FO-01 What people die of when the system fails: mortality after collapse, siege and sanction

HEALING after the FALL, research library, FO-01

Researched 10 October 2026 by Claude Opus agent for THRIVING after the FALL, Book Four. Library document, unverified.

How to read this document

This is the map that weights every other chapter of HEALING after the FALL. It asks the same questions of every documented collapse, siege, sanction regime, epidemic and plague. Who died? Of what? How fast? Could cheap lay care have prevented it? The cases differ in quality. Some are counted well: Russian vital registration in the 1990s, the Sarajevo household survey of 1994, and cholera surveillance in Haiti and Yemen. Some are estimates built on thin data, as for Leningrad, Syria and the 1918 influenza. Some were inflated by a government or simplified by advocates, as with the Iraqi half million and several Venezuelan and Yemeni figures. Each section says which kind it is.

The report keeps three kinds of death apart, because each calls for a different chapter of the book:

- **Loss of a drug.** The patient lived because of a manufactured product, such as insulin, dialysis, antiretrovirals or anti-rejection drugs. When supply stops, death follows on the disease's timetable.
- **Loss of a system.** The patient needed an organised capability, such as an operating theatre, blood for transfusion, a caesarean section or intensive care.
- **Loss of prevention.** People were protected by something that worked quietly and at scale: chlorinated water, sewerage, vaccination, food distribution, heating. When it stops, deaths come later and fall mostly on children and the frail, through infection and hunger.

Every modern case here still had some hospitals, imports and aid, so they understate what the Fall would do. Deep-time cases show a world without those things. But they carried burdens the Fall may not, such as smallpox and plague. And they lacked one it will have: an old population kept alive by drugs.

1. Findings by case

1.1 Baselines: what normal death looks like

Before modern medicine. For most of history, roughly one child in two died before age 15. Until at least 1800, more than one in three died before age five (Roser, undated). In 1750 to 1780, about 40% of Swedish and about 45% of French children died before age 15 (same source). Volk and Atkinson (2013) pooled hunter-gatherer and historical populations. They estimated that about 27% of infants died in the first year and about 47.5% of children died before puberty. These are the rates a population drifts back towards when clean water, vaccination and antibiotics are gone and nothing replaces them. They replicate across many unrelated societies and are among the best-supported figures in this report.

Childbirth without obstetric care. The cleanest modern natural experiment comes from the Faith Assembly, an Indiana sect that refused medical care. Kaunitz and colleagues (1984) verified all perinatal and maternal deaths among members from 1975 to 1982. Results:

- 85% of mothers had no prenatal care.
- Maternal mortality was 872 per 100,000 live births, against 9 for the rest of Indiana.
- Of six maternal deaths, four were from haemorrhage and two from infection.
- Perinatal mortality was 48 per 1,000, against 18 (CDC MMWR 1984).

This was a well-fed, literate, temperate population with clean water, much like the European village after the Fall. Historically, English maternal mortality stood near 50 per 10,000 births for much of the nineteenth century (Loudon 1992) [VERIFY exact table values, read only in a garbled extract]. In England and Wales in 1926, sepsis caused 1,109 of 2,860 maternal deaths, about 39%. Today, WHO's systematic analysis gives these shares of maternal deaths (Say et al. 2014):

- haemorrhage 27.1%
- hypertensive disorders 14.0%
- sepsis 10.7%
- abortion 7.9%
- embolism 3.2%
- other direct causes 9.6%
- indirect causes 27.5%

Low-income countries today. WHO's Global Health Estimates for 2019 rank neonatal conditions first among causes of death in low-income countries. Diarrhoea is in the top five, malaria sixth, tuberculosis eighth and HIV ninth (WHO 2020). Crude death rates there are near 8 to 10 per 1,000 per year because the populations are young. In 2023 Burkina Faso stood at 7.96 and South Sudan at 9.61 (World Bank). The EU's crude death rate is about 11.5 per 1,000, higher because its population is old.

The humanitarian yardstick. Agencies declare an emergency when the crude mortality rate doubles from baseline. Where the baseline is unknown, the threshold is 1 death per 10,000 people per day, or 2 per 10,000 per day for under-fives (UNHCR, current). One per 10,000 per day equals 36.5 per 1,000 per year. In a village of 300, that is about 11 deaths a year, or almost one a month.

1.2 The Soviet collapse, 1991 to 1994

What happened. Russian male life expectancy fell from 64.2 years in 1989 to 57.6 in 1994. Female life expectancy fell by 3.3 years (Brainerd and Cutler 2005). Leon and colleagues (1997) showed the fall was real, not an artefact of recording: cancer mortality stayed stable while other causes swung. Bloom and Malaney (1998) estimated about 1.6 million excess deaths in 1990 to 1995 [VERIFY: read only as quoted].

Who died. This is the first surprise. Between 1989 and 1994 the death rate rose by:

- 74% for men aged 35 to 44
- 25% for men aged 65 to 74
- 14% for men aged 75 to 84

Infant mortality fell, and death rates under 14 changed little (Brainerd and Cutler 2005). The deaths concentrated in poorly educated men of working age. For 1995 to 2001, annual mortality was 1.86% among adults with primary education against 0.23% among those with higher education (same source).

Of what. Brainerd and Cutler (2005, Table 1) break down the rise in deaths from 1989 to 1994:

Cause (share of the increase)	Men	Women
Circulatory disease	41.8%	46.6%
of which ischaemic heart disease	21.3%	15.5%
of which stroke	10.4%	16.7%
External causes	32.7%	20.1%
of which alcohol poisoning	7.0%	5.7%
of which homicide	4.7%	3.6%
of which suicide	4.5%	1.0%
Ill-defined conditions	10.0%	21.0%
Pneumonia	3.3%	1.4%
Bronchitis	2.6%	0.0%
Tuberculosis	1.9%	0.5%
Diabetes	0.5%	2.0%

Alcohol against health-system failure. The weight of evidence points at alcohol:

- The real price of alcohol fell by 58% between December 1990 and December 1994 (Brainerd and Cutler 2005).
- In Izhevsk, men who were problem drinkers or drank non-beverage spirits (colognes, medicinal tinctures) had six times the mortality of other men. Hazardous drinking accounted for 43% of deaths in men aged 25 to 54 (Leon et al. 2007).
- Bhattacharya, Gathmann and Miller (2013) attribute a large share of the crisis to the end of Gorbachev's anti-alcohol campaign.
- The recovery after 1994 was mainly in alcohol-related deaths (Shkolnikov, McKee and Leon 2001, Leon, Shkolnikov and McKee 2009).

