esc
        + [ (S_total × PAF_housing)
          + (P_hidden,adol × R_adol × (M_adol − 1) × F_suicide × T_esc)
          + (E_filicide_DFV × H_counterfactual)
          + Σ(P_hidden,a × R_a × (M_a − 1)) × T_esc     [ages 1–11]
          + (E_visible-adj × T_esc × T_rate)
          + E_OOHC
          + (N_total × PAF_maternal × A_housing)
          ] × (1 − O_rate)

Where:
  E_AIHW           = AIHW-reported linked deaths (~35/year, 11-year period)
  C_rate           = Combined coverage-and-linkage rate (0.70; 0.65–0.75)
  T_esc            = Temporal escalation factor (1.15; 1.05–1.30)
  S_total          = Annual SUDI deaths (100; 90–117)
  PAF_housing      = Population attributable fraction for housing (see 3.3)
  P_hidden,adol    = Hidden homeless population aged 12–17 (~40,000; 30,000–55,000)
  R_adol           = Baseline mortality rate, 12–17 composite (~22/100,000)
  M_adol           = Hidden-population risk multiplier (4.5; 3.0–6.0)
  F_suicide        = Cause-specific fraction, suicide/OD (0.55; 0.45–0.65)
  E_filicide_DFV   = Annual DFV-context filicides (14; 11–17)
  H_counterfactual = Housing-preventable fraction (0.40; 0.30–0.50)
  T_rate           = Temporal unlinking rate (0.15; 0.10–0.20)
  E_OOHC           = Child protection interface deaths (4; 2–6)
  N_total          = Annual neonatal deaths (719; ABS 2025b)
  PAF_maternal     = PAF for maternal housing insecurity (see 3.3)
  A_housing        = Housing-specific attribution (0.20; 0.15–0.25)
  O_rate           = Inter-pathway overlap rate (0.07; 0.05–0.10)
```

All population-rate pathways use **(M − 1)**: excess deaths beyond baseline, not total deaths at the elevated rate.

3.3 Pathway Calculations

Central (modal) values are shown below; Section 3.6 reports the Monte Carlo medians and credible intervals, which are the headline figures.

Pathway 1: Visible Deaths (Coverage-and-Linkage-Adjusted, Escalated)

```
E_visible-adj = 35 ÷ 0.70 = 50 deaths/year   (study-period-average conditions)
Escalated:      50 × 1.15 ≈ 58 deaths/year   (current-year conditions)
```

> **Change from V2.0:** baseline and adjustment unchanged (no newer NACS data exists); temporal escalation now applied here rather than in a post-hoc adjustment. The escalated figure estimates *current-year* SHS-connected child deaths, on the logic that the SHS-connected population has grown materially since the study-period midpoint.

Pathway 2: SUDI in Housing-Insecure Infants

The national SUDI count has fallen: **100 SUDI deaths in 2024** (Red Nose 2026, from ABS Causes of Death 2024), down from the 117 (2022) used in earlier versions. The corroborating QFCC national series records 83 infant deaths from SIDS and undetermined causes in 2023 (QFCC 2026).

PAF approach, as in Version 2.0:

- Proportion of infants in housing-insecure households: p ≈ 0.05 (0.04–0.06)
- Relative risk of SUDI in housing-insecure vs stable-housed infants: RR ≈ 5.0 (4.0–6.0)

```
PAF = p(RR − 1) / [1 + p(RR − 1)] = 0.05 × 4.0 / 1.20 = 0.167

E_SUDI = 100 × 0.167 ≈ 17 deaths/year
```

No escalation applied — the SUDI count is a 2024 figure.

> **Change from V2.0:** input updated 117 → 100; central estimate falls from 20 to 17. The NSW CDRT mechanism evidence (97% modifiable factors; 83% unsuitable bedding; 68% surface-sharing; concentration in the most disadvantaged areas) strengthens the RR assumption without changing it.

Pathway 3: Adolescent Suicide/Overdose (Hidden Population, Excess Deaths)

> "Around 2 in 5 (39%) of all deaths from any cause among SHS clients aged 0–24 years were due to suicide."
>
> — AIHW (2026b), Suicide & Self-harm Monitoring

This new AIHW figure — 39% of *all-cause* deaths among SHS clients aged 0–24, a band diluted by non-suicide infant and child deaths — supports the model's 55% suicide/overdose cause fraction for hidden adolescents aged 12–17. AIHW publishes no 12–17 breakdown for this cohort; the 0–24 figure is the closest published anchor.

