

HOW DEATH OUTLIVES WAR

The Reverberating Impact of the
Post-9/11 Wars on Human Health

Stephanie Savell | May 15, 2023

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COSTS OF **WAR**

***How Death Outlives War:
The Reverberating Impact of the Post-9/11 Wars on Human Health¹***

Summary

The total death toll in the post-9/11 war zones of Afghanistan, Pakistan, Iraq, Syria, and Yemen could be at least 4.5-4.6 million and counting, though the precise mortality figure remains unknown. Some of these people were killed in the fighting, but far more, especially children, have been killed by the reverberating effects of war, such as the spread of disease. These latter *indirect deaths* – estimated at 3.6-3.7 million – and related health problems have resulted from the post-9/11 wars' destruction of economies, public services, and the environment. Indirect deaths grow in scale over time. Though in 2021 the United States withdrew military forces from Afghanistan, officially ending a war that began with its invasion 20 years prior, today Afghans are suffering and dying from war-related causes at higher rates than ever.

This report examines the devastating toll of war on human health, whoever the combatant, whatever the compounding factor, in the most violent conflicts in which the U.S. government has been engaged in the name of counterterrorism since September 11, 2001, including in the above countries as well as Libya and Somalia. The report does not focus on attributing responsibility to particular warring parties over others, or to disentangling various intensifying factors, such as the actions of authoritarian governments, related political upheavals, global economic sanctions, climate change, environmental disasters, or the accumulating devastations of previous wars. Rather than teasing apart who, what, or when is to blame, this report will show that the post-9/11 wars are implicated in many kinds of deaths. In a place like Afghanistan, the pressing question is whether any death can today be considered unrelated to war.² Ultimately, the impacts of the ongoing violence are so vast and complex that they are unquantifiable.

In laying out how the post-9/11 wars have led to illness and indirect deaths, the report's goal is to build greater awareness of the fuller human costs of these wars and support calls for the United States and other governments to alleviate the ongoing losses and suffering of millions in current and former war zones. The report highlights many long-term and underacknowledged consequences of war for human health, emphasizing that some groups, particularly women and children, suffer the brunt of these ongoing impacts.

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² The author thanks Anila Daulatzai for this formulation. (2022, May 31). Personal communication.

Introduction

“Jalil Ahmed is brought in hardly breathing. His hands and feet have gone cold. He's rushed through to the resuscitation room. His mother Markah says he's two and a half years old, but he looks a lot tinier. He's severely malnourished and has tuberculosis. Doctors work fast to revive him.

Markah watches in tears. ‘I'm helpless as he suffers. I've spent the whole night scared that at any minute he'll stop breathing,’ she says.”

- [BBC News, 16 March 2022](#), describing a hospital in Helmand province, Afghanistan

Jalil Ahmed is one of millions of malnourished Afghan children who have suffered from a hunger crisis that worsened dramatically in the wake of the U.S. war in Afghanistan. Tens of thousands of children under five, like him, are dying of infectious diseases like cholera and measles, of acute malnutrition, and of neonatal complications. As much as anyone killed by an airstrike or a gunshot wound, their deaths must be counted among the costs of war. These are “indirect deaths,” attributable to the deterioration of economic, social, psychological and health conditions due to war.³ Generally, the large majority of indirect war deaths occur due to malnutrition, pregnancy and birth-related problems, and many illnesses including infectious diseases and noncommunicable diseases like cancer. Some also result from injuries due to war's destruction of infrastructure such as traffic signals and from reverberating trauma and interpersonal violence.⁴

Indirect deaths are devastating, not least because so many of them could be prevented, were it not for war. Analytically, they are also an important mechanism for understanding the broader, longer term, and lesser known consequences of war for the health of war zone populations (see Figure 1, below).⁵ Past wars have shown that indirect deaths can number far higher than direct combat deaths – for instance, in the 1950s Korean War, estimates are that five to six million people died, only 15-20% as a result of violence and the great majority by starvation and other war-related causes. In the Democratic Republic of the Congo between 1999 and 2003, just roughly 10% of three million war deaths were due to violence.⁶ In conflict areas, children are 20 times more likely to die of diarrheal disease than from the conflict itself.⁷

³ Guha-Sapir, D. (2021, January 26-28). *Roundtables on Indirect Death*. Costs of War Project and United Against Inhumanity Conference, Boston University.

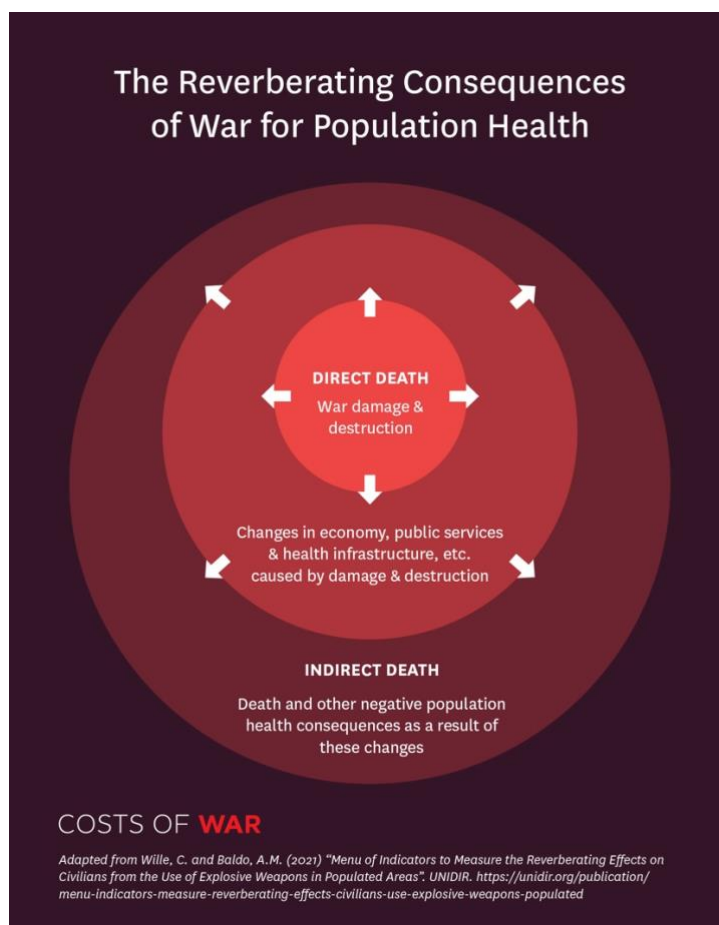
⁴ Between 1990 to 2017, an estimated two-thirds of global indirect war deaths were due to communicable, maternal, neonatal and nutritional diseases. Jawad, M., Hone, T., Vamos, E. P., Roderick, P., Sullivan, R., & Millett, C. (2020, September 10). *Estimating indirect mortality impacts of armed conflict in civilian populations: Panel regression analyses of 193 countries, 1990-2017*. BMC Medicine, 18(1), 1–11.