The case for health-system failure is weaker than it looks:

- In Novosibirsk, stroke case fatality stayed between 28 and 43%. More people had strokes, but no larger share of them died (Stegmayr et al. 2000, as cited in Brainerd and Cutler 2005).
- Maternal mortality, a sensitive test of basic acute care, barely moved. It was 49.0 per 100,000 in 1989, 53.3 in 1995 and 39.7 in 2000 (same source).

Brainerd and Cutler conclude that the decline of the health system, diet and deprivation explain little of the rise. Alcohol and stress explain part, and a large residual remains. Shkolnikov, Cornia, Leon and Meslé (1998) reached a similar verdict [VERIFY: read via summary]. Stuckler, King and McKee (2009) claimed mass privatisation raised male mortality by 13%. Reanalyses by Gerry, Mickiewicz and Nikoloski (2010) and by Earle and Gehlbach (2010) did not support that claim.

Lost prevention. One clear prevention failure was diphtheria. Childhood immunisation lapsed and adults were not boosted. Across the former Soviet Union there were over 140,000 cases and over 4,000 deaths after 1990, three quarters of the cases in Russia (Vitek and Wharton 1998). The epidemic was controlled by vaccinating adults. Adult coverage rose from about 20% in 1990 to 70 to 80% by the end of 1995.

Lesson. A population can lose its state, its currency and much of its health care without dying mainly of infection, as long as water, heating, food and most vaccination continue. The excess killers were heart disease, stroke, poisoning and violence in middle-aged men, driven by cheap spirits and despair.

Measurement: well measured. But cause coding was inconsistent: "ill-defined conditions" absorbed 10 to 21% of the rise.

1.3 The siege of Leningrad, 1941 to 1944

What happened. The city was encircled from September 1941 to January 1944. On 2 September 1941 the daily bread ration for manual workers was 600 g. By November it was 250 g, and other civilians got 125 g (Wikipedia, citing Salisbury 1969). One compilation gives daily intakes of 403 to 1,009 kcal from December 1941 to March 1942 (EAJC, undated) [VERIFY: advocacy compilation].

How many died, and when. Soviet authorities registered about 670,000 deaths. Independent estimates run from 700,000 to 1.5 million, with many scholars at 1.1 to 1.3 million civilians (Wikipedia, citing Salisbury 1969 and Vågerö et al. 2013). Yarov puts civilian deaths near 900,000. Over half a million of these came in the winter of 1941 to 1942. Death rates in January and February 1942 were about thirty times peacetime (as summarised, book not read).

Reid reports deaths reaching about 100,000 a month in January and February 1942 (Reid 2011, via review). Registration broke down in exactly those months, so the historians Kovalchuk and Sobolev turned to burial records (Novaya Gazeta 2019).

I could not find the lead "Jones and Kovacs on Leningrad" named in the brief. I could not read the archival chapters in Barber and Dzeniskevich (2005), the source to consult for monthly figures.

Of what. Starvation and cold, with shelling a minor cause. One compilation states that 97% died of starvation and exhaustion and 3% of shelling and bombing (EAJC, undated) [VERIFY].

What did not happen. No large epidemic followed in spring 1942:

- Typhus broke out in a children's home in late February and was contained.
- By mid-March, half a million people had been inoculated.
- From 8 March 1942, the survivors, mostly women and teenagers, cleared corpses, excrement and debris from the streets (Salisbury 1969, excerpt).

This is the strongest historical case that organised sanitation can stop the epidemic that usually follows famine. On its own it grades D, but it fits the camp literature in section 1.12.

Lesson. In a cold siege without food, hunger and cold kill adults as well as children. Mortality can go from roughly normal in autumn to thirtyfold by January. A village cannot treat starvation without food. But it can store food and fuel, and it can prevent the second wave of infection.

Measurement: estimate. Registration collapsed at the peak, and the totals were politically shaped for decades.

1.4 The siege of Sarajevo, 1992 to 1996

What happened. A medical team visiting in 1993 estimated about 119 people killed or wounded per day over 18 months, 80% of them civilians (Prehospital and Disaster Medicine 1993). For the whole siege, about 13,952 people were killed, including 5,434 civilians (Wikipedia). The Sarajevo Research and Documentation Centre counted 5,564 civilians.

The best measurement. The Household Survey of Sarajevo 1994 covered about 85,000 households and 340,000 people. Tabeau, Bijak and Sołtysiak (2002) analysed it for the International Criminal Tribunal for the former Yugoslavia. For 10 September 1992 to 10 August 1994, inside the front lines:

- The killing rate was 1,153 per 100,000 over the period.
- The natural death rate was 1,060 per 100,000.
- The total death rate was 2,213 per 100,000, 65% above the pre-war rate of 1,342 per 100,000 over two years (1990 to 1991).
- The wounding rate was 4,412 per 100,000.
- They estimated 4,352 killed and 3,780 natural deaths.

- Killings concentrated in men aged 20 to 69. Natural deaths rose steeply with age.

The second surprise: the natural death rate inside the siege was lower than the pre-war total rate. That was so even though WHO-commissioned nutritionists put the food supply at about 40 tonnes a day against a need of 240 [VERIFY]. There are three possible explanations:

- Many old people left early in the siege.
- A household survey misses people who lived and died alone.
- Only deaths that surviving households reported were counted.

Press reports describe the hidden toll. In December 1992 UNHCR said at least 35 elderly residents of one home near the front line had died over several months from lack of food and heat (UPI 1992). By January 1993 the Nedžarići home had lost 45 residents to the cold (Maass 1993). Births also suffered. In Tuzla Canton, low birth weight rose from 3.6% to 7.5% during the war, and prenatal visits fell from 4.6 to 1.8 per pregnancy (Tuzla study 2010). One non-peer-reviewed source gives Sarajevo perinatal mortality rising from 15.8 to 39.6 per 1,000 [VERIFY]. I could not locate the Lancet and BMJ Sarajevo mortality papers of 1993 to 1996 named in the brief.

Lesson. In a siege with aid convoys, working hospitals and a young population, violence dominates. The hidden toll falls on old people living alone, through cold and hunger, and on babies, through low birth weight.

Measurement: well measured for violent deaths, **probably undercounted** for natural deaths.

1.5 Iraq under sanctions, 1990 to 2003

The most famous number in this case turned out to be false.

The claims.