- Hidden homeless adolescents (12–17): ~40,000 (30,000–55,000)
- Base mortality rate (12–17 composite): ~22/100,000 (18–26)
- Risk multiplier (hidden): 4.5× (3.0–6.0) → excess factor (M – 1) = 3.5
- Cause-specific fraction (suicide/OD): 0.55 (0.45–0.65)

```
E_suicide/OD = 40,000 × (22/100,000) × 3.5 × 0.55 ≈ 17 deaths/year
Escalated:     17 × 1.15 ≈ 19 deaths/year
```

> **Change from V2.0:** now reports **excess** deaths — (M − 1) rather than M — making attribution consistent with Pathway 5 (see Appendix A, Change 3). This reduces the pre-escalation central from 22 to 17; escalation restores part of the difference. The correction removes an internal inconsistency a reviewer would legitimately flag: Version 2.0 counted all deaths in hidden adolescents at the elevated rate as housing-attributable, including the share who would have died at baseline rates in stable housing.

Pathway 4: FDV-Related Deaths (Housing Barrier)

The ANROWS/ADFVDRN filicide analysis remains the most recent national filicide study (113 filicides 2010–2018; 76% in a DFV context ≈ 11–14 DFV-context cases/year). New single-year data from the AIC: in 2024–25 there were **30 child homicide victims (0–17) and 13 filicide incidents**, against a long-run average of 17 filicide incidents/year since 1989–90 (Bricknell & Miles 2026).

Counterfactual logic unchanged: how many DFV-context filicides would have been prevented if adequate housing had been available to the non-offending parent?

- Annual DFV-context filicides: ~14 (11–17)
- Housing-preventable fraction: 0.40 (0.30–0.50)

```
E_FDV = 14 × 0.40 ≈ 6 deaths/year
```

No escalation — filicide inputs are current-period.

Pathway 5: Accident/Illness (Hidden Children 1–11, Excess Deaths)

Age Band	Hidden Pop.	Base Rate (per 100K)	Hidden Multiplier	Excess Deaths
1–4	30,000	15	3.0×	9.0
5–11	40,000	8	2.5×	4.8
Total				**~14**

```
Escalated: 13.8 × 1.15 ≈ 16 deaths/year
```

ABS 2024 registrations (165 deaths aged 1–4; 111 aged 5–9; 121 aged 10–14) are consistent with the retained base rates.

Pathway 6: Temporally Unlinked Deaths

Deaths occurring more than 12 months after the last SHS contact, excluded from the visible count by the AIHW data window. Estimated at 15% (0.10–0.20) of the adjusted, escalated visible deaths:

```
E_unlinked = 58 × 0.15 ≈ 9 deaths/year
```

This pathway is conceptually distinct from the Pathway 1 adjustment: Pathway 1 corrects *statistical* undercounting (data matching failures, coverage gaps); Pathway 6 captures a genuinely different population whose service contact ended more than 12 months before death but whose housing insecurity persisted (77% of unaccompanied children were still homeless when support ended — AIHW 2025a).

Pathway 7: Child Protection System Interface Deaths

Children removed from families due to homelessness or housing instability who subsequently die in out-of-home care, or die known to child protection where housing drove the intervention.

Version 3.0 anchors this pathway to published state child death review data for the first time:

Jurisdiction	Measure	Count	Year	Source
NSW	Children who died who were known to DCJ (ROSH report within 3 years, or in OOHC)	**89 of 410 child deaths (22%)**	2024	NSW DCJ (2025)
Qld	Children who died known to the child protection system within 12 months	**57** (up from 53)	2024–25	QFCC (2025)
Vic	Death notifications within 12 months of child protection involvement	**37**	2024–25	CCYP (2025)

Across three states, roughly 180 children a year die having been known to child protection — a national envelope plausibly exceeding 250. This pathway claims only the small housing-attributable subset: cases where housing inadequacy drove the substantiation or removal (neglect substantiations were 21% of the national total, ~8,800 children, in 2023–24, and inadequate shelter is a recognised component; no national figure quantifies the housing-driven share). We retain:

Central estimate: 4 deaths/year (2–6)

> **Change from V2.0:** estimate unchanged but now sits inside a published evidence envelope rather than standing alone. The state data confirm the pathway's population is real and substantial; the housing-attributable fraction remains the estimated component.

Pathway 8: Neonatal/Perinatal Deaths Linked to Maternal Homelessness

The neonatal input is now a published figure: **719 neonatal deaths in 2024** (rate 2.5 per 1,000 live births, up 8.9% on 2023; ABS 2025b), replacing Version 2.0's "~700" approximation.