⁵ The focus of this report is on residents of the war zones rather than on U.S. soldiers, who also continue to die and suffer from the health consequences of combat, including mental trauma such as PTSD and cancers due to exposure to burn pits and other toxic war zone environments.

⁶ Krause, K. (2018). *Bodies Count: The Politics of Assembling War and Violent Death Data Expertise*. Human Remains and Violence, 3(1): 90-115.

⁷ UNICEF. *Water, Sanitation, and Hygiene*. Retrieved 2023, 22 March from <https://www.unicef.org/wash>.

Figure 1. The Reverberating Consequences of War for Population Health



This report is authored by an anthropologist and builds on the insights of a range of scholars from many disciplines regarding how and why the post-9/11 wars have harmed human health. The report's main findings are threefold:

First, the report conveys scale via two windows onto the magnitude of the post-9/11 wars' impact on health.⁸ The first is an estimated number of total war deaths – 4.5 to 4.6 million – based on a combination of the best available secondary data sources. (A truer figure would require more comprehensive original research, ideally carried out by local researchers with knowledge of each context – research that has not yet been carried out in all the war zones.) The second is a compilation of child malnutrition statistics, another important indicator of war's damage to health, in Afghanistan, Iraq, Somalia, Syria, and Yemen.⁹ Hunger crises are a devastating outcome of the intersection of war and other factors, and currently 7.6 million children are suffering from wasting, or acute malnutrition, in these countries.

⁸ This report provides an estimated number of indirect deaths, though this knowledge is challenging to come by and contested, for reasons explained in depth further on.

⁹ Levy, B. S., Sidel, V. W. (2016, March). *Documenting the Effects of Armed Conflict on Population Health*. Annual Review of Public Health, 37, 205–218. p. 214.

Second, the report draws on quantitative and qualitative data to describe the most significant chains of impact leading to indirect deaths in the post-9/11 wars, many of which are not fully recognized. “Causal pathways” is the epidemiological term for this long sequence of war’s consequences, a pattern of suffering that can lead to death, disabilities and other long-lasting physical and mental health conditions, including developmental disorders in children.¹⁰ Public health experts see deaths as “sentinel health events,” like red warning flags calling attention to each causal pathway where governments and humanitarian organizations can organize to prevent further deaths.¹¹ For instance, for every person who dies of a waterborne disease because war destroyed their access to safe drinking water and waste treatment facilities, there are many more who sicken, so a life-saving intervention is to provide clean water and sewage treatment. Some causal pathways are more clearly observable, such as when a bomb destroys a rural hospital and local people lose access to healthcare, resulting in higher death rates from illnesses and birth complications. Other pathways are more winding and enmeshed with many additional complexities, such as how the experience of war, along with other factors, may lead to mental trauma and from there to domestic or interpersonal violence.

Though not an exhaustive list, predominant causal pathways to indirect death in the post-9/11 wars stem from: 1) economic collapse, loss of livelihood and food insecurity; 2) destruction of public services and health infrastructure; 3) environmental contamination; and 4) reverberating trauma and violence. All of these problems have led to increased malnutrition, illness, injury, health complications, and death. Forced displacement, especially within nations, spurs some of the worst outcomes and increases people’s vulnerability to the negative health impacts of all causal pathways. It also comes with some of its own precarities (see Figure 3, page 13). In practice, these pathways often overlap with and intensify one another, especially over time and with many compounding factors, such as natural disasters like droughts. People often suffer from all of them at once.

Though all warring parties must be held responsible, in the sections on the causal pathways this report does touch on relevant consequences of United States actions in particular because that is where the Costs of War project is based and has the most potential to promote government accountability.

The report’s third observation is that some groups are affected far more than others. Whereas men are more likely to die in combat, women and children are more often killed by wars’ reverberating impacts. Within the same country, high-conflict regions suffer more, and rural areas often have less state services to begin with, making residents more vulnerable to the destruction of services, especially healthcare.

¹⁰ Wise, P. H. (2017, January 1). *The Epidemiologic Challenge to the Conduct of Just War: Confronting Indirect Civilian Casualties of War*. *Daedalus*, 146(1):139-154, p. 143.

¹¹ Levy, B. (2021, January 26-28). *Roundtables on Indirect Death*. Costs of War Project and United Against Inhumanity Conference, Boston University. Indirect deaths go along with “morbidity,” or “a wide range of disorders, from disabling injuries to adverse effects on mental health, some of which continue for long periods and even impair future generations.” Levy, B. S., Sidel, V. W. (2016, March). *Documenting the Effects of Armed Conflict on Population Health*. *Annual Review of Public Health*, 37, 205–218. p. 206.