- Garfield (1999) estimated at least 100,000, and more likely 227,000, excess deaths of young children from August 1991 to March 1998. He attributed about a quarter mainly to the Gulf War and the rest mainly to sanctions. He named diarrhoea and respiratory illness as the main causes, driven by contaminated water, poor food, poor breastfeeding and weaning, and a lack of curative supplies (Cortright 2001, report itself not accessible).
- Ali and Shah (2000) analysed the 1999 survey of about 40,000 households. In south and central Iraq, under-five mortality rose from 56 per 1,000 in 1984 to 1989 to 131 in 1994 to 1999. In the Kurdish north, which had its own administration and more aid, it fell from 80 to 72.
- UNICEF said there would have been 500,000 fewer child deaths in 1991 to 1998 had the decline of the 1980s continued.
- Garfield later revised his estimate to about 350,000 through 2000 (Cortright 2001).

The correction. Three later surveys with full birth histories (2004, 2006 and 2011) put under-five mortality for 1995 to 2000 at about 40 per 1,000, with no sign of a rise from 1991 (Dyson and Cetorelli 2017, LSE 2017). Dyson (2009) concluded that the 1999 data had probably been manipulated by the government. Dyson and Cetorelli called the doubling a "remarkable fiction" (LSE 2017). They do not deny that sanctions cut imports of food and medicine. A 2005 working group had put excess child deaths for 1991 to 1996 at 45,000 to 68,000 [VERIFY]. MERIP (2000) noted that the Iraqi health ministry blamed every under-five death from respiratory infection, diarrhoea and malnutrition on sanctions.

Lesson. The mechanism Garfield described (water, food, weaning, curative supplies) is the right general mechanism for child deaths after lost prevention, even though the scale was inflated. A figure from a government with a motive, or from advocates, is a claim until independent surveys replicate it. And the Kurdish north shows that administration mattered more than the embargo.

Measurement: contested, with the original figure manipulated. Some excess child mortality occurred, but its size is unknown and probably modest.

1.6 Syria after 2011

Violence. Guha-Sapir and colleagues (2018) analysed 143,630 documented violent deaths from March 2011 to December 2016:

- 70.6% were civilians.
- Shelling and air bombardment caused 57.3% of civilian deaths.
- Children's share of civilian deaths rose from 8.9% in 2011 to 23.3% in 2016.

The dataset excludes siege deaths and deaths from lack of medical care.

Indirect deaths. The Syrian Center for Policy Research estimated about 470,000 deaths by early 2016. About 70,000 were indirect: from lost health care, medicines, sanitation and vaccination, and from food scarcity (PBS Frontline 2016). The Disasters Emergency Committee reported clinics where up to half of deaths came from normally treatable chronic conditions. Insulin, oxygen, anaesthetics and intravenous fluids were short, and 90% of drug factories had stopped (DEC 2013). These are observations, not counts.

The best survey. Alhiraki and colleagues (2022) surveyed 1,483 households (12,268 people) in Northwest Syria:

- The crude mortality rate rose 3.55-fold.
- Aerial attacks caused 54.3% of war-related deaths.
- From 2017, most conflict-related deaths were non-violent.
- They extrapolated about 874,000 excess deaths nationally.
- 14.9% of households had a member disabled by the violence.

Lesson. In a long war in a middle-income country, where many people have diabetes, heart disease or kidney disease, the dying shifts over the years from bombs to the slow failure of chronic care.

Measurement: mixed. Violent deaths are well documented. Indirect deaths are estimates.

1.7 Venezuela after 2014

Venezuela is a collapse without war: hyperinflation, emigration and a health budget that evaporated. All figures below are from HRW and Johns Hopkins (2019) unless another source is named.

- **Infants and mothers.** The health ministry's 2016 bulletin reported 11,466 infant deaths against 8,812 in 2015, a 30% rise. It reported 756 maternal deaths, about 66% more (VOA 2017). The health minister who released the data was dismissed and publication stopped.
- **Lost prevention.** Measles returned in 2017 after one case in 2008 to 2015: 9,399 suspected and 6,242 confirmed cases, with 76 deaths. Diphtheria, absent in 2006 to 2015, caused 2,512 suspected cases and 270 deaths from July 2016 to January 2019. Malaria rose from under 36,000 cases in 2009 to over 414,000 in 2017. Tuberculosis rose from 6,000 cases in 2014 to over 13,000 in 2017.
- **Lost drugs.** 87% of registered people with HIV (69,308 of 79,467) were not receiving antiretrovirals in 2018. A former head of the social security institute said dialysis patients fell from 14,824 to about 11,000, with over 3,000 deaths (Pulitzer Center 2019) [VERIFY: single official]. Patient groups reported 26 deaths of transplant patients who went without anti-rejection drugs (same source). The NGO Codevida reported 15 dialysis patients dead during the March 2019 blackout, which the government denied (Eastern Mirror 2019).
- **Hunger.** FAO estimated 11.7% of people undernourished, against under 5% before the crisis. A university survey found 80% of households food insecure and an average weight loss of 11 kg in 2017. Caritas reported acute malnutrition in under-fives rising from 10% to 17%.

Lesson. A modern collapse kills first through lost drugs (dialysis, HIV, transplants), around birth, and then through lost prevention (vaccines, malaria control).

Measurement: partly measured, then suppressed.

1.8 Haiti after the 2010 earthquake

The earthquake. Kolbe and colleagues (2010) had surveyed Port-au-Prince households before the quake of 12 January 2010 and re-interviewed them six weeks after. They estimated 158,679 deaths (95% CI 136,813 to 180,545) from the quake and the following six weeks, with children at high risk. In the weeks after, people fell ill with diarrhoea and fever (Wayne State University 2011). Severe food insecurity affected 18.6% of households. A later survey estimated 49,033 to 86,555 deaths (Population Health Metrics 2013). The government figure of 316,000 [VERIFY] has no published method I could find.

The cholera. Cholera arrived in October 2010. It caused over 820,000 cases and nearly 10,000 reported deaths (CDC). Case fatality fell fast:

- By 13 November 2010, 992 of 16,111 hospitalised patients had died, 6.2%.
- By mid-January 2011, case fatality in facilities was below 1% (Routh et al. 2011).

Routh and colleagues (2011) studied 87 cholera deaths in Artibonite:

- 45% died in the community.
- Of those, 59% never sought care, and 69% of families felt no care was needed.
- Only 23% of those who died in the community took oral rehydration salts at home.
- No household reported making sugar-salt solution.
- Median time from onset to death in the community was 12 hours.

A survey in the north found deaths 2.9 times the expected level [VERIFY].

Lesson. Cholera kills within hours by dehydration, mostly people who did not drink enough of the right fluid in time. This is the most preventable mass death in the record, and lay people with salt, sugar and clean water can prevent it.

Measurement: the earthquake toll is an **estimate**. Cholera is **well measured in facilities, undercounted outside them**.