- Proportion of births to housing-insecure mothers: p ≈ 0.04 (0.03–0.05)
- Relative risk of neonatal death: RR ≈ 2.5 (2.0–3.0)

```
PAF = 0.04 × 1.5 / 1.06 = 0.057

E_neonatal = 719 × 0.057 × 0.20 ≈ 8 deaths/year
```

The 0.20 (0.15–0.25) housing-specific attribution factor isolates the component that stable housing would eliminate, net of confounders (substance use, mental health, late/no prenatal care). No escalation — the count is a 2024 figure.

3.4 Inter-Pathway Overlap Adjustment

A single death could be partially attributable across multiple pathways — an adolescent suicide with FDV exposure; a SUDI death in a service-avoidant family also at risk of child protection involvement. We apply an overlap deduction of **7% (5–10%)** to the gross total across Pathways 2–8, unchanged from Version 2.0. The age-stratification of pathways and the structural independence of the infant pathways from the visible baseline (Section 2.4) keep the true overlap low.

3.5 Monte Carlo Simulation

New in Version 3.0, implementing the recommendation Version 2.0 made for itself. The scenario analysis (floor/conservative/central/upper/ceiling) is retired.

Method:

- Every parameter in Section 3.2 is assigned a **triangular distribution** (low, mode, high), with values as listed there and coded in the published script
- **50,000 iterations**; each iteration samples all parameters independently and computes the full pathway model
- Fixed random seed (20260707) for exact reproducibility
- Outputs: median and mean totals, 90% and 95% credible intervals, per-pathway distributions, undercount factor distribution, and Spearman rank-correlation tornado analysis
- Implementation: Python 3 / NumPy; script published at `01_Projects/LANA/Tools/lana_monte_carlo.py` with parameters in a single labelled block for annual updating

Known simplification: parameters are sampled independently. Plausible positive correlations (e.g. between the hidden population size and hidden multipliers, both driven by the same underlying deprivation) would widen the intervals if modelled. The reported credible intervals should therefore be read as the *minimum* honest uncertainty; this is noted in the Limitations.

3.6 Results

All figures are Monte Carlo medians with credible intervals (deaths/year).

Pathway	Median	90% CrI	95% CrI
1. Visible (adjusted, escalated)	60	55–67	54–68
2. SUDI (housing-insecure infants)	17	14–21	13–21
3. Adolescent suicide/OD (hidden, excess)	20	13–30	12–32
4. FDV filicide (housing-preventable)	6	4–7	4–7
5. Accident/illness 1–11 (hidden, excess)	16	12–21	11–22
6. Temporally unlinked	9	7–11	7–12
7. Child protection interface	4	3–5	2–6
8. Neonatal/perinatal	8	6–11	5–11
Overlap-adjusted hidden total (2–8)	74	65–85	63–88
TOTAL	**135**	**123–149**	**121–152**

Undercount factor (total ÷ official annualised baseline): **median 3.7× (90% CrI 3.4–4.1×)** — official statistics capture roughly 27% of estimated actual deaths.

The Monte Carlo median (135) modestly exceeds the deterministic modal calculation (~130) because several distributions are right-skewed; the median is the headline figure.

3.7 Tornado Analysis

Parameters ranked by contribution to output variance (Spearman rank correlation with the total; ρ^2 approximates the share of variance driven by each parameter):

Rank	Parameter	ρ	ρ²	Reading
1	Temporal escalation factor	+0.56	0.31	Largest single uncertainty — how much worse conditions are now than the 2012–23 average
2	Adolescent hidden multiplier	+0.40	0.16	The model's most consequential extrapolation, as flagged since V2.0
3	Adolescent hidden population	+0.28	0.08	Category C flows directly into this
4	Coverage-and-linkage rate	−0.25	0.06	Child-specific linkage failure remains unpublished
5	Hidden multiplier, ages 1–4	+0.25	0.06	
6	Visible baseline	+0.21	0.04	Fixed by AIHW publication cycle
7–25	All remaining parameters		≤0.03 each	Individually minor

Data-collection priorities follow directly: (1) a current-year update of the NACS last-year-of-life analysis would collapse the escalation uncertainty; (2) any Australian mortality study of non-service-connected homeless young people would anchor the adolescent multiplier; (3) publication of child-specific linkage rates by AIHW would resolve rank 4. These three items would together address over half the model's variance.