Using a wider lens, it is essential to note that, with or without war, people who suffer from societal injustices due to their poverty, gender, race, ethnicity, and/or colonial legacies have a higher risk of death. Poverty is statistically associated with higher mortality rates and lower life expectancies. Women in particular suffer from gender-based violence, worsened in wartime.¹² The post-9/11 wars have occurred in countries whose populations are largely Black and brown, and are often waged by countries with histories of white supremacy and Islamophobia.¹³ Authoritarian governments in war zones act on their biases against particular ethnic, racial, and/or other local populations. Thus, it is necessary to situate indirect deaths within these broader forms of structural violence. The following section's focus on indirect death numbers should not be taken to normalize already high death rates amongst particular populations due to multilayered global, local, and historical forces.¹⁴

Understanding the Scale of Indirect Deaths

Counting war deaths of any kind – not just indirect, but also direct – is difficult and politically contested. Data from war zones is missing, unreliable, and hard to access. In these contexts, death records often reflect political choices about who gets counted and how they are registered, as well as widely varying techniques of counting.¹⁵

Estimates of war deaths in Iraq have been particularly controversial. A 2006 article in *The Lancet* estimated that approximately 600,000 Iraqis had died due to war violence between 2003 and 2006.¹⁶ Many people questioned the number's validity, accusing the authors of having a political agenda opposing the war in Iraq; critics were accused, in turn, of having political agendas of their own that led them to want to minimize the war's damages.¹⁷ Two years later, in 2008, another study estimated the number of violent deaths in that same time period at 151,000.¹⁸ The Iraq Body Count, a project counting civilian and combatant deaths in Iraq, documents 300,00 violent deaths up to the present day.¹⁹ The sharp difference between various estimates, including these and others, is due in part to

¹² Al-Ali, N. (2013). *The Forgotten Story: Women and Gender Relations 10 Years After*. Costs of War, Watson Institute, Brown University. <https://watson.brown.edu/costsofwar/files/cow/imce/papers/2013/Women%20and%20Gender%20Relations%2010%20Years%20After.pdf>.

¹³ See e.g., Kumar, D. (2021). *Islamophobia and the Politics of Empire: 20 Years after 9/11 (Second Edition)*. London and New York: Verso.; Singh, N. (2017). *Race and America's Long War*. Oakland: University of California Press.

¹⁴ Dewachi, O. (2021, January 26-28). *Roundtables on Indirect Death*. Costs of War Project and United Against Inhumanity Conference, Boston University.

¹⁵ Crawford, N. (2013). *Accountability for Killing: Moral Responsibility for Collateral Damage in America's Post-9/11 Wars*. Oxford University Press..

¹⁶ Burnham G., Lafta, R., Doocy, S., Roberts, L. (2009, March 7). *Mortality after the 2003 invasion of Iraq: a cross-sectional cluster sample survey*. *Lancet* 373(9666):810.

¹⁷ Reynolds, P. (2006, October 20). *Huge gaps between Iraq death estimates*. BBC News. http://news.bbc.co.uk/2/hi/middle_east/6045112.stm

¹⁸ Alkhuzai et al. (2008, January 31). *Violence-related mortality in Iraq from 2002 to 2006*. *The New England Journal of Medicine*, 358(5): 484-93.

¹⁹ Iraq Body Count. Accessed April 11, 2023. <https://www.iraqbodycount.org/>

varying enumeration techniques: some studies counted combatants, others civilian deaths, and still others focused on overall changes in mortality rates.²⁰ Such disputes over methods of counting, while important in any scientific endeavor, had the effect in this instance of focusing attention on the counting rather than on the dead and wounded themselves.²¹

Body counts are complicated and controversial, but it is far more difficult still to estimate indirect deaths. Unlike in combat, these deaths do not necessarily occur immediately or in the close aftermath of the battles which many observers focus on. A death from hunger mostly occurs at some distance from this attention to spectacle and it may happen months or years after war disrupts access to food. Often, people affected by war are displaced and transient, making them hard to track. Furthermore, it is difficult to disentangle indirect war deaths from those that might have occurred with or without a war, since, as mentioned, in many places people already suffer from high rates of poverty, disease, malnutrition, and death. Authoritarianism and misrule cause and exacerbate many of the same problems, as is the case with Taliban rule before and after the U.S.-led war in Afghanistan.

Even before wars break out, many countries have weak state structures and correspondingly unreliable or dysfunctional vital registration systems, which are based on documents such as hospital records and birth and death certificates. The absence of reliable pre-war data makes it impossible to calculate “excess mortality” – the difference between baseline and wartime numbers. This is the case in Afghanistan and Iraq, both devastated by decades of war and sanctions prior to 9/11. Afghanistan’s last attempted census was in 1979, and that was disrupted by the Soviet Union’s invasion and attendant protracted war.²² In Iraq, the 1990s UN economic sanctions decimated the healthcare system and negatively impacted population health, making it impossible to assess baseline mortality before the 2003 U.S. invasion. Iraq likewise did not have a census in the preceding years.²³ Currently, there is no vital registration system in Afghanistan and deficient registration of births and deaths in Iraq.²⁴

A further complication involves the issue of intentionality.²⁵ When warring parties intentionally attack food distribution, for instance, this raises the question of whether the ensuing deaths should actually be considered direct, rather than indirect, results of combat. In Yemen, for instance, combatants are using starvation as a method of warfare, including

²⁰ Geneva Declaration Secretariat. (2008, September). *Global Burden of Armed Violence*. Geneva.

<http://www.genevadeclaration.org/fileadmin/docs/Global-Burden-of-Armed-Violence-full-report.pdf>

²¹ Crawford, N. (2013). *Accountability for Killing: Moral Responsibility for Collateral Damage in America’s Post-9/11 Wars*. Oxford University Press.

²² Crawford, N. (2011, June 13). *Assessing the Human Toll of the Post-9/11 Wars: The Dead and Wounded in Afghanistan, Iraq, and Pakistan, 2001-2011*. Costs of War, Watson Institute, Brown University. <https://watson.brown.edu/costsofwar/files/cow/imce/papers/2011/Assessing%20the%20Human%20Toll%20of%20the%20Post911%20Wars.pdf>

²³ Crawford, N. (2013). *Accountability for Killing: Moral Responsibility for Collateral Damage in America’s Post-9/11 Wars*. Oxford University Press.

²⁴ United Nations Statistics Wiki. (2019). Retrieved from: <https://unstats.un.org/wiki/>.

