Poverty amid Progress:
The Hidden Cost of a Cold Shock in Mongolia

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The 2023/24 dzud killed **nine million livestock, one in seven.** Yet **poverty kept falling fast.**

A dzud is an extreme winter of deep cold, heavy snow and ice-locked pasture. Outside the capital, one household in three herds.

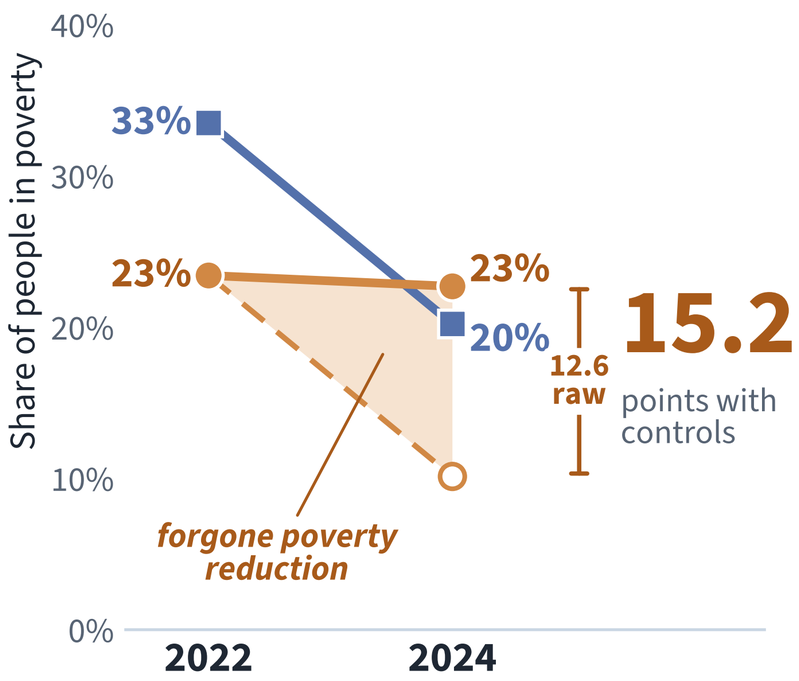
What did falling poverty hide? For whom, and how?
A large, concentrated loss. Herders most, but not alone.

Severely affected districts · Less affected districts · Severely affected, had poverty fallen like the rest