1.9 Yemen after 2015

- **Cholera.** By 30 November 2018 WHO had recorded 1,361,933 suspected cases and 2,770 deaths, a case fatality of 0.20%. Children under five made up about 29% of cases (WHO EMRO 2018). Compare Haiti's early 6.2%: oral rehydration and treatment centres held deaths down even in a war.
- **All deaths.** A UNDP-commissioned model projected 377,000 deaths by the end of 2021. About 60% were indirect, from lack of food, water and health care, and about 70% of those killed were children under five (Al Jazeera 2021). The brief's date of 2019 for this study is wrong: it was published in November 2021.
- **Hunger.** Save the Children (2018) estimated that 84,701 children under five "may have died" of extreme hunger or disease. They applied an untreated case fatality of 20 to 30% for severe acute malnutrition to children aid could not reach. This is a model.

Lesson. In a poor, young, hot country, the indirect deaths of war are children's deaths from hunger and diarrhoea.

Measurement: cholera **well measured**, total deaths **modelled**, hunger deaths an **advocacy estimate**.

1.10 The 1918 influenza

Scale. About a third of the world's population, roughly 500 million people, fell ill. Case fatality exceeded 2.5%, against under 0.1% in other influenza pandemics (Taubenberger and Morens 2006). Johnson and Mueller (2002) put global deaths near 50 million and possibly up to 100 million. Spreeuwenberg, Kroneman and Paget (2018) estimated 17.4 million. The total is open.

Who died. The usual U-shaped curve, with deaths in infants and the old, gained a third peak in adults aged about 20 to 40.

Of what. Morens, Taubenberger and Fauci (2008) re-examined 58 autopsies and 109 published series covering 8,398 autopsies. Most deaths came from secondary bacterial pneumonia. Without antibiotics, that is a pneumonia the village must nurse.

Harm from treatment. Starko (2009) showed that the aspirin regimens then recommended, 8.0 to 31.2 g per day, would cause hyperventilation in about a third of recipients and pulmonary oedema in about 3%. Nobody knows how many people took such doses, so this remains a hypothesis.

Isolation. Western Samoa let the infected ship *Talune* land on 7 November 1918 and lost 19 to 22% of its population. American Samoa enforced a maritime quarantine from 23 November and recorded no influenza deaths (McLeod et al. 2008, NZHistory). This is a natural experiment, not a trial.

Lesson. A severe pandemic after the Fall would kill mainly through pneumonia. Deaths cluster where the sick are left without water, food and warmth, and where whole households fall ill at once. Isolating a village works if it is total and early.

Measurement: estimate.

1.11 Deep time: the Black Death and post-Roman Britain

The Black Death. Plague reached England around 8 May 1348. Benedictow estimates European mortality at about 60%. Others estimate lower, and about 50% is a common working figure for England [VERIFY]. WHO (2022) gives untreated bubonic plague a case fatality of 30 to 60% and says untreated pneumonic plague is always fatal.

The dying was selective. Older and frailer people were more likely to die (DeWitte and Wood 2008), and short stature raised the risk (DeWitte and Hughes-Morey 2012).

Post-Roman Britain. The collapse of Roman rule in fifth-century Britain is the nearest northern European analogue for the Fall. The skeletal record does not show the catastrophe one might expect. A Durham thesis on 1,248 individuals found stature and health improved from the Roman to the early medieval period, and linked the earlier stress markers to the burdens of Roman occupation (Walther 2017). Towns were more stressful than the countryside, but samples are small and regional variation is large.

In the sixth century, plague reached Britain. Ancient DNA from Edix Hill in Cambridgeshire yielded *Yersinia pestis* of the Justinianic lineage (Keller et al. 2019). Singer (2024) argues it may have struck more than once. There are no mortality figures.

Lesson. Losing a state need not make a rural population sicker. But a population without medicine is fully exposed to a new epidemic, and that is what caused the great die-offs.

Measurement: inference from skeletons and DNA.

1.12 The extreme reference: displaced people in camps

The worst measured mortality in the modern record is not in sieges. It is in camps, among people who lost their homes, water and food at once. Toole and Waldman (1990) found crude mortality early in displacement up to 60 times the expected rate, with excess deaths greatest in children aged 1 to 14. The killers were measles, diarrhoea, respiratory infection and malaria, made worse by malnutrition.

In Goma, Zaire, in July 1994, about 50,000 Rwandan refugees died in the first month, mainly of cholera and dysentery. Crude mortality was 20 to 35 per 10,000 per day, and coordinated relief cut it to 5 to 8 in the second month (Goma Epidemiology Group 1995). For a village of 300, 20 to 35 per 10,000 per day means about one death every two days.

2. Drug, system, prevention: sorting the deaths

Loss	Example	Who dies	Timetable	Can a lay healer change it?
Drug: dialysis	Venezuela	Kidney failure patients	Mean 7.4 days after hospice admission (O'Connor et al. 2013)	No. Comfort only
Drug: insulin	Syria, Venezuela	Type 1 diabetics, children fastest	Days to weeks in children by clinical report. Before insulin, few children survived more than months (Mazur 2011)	Delay only, by diet, fluids and salt
Drug: antiretrovirals, anti-rejection and others	Venezuela, 87% of people with HIV without antiretrovirals	Known patients	Weeks to months [VERIFY]	Little. Ration, plan
System: obstetric surgery, blood	Faith Assembly, Venezuela	Mothers, newborns	Hours	Partly
System: surgery	32.9% of deaths in 2010 from surgically treatable conditions (Meara et al. 2015)	Acute abdomen, obstructed labour, injury	Hours to days	Partly, for wounds and fractures
System: acute cardiac and stroke care	Russia	Middle-aged, old	Minutes to days	Little. Prevention only
Prevention: water, sanitation	Iraq, Haiti, Yemen, Goma	Under-fives, then all	Hours to weeks	Yes, largely
Prevention: vaccination	Russia, Venezuela	Children, adults without boosters	Months to years	Not without vaccine. Isolation and nursing help
Prevention: food, heat	Leningrad, Sarajevo, Yemen	The starving, old, infants	Weeks to months	Yes, by organisation, if food and fuel exist
Prevention: vector control	Venezuela malaria	All in malarial zones	Seasonal	Partly

3. The ranking: what killed, by age

This is my synthesis across the cases, weighted by how well each was measured.