²⁵ Crawford, N. (2021, January 26-28). *Roundtables on Indirect Death*. Costs of War Project and United Against Inhumanity Conference, Boston University.

the U.S.-supported Saudi and United Arab Emirates coalition, which has conducted airstrikes on farms, water facilities, and artisanal fishing boats, destroying and damaging agricultural areas, irrigation works, livestock, foodstuffs, water infrastructure, and fishing equipment.²⁶ According to the Geneva Conventions and their Additional Protocols, international treaties that are ratified by many countries and form the basis of international humanitarian law, wars' expected damage to civilians should never be intentional, though the protocols acknowledge that such damage may occur as a side effect.²⁷ International humanitarian law obligates warring parties to assess the proportionality of attacks with "reasonably foreseeable" reverberating effects on civilians.²⁸ This framing has roots in one particular form of Catholic theology and "underscores the moral pivot on intentionality, rather than the foreseen [or foreseeable] consequences of any given act of war that had been deemed militarily useful."²⁹ In other words, critics suggest that the question of intentionality distracts from the imperative that all combatants take steps to minimize civilian casualties. It is too easy to justify an act of war by claiming that it did not harm civilians intentionally, only unintentionally. In line with this critique, the current report includes all non-violent war deaths, whether intentional or not.

The calculation of indirect deaths is a field of public health and demographic research evolving over the past two decades.³⁰ Many experts regard a recent study estimating global excess mortality due to COVID-19 as employing the most cutting-edge statistical methodology to date.³¹ This methodology could not be replicated for the war zones that are the focus of the current report, however, because of a lack of "all-cause mortality data," combined with nonfunctioning or insufficient vital registration systems in these countries.³² Nonetheless, other methods could be employed, including retrospective mortality surveys, which sample select households to collect information on deaths of family members in a specified period of time. In other conflict areas, researchers have

²⁶ Mwatana for Human Rights, Global Rights Compliance. (2021, September 1). *Starvation Makers: The Use of Starvation by Warring Parties in Yemen as a Method of Warfare*. <https://mwatana.org/en/starvation-makers/>; As of 2022, more than 7,000 airstrikes have targeted nonmilitary facilities, compared with 8,000 targeting military facilities and another 9,000 whose targets could not be determined. Sheline, A. (2022, March). *The Yemen War in Numbers: Saudi Escalation and U.S. Complicity*. Quincy Institute for Responsible Statecraft. Brief No. 22. p. 14. <https://quincyinst.org/wp-content/uploads/2022/03/QUINCY-BRIEF-NO.-22-MARCH-2022-SHELINE-1-1.pdf>

²⁷ *Protocols Additional to the Geneva Conventions of 12 August 1949*. 2010. International Committee of the Red Cross. https://www.icrc.org/en/doc/assets/files/other/icrc_002_0321.pdf.

²⁸ Giourgou, E. (2022, January 25). *Explosive weapons with wide area effects: a deadly choice in populated areas*. Humanitarian Law and Policy Blog. <https://blogs.icrc.org/law-and-policy/2022/01/25/explosive-weapons-populated-areas/>.

²⁹ Wise, P. H. (2017, January 1). *The Epidemiologic Challenge to the Conduct of Just War: Confronting Indirect Civilian Casualties of War*. *Daedalus*, 146(1), p. 145.

³⁰ Brunborg, Helge, and Ewa Tabeau. (2005). *Demography of conflict and violence: An emerging field*. *European Journal of Population/Revue Européenne de Démographie* 21: 131-144.

³¹ COVID-19 Excess Mortality Collaborators. (2022, March 10). *Estimating excess mortality due to the COVID-19 pandemic: a systematic analysis of COVID-19-related mortality, 2020-21*. *The Lancet*, 399(10334): 1513-1536. [https://www.thelancet.com/article/S0140-6736\(21\)02796-3/fulltext#seccestitle10](https://www.thelancet.com/article/S0140-6736(21)02796-3/fulltext#seccestitle10)

³² This is according to Haidong Wang, one of the COVID-19 study's authors. (2022, September 8). Personal communication.

successfully conducted statistical analyses that arrive at a best estimate using multiple overlapping data sources of lists of dead and wounded.³³ Such methods require significant funding and political will to be carried out on a large scale, and have not yet been used in most post-9/11 war zones.

Despite the myriad challenges, estimates of indirect death tolls are essential to a fuller understanding of the human costs of war. Such estimates can inform national and international responses and help direct resources and interventions such as disease control programs and sanitation projects to the most vulnerable populations.³⁴ Estimates are also essential in enabling the war zone populace and international organizations to hold political and military leaders accountable for war violence.³⁵ For instance, the UN conducted studies on the impact of explosive weapons in populated areas in order to support a political declaration, formally adopted by 83 countries in 2022, on the need to improve military policies for protecting civilians in urban warfare.³⁶

Given lack of specific data, one of the best available methods for generating a rough estimate for any particular war is to use a ratio. According to a pivotal study by the Geneva Declaration Secretariat in 2008, the burden of indirect deaths for the majority of conflicts since the early 1990s has been between three to 15 times the number of direct deaths. These experts suggested that a reasonable, conservative average estimate for any contemporary conflict is a ratio of four indirect deaths for every one direct death.³⁷

Since that study, advances in the field are making it increasingly clear that there is no way to generate a general ratio that covers all conflicts.³⁸ More accurate ratios are needed that consider the leading causes of non-violent mortality in conflict situations and recognize the particularities of different contexts, including urban versus rural settings, and the shifting phases of conflict and post-conflict reverberating effects.³⁹ The latest thinking is that indirect deaths may be greater, in the words of epidemiologist Leslie Roberts, “the poorer the population and closer to the edge of survival people are before the

³³ Geneva Declaration Secretariat. (2008, September). *Global Burden of Armed Violence*. Geneva.

<http://www.genevadeclaration.org/fileadmin/docs/Global-Burden-of-Armed-Violence-full-report.pdf>

³⁴ Guha-Sapir, D., Checchi, F. (2018, September 24). *Science and politics of disaster death tolls*. *BMJ*, 364:k4005. ; Geneva Declaration Secretariat (2008, September). *Global Burden of Armed Violence*. Geneva.