Underneath the decline

All households

Flat where the winter hit hardest, falling elsewhere



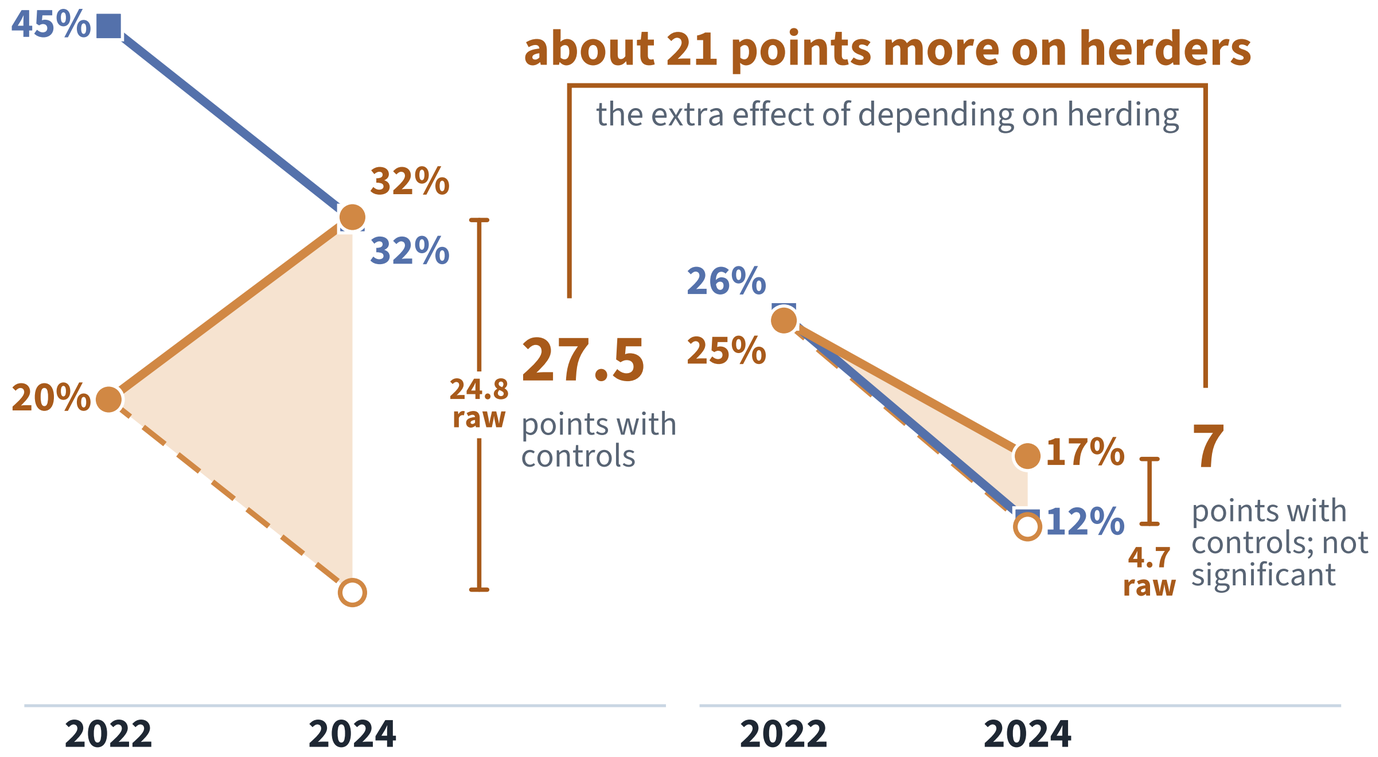
Who carried it: herders against non-herders

Herders

Rising where the winter hit hardest

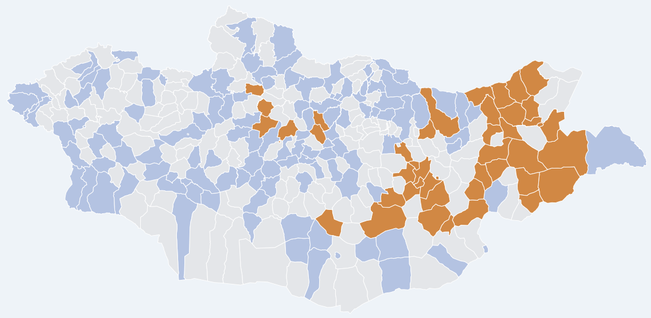
Non-herders

Falling less, not significantly



Same households, 2022 and 2024, outside the capital. Dashed: poverty in the severely affected districts had it fallen like the rest. Bracket: the raw gap. Large number: the estimate with controls.

1 The study design



Severely affected: 46 districts whose cold or snow, against their own history, was in the top 15 percent. Lost **27 percent** of livestock.

Less affected: 129 others. Lost **9 percent**.



Difference-in-differences $\beta = 15.2$

$$Y_{ist} = \alpha_i + \lambda_t + \boldsymbol{\beta}\,(\text{Severe}_s \times \text{Post}_t) + (X_i \times \text{Post}_t)'\delta + \varepsilon_{ist}$$

Triple difference $\gamma = 20.6$

adds $\text{Post}_t \times \text{Herder}_i$ and $\boldsymbol{\gamma}\,(\text{Severe}_s \times \text{Post}_t \times \text{Herder}_i)$

Anything that raised poverty equally for herders and non-herders, such as blocked roads, cancels out of γ.