3.8 Simplified Formula for Ongoing Monitoring

For practical application and annual updating:

```
E_estimated = (E_AIHW × 1.43 × T_esc)
            + [E_SUDI + E_adol + E_FDV + E_accident + E_unlinked + E_OOHC + E_neonatal] ×
0.93

Central values (July 2026):
            = (35 × 1.43 × 1.15) + [17 + 19 + 6 + 16 + 9 + 4 + 8] × 0.93
            = 57.5 + 79 × 0.93
            = 57.5 + 73.5
            ≈ 131  (deterministic; Monte Carlo median 135)
```

For any parameter update, edit the labelled block in `Tools/lana_monte_carlo.py` and re-run — the simulation, credible intervals, and tornado analysis regenerate in seconds. The deterministic formula above is for transparency and back-of-envelope checking only; published figures should come from the simulation.

4. Indigenous Sub-Model

New in Version 3.0, implementing Version 2.0's recommendation. Aboriginal and Torres Strait Islander children are catastrophically overrepresented at every point in the causal chain this model describes. The sub-model estimates their share of the total and validates it against published mortality data.

4.1 Published Anchors

Indicator	Figure	Source
Indigenous share of all homeless persons	**20.4%** (24,930 of 122,494); rate 307 vs 35 per 10,000 (**8.8**×)	ABS (2023b)
Indigenous homeless who are children	**37% under 18**	AHURI (2023)
Indigenous share of SHS clients	**29%** (~82,900); rate 784 vs 82 per 10,000 (**9.6**×)	AIHW (2025b)
Indigenous homeless in severe overcrowding	**60.0%** nationally; **96.3%** in Very Remote areas	ABS (2023b)
Indigenous share of child population (0–17)	**6.8%**	QFCC (2026)
Indigenous share of child deaths (0–17)	**18.1%** (288 of 1,594 in 2023)	QFCC (2026)
Indigenous infant mortality rate ratio	**1.8**× (5.3 vs 3.0 per 1,000, 2017–2021)	AIHW (2026d)
Indigenous child (0–4) mortality rate ratio	**2.1**× (145 vs 70 per 100,000, 2017–2021)	AIHW (2026d)
Indigenous SUDI rate ratio	**~3**× (2.13 vs 0.72 per 1,000; Queensland cohort)	Shipstone et al. (2020)
Indigenous OOHC overrepresentation	**~11**× (50 vs 4.6 per 1,000; 45% of all children in OOHC)	AIHW (2025c)

4.2 Indigenous Share of the Housing-Insecure Child Population

No single published figure states the Indigenous percentage of homeless children; it must be derived (and is flagged as a derivation):

- Census: 24,930 Indigenous homeless persons × 37% under 18 ≈ **9,200 Indigenous homeless children**, against ~29,000 homeless children total → **~32%**
- SHS: 29% of all clients are First Nations, with a younger age profile than non-Indigenous clients → child share ≥ 29%
- The hidden population skews the share *upward*: severe overcrowding — the dominant hidden category — is overwhelmingly Indigenous in remote Australia (96.3% in Very Remote areas)

We adopt a central share of 30% (range 25–35%) of the housing-insecure child population.

4.3 Indigenous-Attributable Estimate

Applying the share to the model total, with the assumption (stated, testable) that per-capita mortality risk *within* the housing-insecure child population is at least as high for Indigenous children as for non-Indigenous children:

```
E_Indigenous = 135 × 0.30 ≈ 40 deaths/year   (range ~30–53 across share and total CrI)
```

Implied rate ratio: Indigenous children at 30% of housing-insecure deaths but 6.8% of the child population implies an Indigenous childhood homelessness death rate approximately **6× the non-Indigenous rate**.

This assumption is likely conservative: Indigenous housing insecurity is concentrated in severe overcrowding in remote areas, where child mortality gradients are steepest (Section 5), and the Indigenous SUDI ratio (~3×) exceeds the general Indigenous child mortality ratio (2.1×), indicating the housing-linked causes are precisely where Indigenous risk is most elevated.

4.4 Sub-Model Validation

- Our estimate implies ~40 of the 288 Indigenous child deaths recorded in 2023 (**~14%**) are housing-attributable, against 8.5% of all child deaths model-wide. Given that Indigenous children experience homelessness at 8.8× the non-Indigenous rate, a housing-attributable share 1.6× the national average is conservative-to-plausible. ✓
- The published Indigenous child death share (18.1%) against population share (6.8%) yields an implied all-cause rate ratio near 3× for ages 0–17 — higher than the 2.1× published for ages 0–4. Housing insecurity is among the most plausible drivers of that excess. ✓

4.5 Data Gaps

- No published national SUDI rate ratio by Indigenous status (the ~3× is a Queensland cohort study)
- No Indigenous-specific homeless mortality data of any kind — the NACS analysis publishes no Indigenous child breakdown
- Under-18 Indigenous share of SHS clients not published in report narrative (may exist in AIHW data tables FN.2/FN.3)
- Indigenous child (0–17) mortality rate ratio not published nationally — the 0–4 figure (2.1×) is the closest anchor, and the QFCC share-derived ~3× (0–17) suggests risk rises with age

> **Note:** child mortality is no longer a formal Closing the Gap target (the National Agreement's Target 2 is healthy birthweight). The deaths this sub-model describes sit outside every current national accountability framework.