<http://www.genevadeclaration.org/fileadmin/docs/Global-Burden-of-Armed-Violence-full-report.pdf>

³⁵ Guha-Sapir, D. (2021, January 26-28). *Roundtables on Indirect Death*. Costs of War Project and United Against Inhumanity Conference, Boston University.

³⁶ United Nations Office for the Coordination of Humanitarian Affairs. (2021). *Explosive Weapons in Populated Areas*. <https://www.unocha.org/themes/explosive-weapons-populated-areas>. See also Ireland’s Department of Public Affairs. *Explosive Weapons in Populated Areas Dublin Conference 2022*. <https://www.dfa.ie/our-role-policies/international-priorities/peace-and-security/ewipa-consultations/>.

³⁷ Geneva Declaration Secretariat (2008, September). *Global Burden of Armed Violence*. Geneva. p. 32.

<http://www.genevadeclaration.org/fileadmin/docs/Global-Burden-of-Armed-Violence-full-report.pdf>

³⁸ Wise, P. H. (2017, January 1). *The Epidemiologic Challenge to the Conduct of Just War: Confronting Indirect Civilian Casualties of War*. *Daedalus*, 146(1):139-154.

³⁹ Alda, E., McEvoy, C. (2017, September). *Beyond the Battlefield: Towards a Better Assessment of the Human Cost of Armed Conflict*. Small Arms Survey, p. 12.

conflict.”⁴⁰ For instance, a recent mortality survey in a high conflict region of the Central African Republic, one of the world’s poorest countries, documented that violent deaths accounted for about 13% of total mortality, as people were also dying at high rates from illnesses such as malaria and diarrhea and maternal and newborn complications.⁴¹ By contrast, in the 1990s war in wealthier Bosnia, evidence suggests that the majority, about 67%, of war-related deaths, were due to violence.⁴² It is important to point out here that there is still much that is unknown about impoverished war zone countries, where documentation is far sparser (so much so that an internet search of conflict deaths in these places usually yields inaccurate information).⁴³

One of the most widely cited figures of total Iraq war deaths is a 2013 estimate – though it too has been criticized – of 461,000 direct and indirect deaths between March 2003 to June 2011.⁴⁴ Specifically, Hagopian et al. document 405,000 excess deaths in Iraq, with an additional estimated 55,000 deaths of Iraqi emigrants. They found that about one third of this total, approximately 153,667 deaths, were attributable to indirect causes. These numbers reflect a low ratio of 0.5 to 1 indirect to direct deaths, which is quite likely an underestimate but, even if it were three times higher, still supports the observation that wealthier nations with more infrastructure (as in the case of Iraq, before the 1990s war and sanctions) may have lower ratios.⁴⁵ In Yemen, according to UNDP, as of 2021, the war killed an estimated 377,000, “nearly 60 per cent of which are indirect and caused by issues associated with conflict like lack of access to food, water, and healthcare.”⁴⁶ This is a ratio

⁴⁰ Roberts, L. (2022, July 26). Personal communication.; See also Wise, P. H. (2017, January 1). *The Epidemiologic Challenge to the Conduct of Just War: Confronting Indirect Civilian Casualties of War*. *Daedalus*, 146(1):139-154.

⁴¹ Robinson, E., Lee, L., Roberts, L.F. et al. (2021, June 30). *Mortality beyond emergency threshold in a silent crisis– results from a population-based mortality survey in Ouaka prefecture, Central African Republic, 2020*. *Conflict and Health*, 15(50).

⁴² Roberts, Leslie. (2022, July 26). Personal communication. See: Spiegel, P. (2000, July). *War and mortality in Kosovo, 1998-99: An epidemiological testimony*. *The Lancet*.

https://www.researchgate.net/publication/12436974_War_and_mortality_in_Kosovo_1998-99_An_epidemiological_testimony

⁴³ Flaherty, M. G., Roberts, L. F. (2019, February 15). *Internet searching produces misleading findings regarding violent deaths in crisis settings: short report*. *Conflict and Health*, 13(1):1-4.

⁴⁴ Hagopian, A. et al. (2013, October 15). *Mortality in Iraq Associated with the 2003-2011 War and Occupation: Findings from a National Cluster Sample Survey by the University Collaborative Iraq Mortality Study*. *PLOS Medicine*.; Levy, B. S., Sidel, V. W. (2016, March). *Documenting the Effects of Armed Conflict on Population Health*. *Annual Review of Public Health*, 37, 205–218.

⁴⁵ According to Amy Hagopian (Personal communication, 2022, July 26), “There are also estimates that Iraq deaths totaled far higher than we found in our household/sibling survey. I do think our estimates are lower than what is likely true, for a variety of reasons.” Subtracting 153,667 indirect deaths from the total of 461,000 yields 307,333 direct deaths. 153,667 indirect to 307,333 direct deaths is a ratio of 0.5:1 indirect/direct.

⁴⁶ Hanna, T., Bohl, D., Moyer, J. (2021, November 23). *Assessing the Impact of War in Yemen: Pathways for Recovery*. United Nations Development Program. p. 12. <https://www.undp.org/publications/assessing-impact-war-yemen-pathways-recovery>.

of 1:5 to 1 indirect/direct deaths. Note that UN figures are sometimes significant underestimates due to their reliance on outdated, low quality, or nonrepresentative data.⁴⁷

One path forward in the case of the post-9/11 wars is to generate a rough estimate by applying the Geneva Declaration Secretariat's average ratio of four indirect for every one direct death. Though scientific advances propose using varied ratios for each context, that is outside the scope of the current report. The author's review suggests that a lower ratio may be accurate in Iraq, while a higher ratio is likely in today's humanitarian crisis situations such as in Afghanistan and Yemen. Across all the war zones, therefore, using an average four to one ratio can generate a reasonable and conservative estimate.