$Y = 1$ if poor; 2,128 households. Household and year fixed effects; X: baseline traits, region, interview quarter.

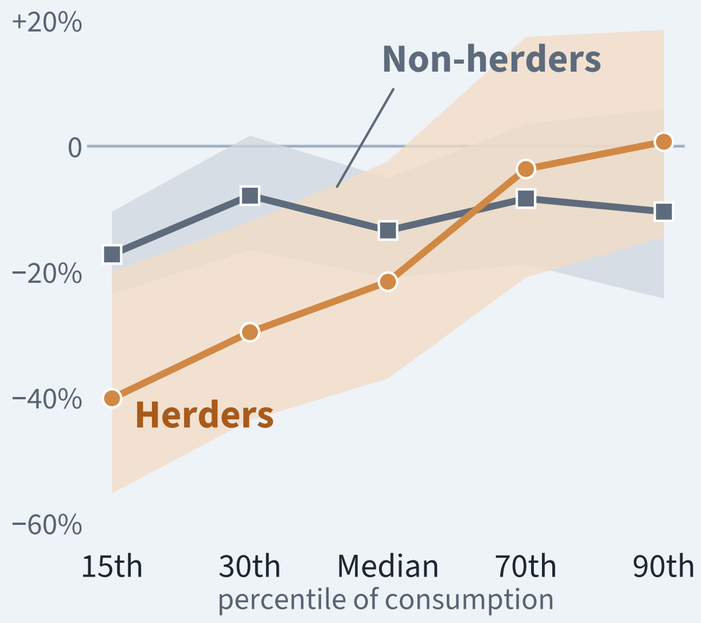
- ✔ Parallel pre-trend; placebo winter: no effect*
- ✔ Herder gap also stable before the winter*

*Earlier survey rounds in the same 175 districts; the panel starts in 2022.

2 For whom, and how

Where the loss landed

Herders crossed the poverty line; poor non-herders fell further below it.



Consumption against the less affected districts, by percentile. Bands: 90 percent confidence intervals.

Herders: mainly deaths, not distress sales

Herds shrank **36 percent**, against 13 percent elsewhere.

Non-herders: the food channel

Calories about **12 percent** lower. They had less of their own food as prices rose, and food took 47 percent of poor budgets.

3 Policy implications

- **Look beyond the national aggregate.** Report poverty and its depth for the places and livelihoods a disaster hits.
- **Reach beyond herders.** Base relief on need, not herd ownership: poor non-herders lost food, not herds.
- **Can anticipatory cash cost less?** Consumption lost in 2024: **$65 to 88 million** (10 to 13 percent). Emergency response: **$15 million**. Cash ahead of the winter: **$9 to 36 million**, depending on targeting.†

†$238 per household (Mogge et al. 2025): 38,554 herder households in severely affected districts, up to 152,371 outside the capital. Costs, not returns: in that trial, small herders kept more animals; on average, no effect.

A falling national headcount is not evidence that a shock was absorbed.

Extreme winters will come again.

When the numbers show progress, look for the hidden cost.

Robustness. The poverty effect survives a trend break 1.4 times the largest seen in earlier rounds. Allowing steeper trends where poverty started higher: 9.4 to 11.3 points. Other estimators: 7.9 to 15.2 points; herder gap 19 to 21. Capital added as a comparison: 10.9 points. Without the West: unchanged. Less affected were also hit, so against no dzud this is a lower bound.

Poverty rates are the authors' calculations. Data: HSES 2022 and 2024 household panel (National Statistics Office of Mongolia); CRU TS 4.09 temperature; MODIS snow cover; NSO livestock statistics. Grey on the map: no panel households, or the capital. Emergency response: UNDP (2025). Prepared with the help of Claude, with the frost texture generated by ChatGPT. The views expressed are the authors' and do not necessarily represent those of the World Bank, its Executive Directors, or the governments they represent.