- **Infants.**
  - In the first month: prematurity, low birth weight, birth asphyxia, neonatal infection and cold (WHO 2020, Tuzla).
  - After that: diarrhoea once weaning starts or water fails (Iraq, Haiti, Yemen), then pneumonia, then malaria in the tropics.
  - Measles and other vaccine-preventable disease rise year by year (Venezuela).
- **Children aged 1 to 14.** Diarrhoea, pneumonia, measles, malaria and malnutrition, with malnutrition raising the fatality of all the others (Toole and Waldman 1990). In Russia, where water, food and vaccination held, children barely died more.
- **Women of childbearing age.** Haemorrhage, then infection, then hypertensive disease and unsafe abortion (Kaunitz et al. 1984, Say et al. 2014). In war, violence as well.
- **Working-age men.** Violence and injury (Sarajevo, Syria), alcohol, heart disease and stroke (Russia), and pneumonia in a 1918-type pandemic.
- **The old.** Cold and hunger (Leningrad, Sarajevo), untreated chronic disease, pneumonia, and the loss of a specific drug. Frailty raises the risk in epidemics (DeWitte and Wood 2008).

Three clocks.

- Cholera and haemorrhage kill in hours.
- Hunger and cold kill in weeks to months. Leningrad went from near-normal to thirtyfold mortality between October and January.
- Lost vaccination kills over years, as the unprotected cohort grows. Venezuela's measles returned after years of falling coverage, and Russia's diphtheria built up over five years.

4. Projection onto two villages of 300, year one

This is my own model, built from the figures above. It is highly uncertain, and every assumption is stated so the model can be redone.

4.1 A temperate European village of 300

Assumptions.

- Crude death rate 11.5 per 1,000.
- About 3 births a year [VERIFY birth rate].
- Kidney replacement therapy prevalence is 1,040 per million (ERA Registry 2021), so about 0.3 people per village. 39% of them have a transplant, the rest are on dialysis.
- Type 1 diabetes: perhaps one person per village (IDF 2021) [VERIFY denominator].
- Water from wells, boiled. Food adequate from stores. Wood heat.

Cause	Expected deaths, year one	Basis
Normal background	3.5	11.5 per 1,000
Lost drug: dialysis	0.2 to 0.3	registry prevalence, death within about two weeks
Lost drug: insulin	0.5 to 1	prevalence assumption

Cause	Expected deaths, year one	Basis
Lost drugs: others (anticoagulants, heart failure, epilepsy, steroids, transplants)	0.5 to 1 [VERIFY]	judgement
Lost system: surgical emergencies, trauma, heart attack, stroke	0.5 to 1	judgement, guided by Meara et al. 2015
Childbirth: mothers	0.03	3 × 872 per 100,000
Childbirth: perinatal	0.15	3 × 48 per 1,000
Pneumonia and cold in the old	0.5 to 1	judgement
Total	**about 6 to 8**	**about double the baseline**

Even in this benign case, the village crosses the doubling line in year one. The excess comes mostly from known people who depended on a drug or a system, and from the old. Children are barely affected in year one, as in Russia. If food or fuel fails, the Leningrad pattern takes over. If a 1918-type pandemic strikes, with a third of people ill and 2.5% of them dying, add about 2.5 deaths. If cholera or plague arrives, deaths can run into tens.

What a lay healer could prevent. Almost none of the deaths from lost drugs, and none from dialysis. Part of the childbirth deaths. Part of the deaths from cold and infection in the old, through warmth, fluids, feeding and nursing. And above all, the deaths in an epidemic, through water treatment, isolation and rehydration. My honest estimate: one or two of the six to eight deaths in an ordinary year, and many more in a year with an epidemic.

4.2 A tropical village of 300

Assumptions.

- Crude death rate 8 to 10 per 1,000.
- About 10 births a year [VERIFY birth rate].
- Under-fives about 15% of the population, so about 45 children [VERIFY].
- Malaria is endemic.
- Vaccine-derived immunity persists in year one, but newborns are unprotected.

Cause	Expected deaths, year one	Basis
Normal background	2.5 to 3	8 to 10 per 1,000
Perinatal deaths	0.5 to 1	10 births, 48 per 1,000 or more
Under-five deaths: diarrhoea, pneumonia, malaria, malnutrition	1.5 to 3	rising towards one in three dying before five (Roser)
Childbirth: mothers	0.1	10 × 872 per 100,000
Lost drugs (HIV, tuberculosis, diabetes)	0.5 to 2 [VERIFY]	depends on local HIV prevalence
Lost system	0.5	judgement
Total	**about 6 to 9**	**double to triple the baseline**

From year two, vaccine-preventable disease returns in the unvaccinated newborn cohort, as in Venezuela. With no vaccine, no oral rehydration salts and no antimalarials, a village with 10 births a year would in the long run bury three or more young children a year.

What a lay healer could prevent.

- **Most diarrhoea deaths.** Oral rehydration salts are estimated to prevent 93% of child diarrhoea deaths (Munos, Walker and Black 2010, modelled).
- **A share of newborn deaths.** Starting breastfeeding in the first hour was associated with 22% fewer neonatal deaths among 10,947 Ghanaian infants (Edmond et al. 2006, observational). A family and community care package at high coverage was estimated to avert 18 to 37% of neonatal deaths (Darmstadt et al. 2005, modelled).
- **Many malnutrition deaths, if food exists.** Community therapeutic care across 21 programmes and 23,511 children reached 4.1% mortality (Collins et al. 2006), against an assumed 20 to 30% untreated.

Without antibiotics and antimalarials, pneumonia and malaria are harder to prevent. My honest estimate: a lay healer could prevent a third to half of the excess child deaths in year one. This is where the book saves the most lives.

4.3 The district of 3,000

At ten times the size, rare events become regular ones:

- About 30 births a year in Europe and 100 in the tropics. At 872 per 100,000, the tropical district would lose almost one mother a year without care.
- Within a few years of vaccines failing, a measles outbreak.
- About three people on kidney replacement in Europe, and dozens with insulin-dependent diabetes, tuberculosis or HIV, depending on place.

The district is the level at which a sterile room, a trained birth attendant, a microscope and salvaged antibiotics measurably change outcomes.

5. Evidence grades

How well each case is measured

Case	Quality	Why
Russia 1989 to 1994	Well measured	National registration, replicated, artefact excluded
Sarajevo violent deaths	Well measured	Survey of 340,000 people
Sarajevo natural deaths	Probably undercounted	Misses people living alone
Haiti and Yemen cholera	Well measured	Surveillance, undercounted outside facilities
Leningrad	Estimate	Registration collapsed, totals politically shaped
Syria indirect deaths	Estimate	One survey extrapolated, plus anecdote
Yemen totals and hunger deaths	Model and advocacy model	UNDP, Save the Children
Venezuela	Partly measured, then suppressed	One bulletin, NGOs, one official
Iraq	Original figure manipulated	Not replicated by three later surveys
1918 influenza	Estimate	Range of 17 to 100 million
Black Death, post-Roman Britain	Inference	Bones and DNA

Practices this map points to. For each practice: what the tradition says, what the record shows, and what science infers.