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5. Geographic Variation

New in Version 3.0. The model's national parameters average over extreme geographic disparities. Full quantification is not possible with published data — the required all-persons homelessness rates by remoteness exist only in unpublished ABS data cubes, and no current national child mortality gradient by remoteness is published — but the direction and rough magnitude of the variation are clear and belong in the model's interpretation.

5.1 Published Gradients

Indicator	Major Cities	Remote / Very Remote	Ratio	Source
Indigenous homelessness (per 10,000)	155	705 / **1,439**	up to 9×	ABS (2023b)
SHS client rate (per 10,000, all persons)	~91	**337**	3.7×	AIHW (2025b)
Infant mortality (per 1,000 live births)	2.9	5.9	~2×	AIHW (2022)*
Child deaths (per 100,000)	9.4	25	~2.7×	AIHW (2022)*
Child/adolescent injury fatality (0–19)	—	—	~6× (Very Remote)	MDPI Children (2021)

* 2015–2017 data — the most recent published national child mortality gradient by remoteness; flagged as dated.

Jurisdictionally: the NT's homelessness rate (564 per 10,000) is nearly 12× the national rate (48); 75.6% of NT homeless people live in severely crowded dwellings; 87% of the NT homeless population is Aboriginal; the NT child death rate (63.8 per 100,000 in 2023) is 2.3× the national rate (QFCC 2026). In remote SHS services, 92% of clients are First Nations (AIHW 2025b).

5.2 Indicative Pathway Geography

- **Pathways 2 (SUDI), 5 (accident/illness) and 8 (neonatal) skew heavily remote**: they run through severe overcrowding, environmental hazard, and healthcare distance — conditions concentrated in remote and Very Remote Australia, where the overcrowding form of homelessness dominates
- **Pathway 3 (adolescent suicide/overdose) skews urban and regional**: couch surfing and unaccompanied youth homelessness are predominantly metropolitan and regional phenomena
- **Pathways 4, 6 and 7 are more geographically diffuse**, following FDV and child protection system contact

The national model likely **underestimates remote-area deaths**: its base mortality rates are national averages, but the children most exposed to the overcrowding pathways live where child mortality runs 2–3× (and injury mortality up to 6×) the metropolitan rate. A geographically stratified model would probably raise the national total, not lower it.

5.3 What Full Quantification Requires

1. ABS publication (or data cube extraction) of all-persons homelessness rates by remoteness area, by age
2. A current national child mortality series by remoteness (the newest is 2015–2017)
3. Remoteness-coded SHS child client mortality — which the NACS could support but does not publish

---

6. Model Validation

6.1 Cross-Validation Tests

Test 1: Ratio to Adult Deaths

The AIHW reports approximately 1,400–1,500 adult SHS-connected deaths annually. Children represent approximately 10–12% of the homeless population but have substantially lower base mortality rates; child deaths should represent roughly 8–15% of adult deaths.