Applying this ratio to Costs of War's calculation of 906,000 – 937,000 directly killed in the post-9/11 wars yields between 3,588,000 – 3,716,000 indirect deaths (3.6 – 3.7 million). Thus, the total figure of post-9/11 war deaths, including direct and indirect, could be 4,494,000 – 4,653,000, roughly 4.5 – 4.6 million.⁴⁸

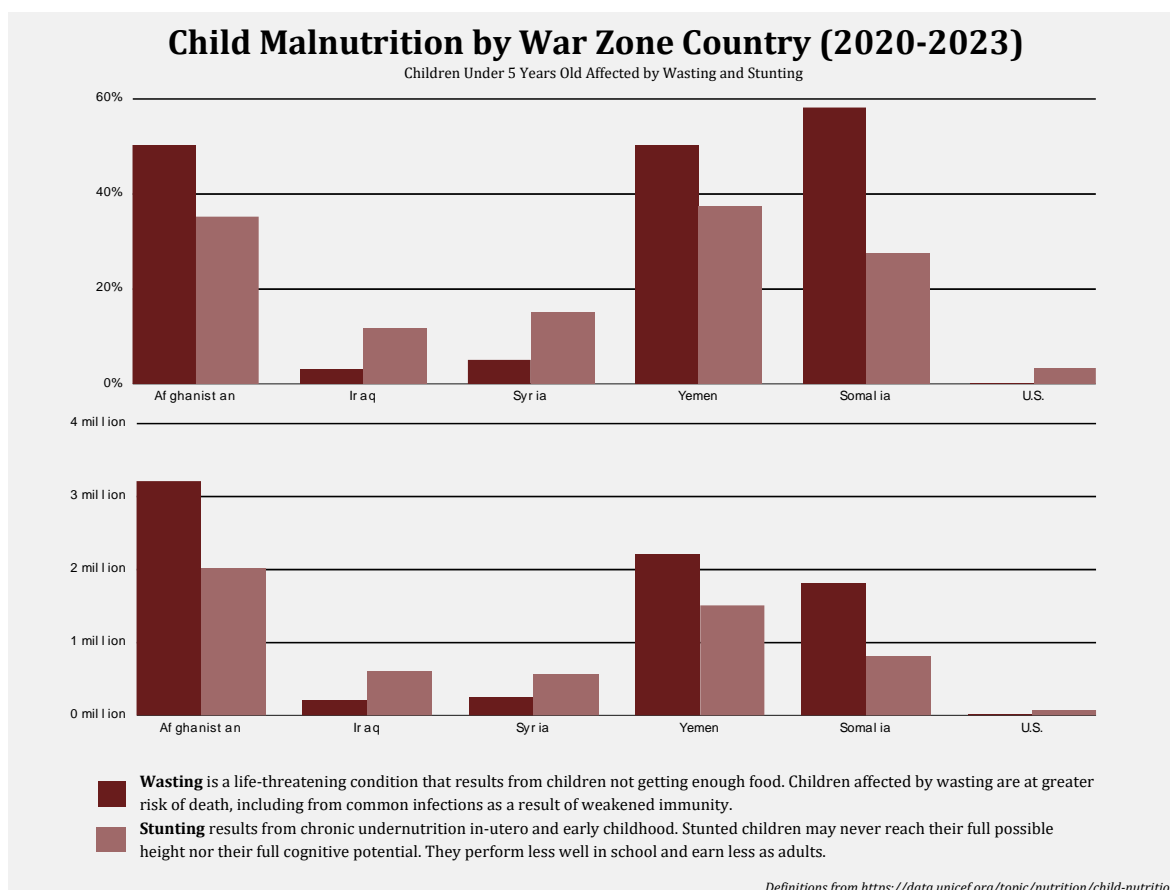
Child malnutrition statistics are also indicators of the scale of war's damage to population health.⁴⁹ Cumulatively, this report's calculation is that more than 7.6 million children under five are suffering from acute malnutrition, or wasting, in Afghanistan, Iraq, Syria, Yemen, and Somalia. "Wasting" means, simply, not getting enough food, literally wasting to skin and bones, putting these children at greater risk of death, including from infections that result from their weakened immune systems. Figure 2, below, displays percentages and absolute numbers of children under age five affected by wasting and stunting, or chronic undernutrition, in post-9/11 war zones, with U.S. rates included for comparison. (See more information about malnutrition in the next section.)

⁴⁷ Robinson, E., Lee, L., Roberts, L.F. et al. (2021, June 30). *Mortality beyond emergency threshold in a silent crisis— results from a population-based mortality survey in Ouaka prefecture, Central African Republic, 2020*. *Conflict and Health*, 15(50).

⁴⁸ This number of direct deaths is from two sources: 897,000 – 929,000 from Crawford, N., Lutz, C. (2021, September 1). *Human Costs of Post-9/11 Wars: Direct War Deaths in Major War Zones, Afghanistan & Pakistan (Oct. 2001 – Aug. 2021); Iraq (March 2003 – Aug. 2021); Syria (Sept. 2014 – May 2021); Yemen (Oct. 2002-Aug. 2021) and Other Post-9/11 War Zones*. Costs of War, Watson Institute, Brown University. https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_Direct%20War%20Deaths_9.1.21.pdf. Dr. Crawford added an additional 8,000 – 9,000 direct deaths in Iraq and Syria in her (2023, March 15) update: *Blood and Treasure: United States Budgetary Costs and Human Costs of 20 Years of War in Iraq and Syria, 2003-2023*. Costs of War, Watson Institute, Brown University. <https://watson.brown.edu/costsofwar/figures/2023/IraqWarCosts>.

⁴⁹ Levy, B. S., Sidel, V. W. (2016, March). *Documenting the Effects of Armed Conflict on Population Health*. *Annual Review of Public Health*, 37, 205–218. p. 214.