Practice	Grade	Tradition / record / science
Oral rehydration solution	A	Tradition: rice water and salted gruels in many cultures. Record: cholera case fatality fell from 6.2% to under 1% in Haiti and stayed at 0.2% in Yemen. Science: 93% of child diarrhoea deaths estimated preventable
Home sugar-salt solution	B	Record supports it as a fallback. Munos et al. (2010) found insufficient evidence for its effect on mortality
Boiling or chlorinating water	A	Guidance from CDC and WHO. Every case where it failed shows the cost
Breastfeeding in the first hour	B	Consistent observational evidence (Edmond et al. 2006)
Community care of severe malnutrition	B	Programme series (Collins et al. 2006). Needs energy-dense food
Sanitation and clean-up after famine	D for Leningrad alone, B with camp evidence	One case, consistent with Toole and Waldman (1990)
Strict quarantine against a pandemic	B	Natural experiment, the two Samoas
Adult vaccination against diphtheria	A	Russia, but needs vaccine
High-dose salicylate in influenza	X	Starko (2009)
Starvation diet for childhood diabetes	X	Mazur (2011)
Spirits as drink or comfort at population scale	X	Russia, Izhevsk

6. Means ledger

The rungs:

- **Hands:** hands and knowledge alone.
- **Hearth:** a household with fire, clean water, salt, sugar, honey, vinegar, fat, cloth, needle and knife.
- **Garden and still:** a hamlet with medicinal plants, ethanol, beeswax, soap, a scale, a pressure cooker and a forge.
- **Village:** a dispensary for 300 with a trained lay healer, salvaged stock, basic instruments and a microscope.
- **District:** an infirmary for 3,000 with a nurse or doctor, a sterile room, ten beds and a lab bench.
- **Hospital:** the pre-Fall reference.

Response	Hands	Hearth	Garden and still	Village	District	Hospital
Rehydration	Recognise dehydration, keep breastfeeding	Home sugar-salt solution, rice water	Weighed salt and sugar, soap	Salvaged oral rehydration sachets, cholera bed, records	Intravenous fluids if salvaged, isolation ward	Intravenous therapy, electrolytes measured
Water and sanitation	Choose source, site latrine downhill, wash hands	Boil water, cover storage	Soap, sand filters, latrines	Bleach stock, outbreak register	Chlorinate a supply, stool microscopy	Piped treated water, sewerage, surveillance
Birth and newborn	First-hour breastfeeding, skin to skin, warmth	Boiled cloth, clean blade and cord tie	Ethanol for hands and blade, scale	Birth attendant, haemorrhage plan, partograph	Sterile room, manual removal of placenta, salvaged drugs	Caesarean, transfusion, neonatal unit
Hunger	Recognise wasting and swelling	Fat, sugar, honey, ground legumes, small frequent meals	Stores, gardens, oil pressing	Arm-circumference tape, feeding programme	Inpatient slow refeeding	Therapeutic foods, intensive care
Cold	Share rooms, check the old	Fire, fuel, clothing	Insulation, woodlots	Register of the old who live alone, warm room	Warm ward	Heated housing
Chronic drug loss	Know who depends on what	Low-carbohydrate diet, salt restriction	Tested substitutes only	Drug inventory, rules, palliative plan	Some salvaged insulin if it can be kept cool	Full supply

What each rung changes.

- **Hands and hearth** do most for diarrhoea, cholera, a cold newborn and early hunger, because the treatments are simple and the windows short.
- **The garden and still** add accurate measurement, soap and disinfecting alcohol, and also the risk of drinking that alcohol.
- **The village dispensary** works mainly through organisation: registers, rules for salvaged drugs, and early warning of outbreaks.
- **The district infirmary** is the first rung that changes the outcome of haemorrhage, obstructed labour, complicated malnutrition and serious wounds.
- **Only the hospital** changes the outcome for dialysis, insulin-dependent diabetes, caesarean birth and major surgery.

7. Harm test

Practice	How it harms	Who must not receive it	Signs of trouble	What to do	Historical harm
Home rehydration	Too much salt causes fits, too much sugar worsens diarrhoea, dirty water spreads infection	Do not force it into anyone unconscious or fitting	Drowsiness, fits, worse diarrhoea	Remake. It should taste no saltier than tears. Give small sips	Haiti: no household made the solution at all (Routh et al. 2011)
Chlorinating water	Overdose unpleasant. Does not remove chemicals	Water near fuel, mines or industry	Chemical smell, oily sheen	Change source (CDC)	None in these cases
Spirits from the still	Poisoning, injury, violence	Everyone as a drink at scale, the young, the pregnant	Rising injuries, fights	Control the still. Spirits are medicine and disinfectant	Russia: alcohol poisoning 7% of the male rise in deaths, 43% of male deaths in Izhevsk
Refeeding the starved	Rapid feeding can cause heart failure [VERIFY in MA-02]	The severely wasted must be fed slowly	Swelling, breathlessness in the first days	Slow down, small frequent feeds	Famine and camp relief
High-dose salicylate (aspirin, willow bark)	Over-breathing, fluid in the lungs	Children [VERIFY], the dehydrated	Fast deep breathing, ringing in the ears	Stop, give fluids	1918 regimens of 8 to 31 g per day (Starko 2009)
Starvation diet for diabetes	Death by starvation	Children	Wasting	Moderate low-carbohydrate diet, palliative care	Pre-insulin diets of 500 kcal a day (Mazur 2011)
Quarantine	The isolated sick die without care	Never isolate without a carer and supplies	Unattended sick	Supplied isolation house	Western Samoa, 1918
Mistaking diabetic crisis for infection	Child dies untreated	Any child with thirst, weight loss and deep sighing breathing	Sweet breath, deep breathing	Think of diabetes [VERIFY bedside urine tests]	Missed diagnosis reported as common in African children [VERIFY]

8. Red flags

Each of these signs means the patient will probably die or be disabled without what the village cannot give. Each comes with what to do anyway.

1. **A child with diarrhoea who is very sleepy, cannot drink, has sunken eyes, or whose pinched skin goes**

back slowly. Give rehydration solution by spoon every few minutes, keep the child warm and stay with the family. A child who cannot swallow at all may die within hours.