135 ÷ 1,450 = 9.3% ✓ *Consistent*

Test 2: Proportion of Total Child Mortality

Australia recorded **1,594 child deaths (0–17) in 2023** (QFCC 2026 — updating the ~1,650 approximation used in V2.0). Our estimate represents 135 ÷ 1,594 = **8.5%** of all child deaths. Given 2.3% of children experience housing insecurity with 2.5–4.5× mortality elevation, this proportion is consistent with a weighted PAF across all cause categories. ✓ *Plausible*

Test 3: Coronial Data Floor

Victorian coronial data shows approximately 100 child deaths annually requiring investigation, with 15–20% involving indicators of socioeconomic distress. Extrapolating nationally (Victoria ≈ 25% of the child population): (100 × 0.175) ÷ 0.25 = 70 deaths as a floor. Our estimate (135) exceeds this floor, as expected for a model that includes populations invisible to coronial classification. ✓

Test 4: International Benchmarking

International studies of homeless mortality undercounting consistently find official statistics capture 20–35% of actual deaths (UK adult studies: 3–5× undercount; Canadian youth studies: 2–4×; US family homelessness studies: 3–6×). Our undercount factor of 3.7× (90% CrI 3.4–4.1×) implies a ~27% capture rate — inside the international range. ✓

Test 5: Filicide Cross-Check

The ANROWS data identifies ~14 DFV-context filicides per year; the AIC's latest single year recorded 13 filicide incidents against a long-run average of 17. Our FDV pathway estimate of 6 housing-preventable deaths represents ~40% of DFV-context filicides — plausible given documented housing barriers to leaving violent relationships, without being implausibly high. ✓

Test 6: Child Protection Envelope (NEW)

Children known to child protection who died: NSW 89 (22% of all NSW child deaths, 2024), Queensland 57 (2024–25), Victoria 37 (2024–25) — roughly 180/year across three states, implying a national envelope above 250. Our pathways that substantially intersect this population (Pathways 4, 7, and portions of 1, 3 and 5 — together roughly 40–70 deaths/year) fit comfortably inside it. The model would fail this test if its child-protection-adjacent estimates exceeded the published envelope; they do not. ✓

Test 7: Suicide Monitoring Cross-Check (NEW)

AIHW reports that 39% of all-cause deaths among SHS clients aged 0–24 were suicides (AIHW 2026b). Our Pathway 3 cause fraction (55% suicide/OD for ages 12–17) must exceed the 0–24 all-cause figure, since the 0–24 band is diluted by infant and young-child deaths that are rarely suicide — and it does, by a consistent margin. ✓

6.2 Indigenous-Specific Validation

Carried out within the sub-model — see Section 4.4. The sub-model's implied Indigenous housing-attributable share (~14% of Indigenous child deaths) and rate ratio (~6×) are internally consistent with the published mortality anchors (2.1× at 0–4; ~3× implied at 0–17; 8.8× homelessness exposure). ✓

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7. Limitations and Caveats

Important Limitations

- **Hidden population estimates** rely on multipliers derived from service data and academic research, not direct observation. Category C is now triangulated against every published anchor that exists (Section 2.5) — all consistent with the estimate, none capable of confirming it directly. The decisive anchors (school-based homelessness counts, health-linkage estimates of non-service-connected families) do not exist in Australian data.
- **Risk multipliers** for the hidden population remain extrapolated from visible-population evidence (AIHW's 1.4–1.7×). The Monte Carlo samples them across wide ranges, and the tornado analysis confirms the adolescent multiplier is the model's second-largest uncertainty. No Australian mortality study of non-service-connected homeless young people exists.
- **The temporal escalation factor**, though now parameterised and evidence-anchored, is the largest single contributor to output variance ($\rho^2 = 0.31$). It will remain so until AIHW publishes a current-period update of the last-year-of-life analysis.
- **Parameter independence:** the simulation samples parameters independently. Plausible positive correlations between them would widen the credible intervals; the reported intervals are therefore a lower bound on honest uncertainty.
- **Sub-clinical deaths** (delayed treatment, medication non-compliance in chaotic housing, deaths during forced relocations) are real but unquantifiable with current evidence and are excluded from the arithmetic — a source of conservatism, not completeness.
- **The counterfactual framing** ("would this death have been prevented by adequate housing?") is inherently speculative. Housing insecurity rarely acts alone; the model isolates the housing-attributable component, but the separation is analytically difficult.
- **Geographic averaging** likely understates remote-area deaths (Section 5.2): national base rates are applied to a population whose overcrowding-exposed segment lives where child mortality is 2–3× higher.
- **The Indigenous sub-model share (30%)** is a derivation from Census, SHS and overcrowding components — no published figure states the Indigenous proportion of homeless children, and the sub-model inherits that gap.
- **Temporal lag:** the 2021 Census remains the population baseline; Census 2026 homelessness estimates are not yet published. Year-to-year variation in a small-number domain (a single mass filicide event, for instance) can move annual figures materially.
- **Double-counting risk** is managed through the overlap deduction (5–10%) and pathway age-stratification, but residual overlap cannot be fully excluded, particularly between the

FDV-adjacent pathways (4 and 7).

Despite these limitations, the fundamental finding — that official statistics capture only a fraction of actual deaths — is robust across the full sampled parameter space. The 2.5th percentile of 50,000 simulations (121 deaths/year) is more than triple the official annualised count.

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Simulation Code

- `01_Projects/LANA/Tools/lana_monte_carlo.py` — Python 3 / NumPy, 50,000 iterations, seed 20260707. All parameters in one labelled block for annual updating.