Figure 2. Child Malnutrition by War Zone Country (Data from 2020-2023)



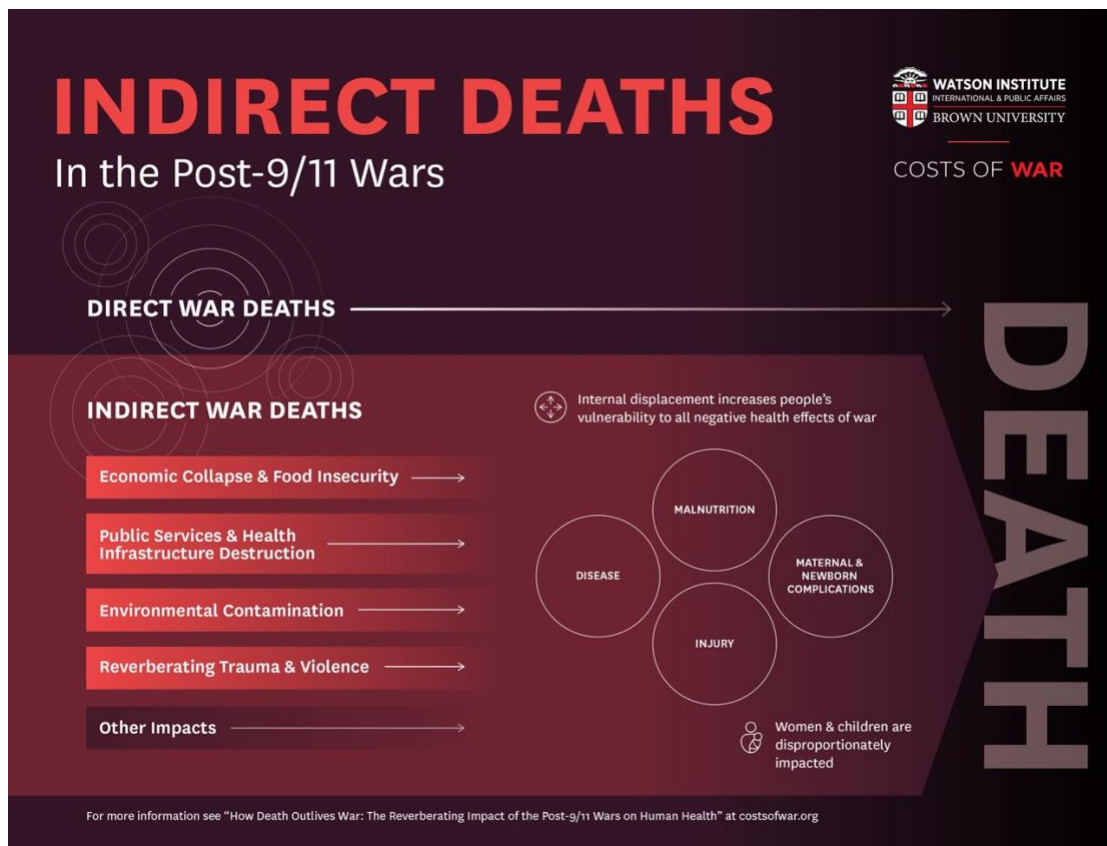
Sources for Figure 2: Most recent available statistics (2020-2023) from the Food and Agriculture Organization of the United Nations, OCHA (United Nations Office for the Coordination of Humanitarian Affairs), UNICEF, World Food Program, and World Health Organization.⁵⁰

⁵⁰ Food and Agriculture Organization of the United Nations (FAO), IFAD, UNICEF, WFP and WHO. (2022). *The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable*. Rome, FAO. <https://doi.org/10.4060/cc0639en> ; Integrated Food Security Phase Classification (IPC). (2023, February 28) *Somalia: IPC Food Security & Nutrition Snapshot: January- June 2023*. <https://reliefweb.int/report/somalia/somalia-acute-malnutrition-situation-january-march-2023-and-projection-april-june-2023> ; OCHA (United Nations Office for the Coordination of Humanitarian Affairs). (2022, February). *Humanitarian Needs Overview, Syrian Arab Republic*. https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/hno_2022_final_version_210222.pdf ; UNICEF. (2022, May). *Severe wasting: An overlooked child survival emergency*. <https://www.unicef.org/media/120346/file/Wasting%20child%20alert.pdf> ; World Food Programme. (2023, February 21). *WFP Afghanistan: Situation Report*. <https://reliefweb.int/report/afghanistan/wfp-afghanistan-situation-report-21-february-2023> ; UNICEF. (2023, March 24). *8 years of crushing conflict in Yemen leave more than 11 million children in need of humanitarian assistance*. <https://www.unicef.org/press-releases/8-years-crushing-conflict-yemen-leave-more-11-million-children-need-humanitarian> ; UNICEF, WFP, FAO. (2022, March). *YEMEN: Food Security and Nutrition Snapshot*. <https://www.unicef.org/mena/reports/yemen-food-security-and-nutrition-snapshot> ; World Health Organization, UNICEF, World Bank. (2021). *Wasting prevalence among children under 5 years of*

Causal Pathways Towards Indirect Deaths

Figure 3, below, displays causal pathways leading to the highest magnitude of indirect deaths in the post-9/11 wars. The categories overlap and intersect significantly. For instance, malnutrition, lack of clean water and sanitation, and forced displacement often go hand-in-hand. Each of the following sections describes a causal pathway and identifies how it varies in impact within populations, affecting women, children, and high-conflict regions most acutely.

Figure 3. Causal Pathways Towards Indirect Deaths in the Post-9/11 Wars



Causal Pathway (1): Economic Collapse, Loss of Livelihood, and Food Insecurity

This section describes how the post-9/11 wars have caused widespread economic hardship for people in the war zones, and how poverty, in turn, has been accompanied by food insecurity and malnutrition, which have led to diseases and death, particularly amongst children under age five. This causal pathway is listed first because of the massive scale of its impact, so much so that malnutrition statistics are an important indicator of the

age (% weight-for-height <-2 SD) (country survey results).

[https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-jme-country-children-aged-5-years-wasted-br-\(-weight-for-height--2-sd\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-jme-country-children-aged-5-years-wasted-br-(-weight-for-height--2-sd)).

costs of war for human health. The section also describes related consequences of United States' drone strikes on livelihood sources and how U.S. counterterrorism restrictions have hampered humanitarian food aid actions – though it is important to note that the magnitude of the impact of this causal pathway stems from actions far beyond only those of the U.S. Poverty has further negative health impacts in preventing people's access to many essential items, including access to healthcare and clean water and sanitation, and increasing child labor and child marriages.