2. **Profuse watery diarrhoea in an adult during an outbreak.** Treat it as cholera. Death can come within 12 hours (Routh et al. 2011). Start rehydration at once and isolate the waste.
3. **Bleeding after birth that soaks cloths, or a mother who turns pale, cold and confused.** Haemorrhage. Rub the womb firmly through the belly, put the baby to the breast, raise her legs, keep her warm, and send for the district. See MA-02.
4. **Labour longer than a day, or a baby lying across the womb.** Obstructed labour needs surgery. Keep her drinking, upright and with an empty bladder, and transfer if possible.
5. **Fever and foul discharge in the days after birth.** Sepsis. Give fluids, warmth and cleanliness, and any salvaged antibiotic under the dispensary's rules.
6. **A newborn who is cold, floppy, not feeding, fitting or grunting.** Put it skin to skin, give expressed milk by cup and keep it warm. Many of these babies will die. Comfort the parents.
7. **A child breathing fast with the lower chest pulling in.** Severe pneumonia. Without antibiotics, nurse the child upright, warm and drinking.
8. **A diabetic, or a thin thirsty child, with deep breathing, vomiting and sweet breath.** Without insulin, death is likely. Give salted fluids and comfort.
9. **A dialysis patient a week after the last session who is breathless, swollen and confused.** Death within days. Limit fluids and salt, sit the patient up, and stay with them.
10. **An old person found cold, slow and confused.** Hypothermia. Warm them slowly with bodies, blankets and warm drinks.
11. **Severe wasting, or swelling of both feet, in a child who will not eat.** Give small frequent energy-dense feeds and warmth, and treat any diarrhoea.
12. **A rigid, painful belly with fever and vomiting.** Without surgery, often fatal. Rest, sips of water and comfort.

Honest comfort. Most deaths from a lost drug or a lost system cannot be prevented in the village. The book should give the healer permission to say so. It should also give plain instructions: keep the dying warm, clean, free of pain where possible, and not alone. A village that knows in advance who depends on which drug can say goodbye properly instead of discovering the death.

9. The case against

Against the big numbers.

- Dyson and Cetorelli (2017) showed that the half million Iraqi child deaths rested on a manipulated survey.
- Spreeuwenberg, Kroneman and Paget (2018) put the 1918 toll near 17 million, not 50 to 100 million.
- Estimates of the Haiti earthquake toll range from about 50,000 to over 158,000.
- The Venezuelan dialysis figure and the Yemeni hunger figure are statements or models with no published method.

A book weighted by inflated numbers spends its pages on the wrong things.

Against "collapse means infection". Brainerd and Cutler (2005), Leon and colleagues (1997, 2007) and Bhattacharya, Gathmann and Miller (2013) show that Europe's largest peacetime mortality crisis killed middle-aged men through alcohol, injury and heart disease, not children through infection. Earle and Gehlbach (2010) and Gerry and colleagues (2010) rejected the claim that economic shock caused the deaths. Natural deaths in Sarajevo did not rise. Post-Roman Britons were, if anything, healthier than Roman ones (Walther 2017). The romance of the hospital, the belief that its loss alone kills, is not supported.

Against "lay care can do much". The deaths that rise first and most surely in a modern collapse are the ones

no lay healer can stop: dialysis, insulin, antiretrovirals, obstetric surgery, transfusion. Meara and colleagues (2015) attributed nearly a third of deaths worldwide in 2010 to conditions treatable by surgery. The romance of the herbal, the belief that knowledge and plants can replace the system, is not supported either. None of the cases here shows a plant remedy changing mortality, which is why no plants appear in this report.

Against modern cases as a guide. Every modern case had hospitals, imports, convoys and vaccines nearby. Yemen's 0.2% cholera fatality was achieved with treatment centres. The Fall removes all of these at once and for good. Deep-time cases, for their part, carried smallpox and plague.

What survives. Three points hold through all of it:

1. Diarrhoea is the largest preventable killer whenever water fails, and lay people can prevent most of those deaths.
2. Childbirth without care kills about one mother in a hundred and several babies in a hundred, and part of that is preventable.
3. Cold and hunger kill the old and isolated first, and organisation can prevent that.

10. Ten-line summary of robust findings

1. Without modern prevention, populations drift back towards one child in three dying before five (Roser, Volk and Atkinson 2013).
2. Where water, vaccination or food failed, diarrhoea, pneumonia, measles, malaria and malnutrition killed most children (Toole and Waldman 1990).
3. Cholera kills within hours. Rehydration cut its case fatality from 6.2% to under 1% in Haiti and held it at 0.2% in Yemen.
4. Without obstetric care, mothers died at 872 per 100,000 births, mostly of haemorrhage and infection (Kaunitz et al. 1984).
5. In Russia from 1989 to 1994, middle-aged men died of heart disease, injury and alcohol, while infant mortality fell (Brainerd and Cutler 2005).
6. Sieges kill by hunger and cold when food fails (Leningrad, thirtyfold) and by violence when it does not (Sarajevo).
7. A lost drug kills on the disease's clock: dialysis patients in about a week or two, children who need insulin in weeks to months.
8. Lost vaccination kills over years, as diphtheria in Russia and measles in Venezuela showed.
9. Siege and sanction figures are politically shaped. The Iraqi half million did not replicate.
10. A lay healer can prevent most diarrhoea deaths, a share of maternal and newborn deaths, and many deaths from cold and hunger, but almost no deaths from a lost drug or from the lack of surgery.

11. Contested and open questions

- How large was excess child mortality in Iraq, now that the 1999 survey is discredited?
- What was the monthly curve of deaths by age and sex in Leningrad? The archival chapters in Barber and Dzeniskevich and the burial-record work of Kovalchuk and Sobolev should be read.
- Did natural mortality in Sarajevo really not rise, or did the survey miss people who lived alone?
- Was the global toll of the 1918 influenza nearer 17 million or 50 million, and did salicylate overdose add to it?
- Did health in post-Roman Britain improve everywhere, or only in some regions?
- What share of excess deaths in Syria and Venezuela came from lost chronic-disease drugs? No count exists.
- How long do insulin-dependent people survive without insulin in a well-fed household?
- How fast will vaccine-derived immunity fade after the Fall, and which disease returns first?

12. Sources to read in full

1. Brainerd and Cutler (2005), Autopsy on an Empire, the best cause-by-cause analysis of a modern collapse.
2. Tabeau, Bijak and Sołtysiak (2002), the ICTY report on Sarajevo, a model of how to count deaths in a siege.
3. Dyson and Cetorelli (2017), on how a famous number was made and unmade.
4. Toole and Waldman (1990), on the ranked killers in the worst emergencies.
5. HRW and Johns Hopkins (2019), on Venezuela, the sequence of a collapse without war.
6. Routh et al. (2011), on why people die of a treatable disease at home.
7. Morens, Taubenberger and Fauci (2008), on bacterial pneumonia in 1918.
8. Loudon (1992), Death in Childbirth.
9. Barber and Dzeniskevich (2005), Life and Death in Besieged Leningrad (not read for this report).
10. Kaunitz et al. (1984), on the Faith Assembly.

At the bedside after the Fall

The household.