Appendix A: Detailed Changelog from Version 2.0

Summary of Changes

Version 3.0's central estimate is **135 deaths/year (95% CrI 121–152)**, down from Version 2.0's 155. The reduction is driven by three deliberate corrections — consistent excess-deaths attribution, an updated (lower) national SUDI count, and the replacement of the +29 post-hoc adjustment with a parameterised escalation factor — not by any evidence that fewer children are dying. The model is now fully probabilistic, its weakest estimate is triangulated against independent evidence, and its two new analytical sections (Indigenous, geographic) address the populations where the toll concentrates. As with the 2.0 revision, defensibility is prioritised over headline size.

Change 1: Full Data Refresh

Every input parameter was checked against the newest published release (July 2026). Updated: SUDI 117 → 100 (Red Nose, 2024 data); neonatal deaths ~700 → 719 published (ABS Perinatal Deaths 2024); child SHS clients 76,000 → 78,800 (AIHW 2024–25); total national child deaths ~1,650 → 1,594 (QFCC, 2023 data); social housing share 4.1% → 4.0% (June 2025); filicide single-year data added (AIC 2024–25: 13 incidents, 30 child homicide victims). Unchanged at source: the NACS visible baseline (no newer last-year-of-life data exists; study period still 2012–13 to 2022–23), the 79.25% linkage rate (reconfirmed May 2026), child protection substantiation shares (2024–25 report not yet published), and the ANROWS filicide series (still the most recent national analysis).

Change 2: Monte Carlo Simulation Replaces Scenario Analysis

V2.0: five discrete scenarios (floor 89 / conservative 107 / central 155 / upper-central 181 / ceiling 240); recommendation to implement Monte Carlo in a future version.

V3.0: 50,000-iteration Monte Carlo simulation over triangular distributions for all 25 parameters; fixed seed; published script. Results are genuine credible intervals (95% CrI 121–152) rather than scenario bounds, and the tornado analysis identifies which parameters drive uncertainty — directly prioritising future data collection (temporal escalation 31% of variance; adolescent hidden multiplier 16%; adolescent hidden population 8%).

Impact: the uncertainty statement changes from "range 136–181" to "95% CrI 121–152". The interval is narrower than V2.0's range at the top end because the discrete "upper-central" scenario stacked several high-end assumptions simultaneously — a configuration the simulation shows is jointly improbable.

Change 3: Pathway 3 — Excess-Deaths Attribution

V2.0: Pathway 3 counted all deaths in hidden adolescents at the elevated rate (multiplier M), while Pathway 5 was corrected to count excess deaths only (M − 1). Internally inconsistent.

V3.0: Pathway 3 uses (M − 1), consistent with the attributable-death definition in Section 1.3: some hidden homeless adolescents would have died at baseline rates even in stable housing, and those deaths are not attributable to housing.

Impact: pre-escalation central falls from 22 to 17; with escalation, the Monte Carlo median is 20. This closes the model's last inconsistency in attribution logic.

Change 4: Temporal Escalation Formalised; +29 Adjustment Removed

V2.0: pathway sum of 126 was raised to 155 by a +29 "temporal trend and sub-clinical" adjustment described in a reconciliation note — outside the pathway structure, with no explicit uncertainty.

V3.0: a temporal escalation factor T_esc ~ triangular(1.05, 1.15, 1.30), evidence-anchored to the persistent-homelessness trend (+39% over six years), unassisted-request growth (+17% in one year) and social housing decline, applied *inside the model* to the four pathways calibrated to study-period-average conditions (1, 3, 5, 6) and sampled in the simulation. Pathways with current-year inputs (2, 4, 7, 8) receive no escalation.

Impact: the temporal component contributes ~+15 rather than +29, and now carries explicit uncertainty (it is the tornado's top-ranked parameter). The former "sub-clinical" component is removed entirely — see Change 5.

Change 5: Sub-Clinical Allowance Dropped

V2.0: part of the +29 covered "sub-clinical pathway deaths" — deaths not fitting any defined pathway.

V3.0: removed from the arithmetic. The data refresh surfaced no evidence base capable of parameterising it, and an unparameterisable component is indefensible inside a probabilistic model. The category is retained qualitatively in the Limitations as a stated source of conservatism.

Impact: approximately −10 to −14 relative to V2.0's implicit allocation.

Change 6: Category C Triangulated Against Independent Anchors

V2.0: the 0.8× service-avoidance multiplier was flagged as the least-evidenced parameter, supported by contextual trends only.

V3.0: tested against every published independent anchor: Impact Economics' modelling (48,195 people/year never reach a service; 123,472 missing out), the ABS GSS finding that 67% of people who experienced homelessness sought no help, Mission Australia's ~1-in-10 youth homelessness prevalence, and direct child turn-away counts (19,833 in 2022–23). All are consistent with 0.8×; two suggest it is conservative; none pushes it lower. The anchors that would settle the question (school-based homelessness counts, health-linkage studies of non-service-connected families) are documented as not existing in Australia — itself now stated as a policy finding. Base updated to the current client count: 78,800 × 0.8 = 63,000; hidden total 103,000 → 105,000; total housing-insecure children 132,000 → 134,000.

Change 7: Pathway 7 Anchored to State Child Death Review Data

V2.0: central estimate of 4 deaths/year stood on reasoning alone.

V3.0: anchored to published state data — children who died known to child protection: NSW 89 (22% of all NSW child deaths, 2024), Queensland 57 (2024–25), Victoria 37 (2024–25). The estimate is unchanged (4; range 2–6) but now sits inside a published envelope, and the absence of any national quantification of housing-driven removals is documented (with a warning that circulating "9% of removals" figures are US data).

Change 8: SUDI Input Updated

V2.0: 117 SUDI deaths (2022) × PAF 0.17 = 20 deaths/year.

V3.0: 100 SUDI deaths (2024, Red Nose June 2026 update) × PAF 0.167 ≈ 17 deaths/year. PAF method and parameters unchanged; NSW CDRT mechanism evidence added (97% modifiable factors, 83% unsuitable bedding, 68% surface-sharing, concentration in disadvantage).

Change 9: Neonatal Input Now Published Data

V2.0: approximated ~700 neonatal deaths/year.

V3.0: 719 neonatal deaths in 2024 (ABS Perinatal Deaths, released November 2025). PAF approach unchanged; central estimate stays 8 deaths/year.

Change 10: Indigenous Sub-Model Added (New Section 4)

Implements V2.0's recommendation. Derives an Indigenous share of the housing-insecure child population (30%; range 25–35%) from Census, SHS and overcrowding components; estimates ~40 Indigenous child deaths/year (~14% of all Indigenous child deaths; implied rate ratio ~6×); validates against published mortality anchors. Corrects two V2.0 assumptions against newer publications: Indigenous share of child population 6% → 6.8%, and share of child deaths 14% → 18.1% (QFCC 2023 data). Data gaps (no national SUDI ratio, no Indigenous homeless-mortality data, no published Indigenous share of homeless children) are itemised.

Change 11: Geographic Variation Added (New Section 5)

Implements V2.0's recommendation at best-available depth. Publishes the known gradients (Indigenous homelessness up to 1,439 per 10,000 in Very Remote areas; SHS client rates 3.7× in remote areas; child mortality ~2–2.7× and injury mortality ~6× in remote/Very Remote areas), assigns indicative geography to each pathway, and concludes the national model likely *underestimates* remote-area deaths. Full quantification is blocked by three identified data gaps.

Change 12: Two New Validation Tests

Added Test 6 (child protection envelope: model estimates fit inside the ~250+/year national envelope of deaths of children known to child protection) and Test 7 (suicide monitoring cross-check: the Pathway 3 cause fraction is consistent with AIHW's published 39% suicide share of 0–24 SHS client deaths). Seven tests now pass, plus Indigenous-specific validation inside the sub-model.

Net Impact Summary

Component	V2.0	V3.0 (MC median)	Change
Visible (adjusted; V3.0 escalated)	50	60	+10
SUDI	20	17	−3
Adolescent suicide/OD	22	20	−2
FDV filicide	6	6	0
Accident/illness (1–11)	14	16	+2
Temporally unlinked	8	9	+1
Child protection interface	4	4	0
Neonatal	8	8	0
Overlap adjustment	−6	−6	0
Temporal trend + sub-clinical bolt-on	+29	— (absorbed/removed)	−29
TOTAL	**155**	**135**	**−20**

The central estimate decreased by 20 deaths/year (13%). The key drivers are the removal of the unstructured +29 (−29, partially absorbed as ~+15 of in-model escalation), the excess-deaths correction to Pathway 3, and the lower published SUDI count, offset by escalation applied to Pathways 1, 5 and 6. The uncertainty statement improves from a scenario range (136–181) to a genuine 95% credible interval (121–152) from 50,000 simulations. Even the 2.5th percentile of the simulation exceeds the official count more than threefold.