- **Minimum:** Boil drinking water. Wash hands with soap. Keep the latrine downhill from the water. Make and give rehydration solution. Breastfeed in the first hour and keep the baby warm. Keep the old warm and fed. Store food and fuel for one winter.
- **To start:** Salt, sugar or honey, a litre measure, a teaspoon, a pot, fuel, soap and cloth.
- **Records:** Who depends on which medicine, and how much is left.
- **First failure to expect:** A child with diarrhoea given too little fluid, too late, because the family thinks no care is needed. In Haiti, 69% of such families thought exactly that.

The village of 300.

- **Minimum:** A named lay healer. Registers of drug dependence, pregnancies and old people living alone. A weekly register of births and deaths. A cholera bed and an isolation hut. A birth kit and a trained attendant. A water-safety rota. Written rules for salvaged drugs.
- **To start:** Salvaged rehydration sachets, bleach, soap, scales, an arm-circumference tape and a ledger.
- **Skills:** Newborn care, first aid for haemorrhage, recognising malnutrition, nursing pneumonia, palliative care.
- **First failure to expect:** In Europe, the death of a dialysis or insulin-dependent patient in the first weeks, then an old person alone in the first winter. In the tropics, the first child deaths from diarrhoea and malaria within the first season, and measles later.

The district of 3,000.

- **Minimum:** An infirmary with a sterile room. The best-trained healer or a nurse. Salvaged antibiotics and drugs for postpartum bleeding, held under strict rules. A microscope. A surveillance system that collects the village registers. A quarantine plan. A food and fuel reserve.
- **Skills:** Manual removal of the placenta, suturing, microscopy, outbreak investigation, calculating death rates.
- **First failure to expect:** An outbreak arriving from outside and recognised only after several deaths, because villages report late.

Protocols

Protocol 1. Rehydration solution at the hearth

- ☐ Use water boiled for 1 minute at a rolling boil and cooled, or chlorinated as in Protocol 2 (CDC).
- ☐ Measure 1 litre (5 cupfuls).
- ☐ Add 6 level teaspoons of sugar (about 25 g) and half a level teaspoon of salt (about 2.1 g) (Rehydration Project, WikEM). Level means scraped flat with a knife.

- ☐ Stir until dissolved. Taste it: it must be no saltier than tears. If it is saltier, throw it away and start again.
- ☐ Never add more than the stated salt. This mix has about half the sodium of the WHO formula, which has 75 mmol of sodium per litre (WHO and UNICEF 2002). That figure is my arithmetic.
- ☐ Give a sip by cup or spoon every one to two minutes to a small child. If the child vomits, pause briefly and go on more slowly [VERIFY timing in HY-03].
- ☐ Keep breastfeeding. Restart food as soon as the child will eat.
- ☐ Make it fresh each day and keep it covered [VERIFY].
- ☐ Use salvaged sachets first for the sickest patients.

Protocol 2. Making water safe

- ☐ Take water from the cleanest source. Let it settle or strain it through cloth.
- ☐ Boil it at a rolling boil for 1 minute, or for 3 minutes above about 2,000 m (CDC).
- ☐ Or chlorinate it. Add 8 drops of unscented 5 to 9% household bleach per US gallon (3.8 litres) of clear water, or 16 drops if the water is cloudy, then wait 30 minutes (CDC). That comes to about 2 drops per litre for clear water (my arithmetic). Drop sizes vary.
- ☐ Store covered. Draw water with a clean dipper, never with hands.
- ☐ Never use water near fuel, mines or chemicals. Boiling and bleach do not make it safe (CDC).

Protocol 3. The newborn's first hour

- ☐ Dry the baby with a warm cloth and lay it skin to skin on the mother's chest. Cover both.
- ☐ Help the baby to the breast within the hour (Edmond et al. 2006).
- ☐ Tie and cut the cord with a boiled tie and a boiled or flamed blade [VERIFY cord care in MA-02].
- ☐ Check feeding, warmth, breathing and colour every hour for the first day.
- ☐ Red flags: section 8, item 6.

Protocol 4. The village mortality watch

- ☐ Record every death: date, name, age, sex, household, cause as the family describes it, and any drug dependence.
- ☐ Expect 3 to 4 deaths a year in a European village of 300, and about 3 in a tropical one.
- ☐ Alarm 1: two diarrhoea deaths in a week, or any adult death from watery diarrhoea. Open the cholera bed and tell the district.
- ☐ Alarm 2: deaths over a month running at twice the expected rate (UNHCR).
- ☐ Alarm 3: about one death a month, every month, in a village of 300. That is the 1 per 10,000 per day emergency threshold.
- ☐ Send the ledger to the district every month.

Protocol 5. The drug-dependence register (first week)

- ☐ List each person on a daily medicine, with the drug, the dose, the days of stock left, and what happens if it stops.
- ☐ Sort them into three groups:
  - (a) death within days to weeks: dialysis, insulin, adrenal replacement, some heart and transplant drugs
  - (b) harm over months: HIV, tuberculosis, epilepsy, heart failure, thyroid
  - (c) harm over years: blood pressure, cholesterol
- ☐ Group (a): talk honestly with the patient and family now, plan comfort care, and search for any salvaged supply.
- ☐ Group (b): pool salvaged stock under written rules.
- ☐ Group (c): manage with diet, less salt, activity and less alcohol.
- ☐ Review the register monthly.

Protocol 6. Winter check of the old

- ☐ List everyone over 70, or frail, who lives alone.
- ☐ From the first frost, visit each one daily. Check that the fire is lit, food eaten and water drunk, the skin warm and speech clear.
- ☐ If a room cannot be heated, move its occupant to a shared warm room.

Numbers to carry

1. **Double.** Deaths at twice the normal rate mean an emergency (UNHCR). A village of 300 normally sees about 3 a year.
2. **One in three.** Without prevention, about one child in three died before five (Roser).
3. **872.** Maternal deaths per 100,000 births without care, about one mother in 115 (Kaunitz et al. 1984).
4. **12 hours.** Median time from onset to death for cholera in the community (Routh et al. 2011).
5. **93%.** The share of child diarrhoea deaths oral rehydration is estimated to prevent (Munos et al. 2010).
6. **Six, a half, one.** Six level teaspoons of sugar and half a level teaspoon of salt in one litre of clean water.
7. **One hour.** Start breastfeeding within the first hour (Edmond et al. 2006).
8. **About a week.** Expected survival after dialysis stops (O'Connor et al. 2013).
9. **One minute, thirty minutes.** Boil water for one minute, or wait thirty minutes after adding bleach (CDC).
10. **0.2% against 6.2%.** Cholera case fatality with organised rehydration (Yemen) and without it (early Haiti).

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