Not just in the post-9/11 wars but in most major conflicts since the late 1980s, malnutrition and disease have been the primary causes of death.⁵¹ Starvation kills people, especially young children, and permanently stunts and disables many more children, slowing their developmental growth. Malnutrition also weakens the immune system and results in higher susceptibility to and severity of infections.⁵² Concomitant diseases such as measles and cholera often sicken malnourished people, particularly children, and at the same time worsen malnutrition.⁵³ The official cause of death of a young child might be cholera, but the underlying malnourishment weakened the child and made them susceptible.

Hunger crises are precipitated by wars' destruction of economies and the impoverishment of millions in the war zones. Poverty lessens people's abilities to grow and buy food, stay in their home communities, access clean water and sanitation, pay for healthcare and medicine, keep children away from hazardous jobs, and other essential pathways to preserving health and life. Affected populations might be forced to spend scarce resources paying for water or other basic staples on the black market at exorbitant prices. Middle East households headed by widows are particularly impoverished; there are over one million widows in Iraq and two million in Afghanistan.⁵⁴

Globally, wars are also correlated with food insecurity because they decrease food availability, disrupt social networks, and increase food prices.⁵⁵ Explosive remnants of war, including unexploded ordnance and mines, render land inaccessible to farm and block the transport of goods. People affected by war may also lose access to farmland in other ways, including through heightened interpersonal conflict and loss of paperwork. In certain cases, such as in Yemen, warring parties have deliberately targeted civilian food sources. In

⁵¹ Guha-Sapir, D., Degomme, O. (2005, May 26). *Darfur: Counting the Deaths: Mortality Estimates from Multiple Survey Data*. Centre for Research on the Epidemiology of Disasters, University of Louvain.

<https://www.cred.be/downloadFile.php?file=sites/default/files/DarfurCountingtheDeaths.pdf>

⁵² França, TGD., et al. (2009, August 31) *Impact of malnutrition on immunity and infection*. Journal of Venomous Animals and Toxins including Tropical Diseases, 15(3). This epidemiological research shows that, in general, malnutrition is “considered the most relevant risk factor for illness and death.”

⁵³ Bendavid, E. et al. (2021, February 6). *The effects of armed conflict on the health of women and children*. The Lancet, 397(10273), 522–532. p. 527.

⁵⁴ Lafta, R., Al-Nuaimi, M. (2019, October 9). *War or health: a four-decade armed conflict in Iraq*. Medicine, Conflict and Survival, 35(3): 209-226.; Siddique, A. (2022, March 25). *Afghan Widows Struggle to Survive Amid Humanitarian Disaster*. Gandhara. <https://gandhara.rferl.org/a/afghan-widows-struggle-to-survive/31768872.html>

⁵⁵ Bendavid, E., et al. (2021, February 6). *The effects of armed conflict on the health of women and children*. The Lancet, 397(10273), 522–532. p. 527.

other cases, such as in Somalia, war has prevented the delivery of humanitarian aid, exacerbating famine. Generally, populations displaced by violence face some of the worse levels of food insecurity and malnutrition, but in some cases food insecurity may be alleviated through migration, for instance through humanitarian aid in refugee camps (see more in the displacement section, below).⁵⁶

In Afghanistan, 20 years of U.S.-led war (2001-2021) on top of the preceding 20 years of Soviet-led and civil wars, combined with the current misrule of the Taliban, U.S. and global sanctions, drought, and the effects of the COVID-19 pandemic and the war in Ukraine, have displaced millions and left tens of millions without basic life necessities. Malnutrition was prevalent throughout the U.S. occupation but it skyrocketed after the U.S. withdrawal in August 2021.⁵⁷ Afghanistan's economy has collapsed and over half the population now lives in extreme poverty, on less than \$1.90 per day.⁵⁸ The situation is dire: 95% of Afghans are not getting enough to eat, and in women-headed households that number is 100%.⁵⁹ An estimated 18.9 million people – nearly half the country's population – were acutely food insecure in 2022. Of these, 3.9 million children are acutely malnourished or “wasting,” insufficiently intaking essential nutrients, with serious physiological consequences. One million Afghan children are at risk of death.⁶⁰

“Hospital wards [are] filled with malnourished children, many weighing at age one what an infant of six months would weigh in a developed country, with some ‘so weak they are unable to move’.”

Ramiz Alakbarov, UN Resident and Humanitarian Coordinator for Afghanistan. (2022, March 15). “Statement on the Continued Food Insecurity in Afghanistan.” <https://afghanistan.un.org/en/174875-statement-dr-ramiz-alakbarov-deputy-special-representative-secretary-general-resident>

The case of Afghanistan shows how the magnitude of indirect death – the large numbers that dwarf those killed by direct war violence – is rooted in the vulnerability of children under age five. Not only are Afghan children at heightened risk of dying of starvation, but also of neonatal complications and illnesses such as acute diarrhea with

⁵⁶ Migration Data Portal. *Food Security and Human Mobility*. Accessed April 11, 2023.

<https://www.migrationdataportal.org/food-security>

⁵⁷ Even in 2019 with foreign donors propping up the Afghan economy, malnutrition was the top risk factor for death and disability. The Institute for Health Metrics and Evaluation. (2022). *Afghanistan*. The Institute for Health Metrics and Evaluation, University of Washington. <https://www.healthdata.org/afghanistan>

⁵⁸ Special Inspector General for Afghanistan Reconstruction. (2022, July 30). *Quarterly Report to the United States Congress*. p. 100. <https://www.sigar.mil/pdf/quarterlyreports/2022-07-30qr.pdf>

⁵⁹ United Nations. (2022, March 15). *Afghanistan: Food insecurity and malnutrition threaten ‘an entire generation’*. UN News.

<https://news.un.org/en/story/2022/03/1113982#:~:text='Harsh%20reality'&text=A%20staggering%2095%20per%20cent.that%20it%20is%20almost%20inconceivable.>

⁶⁰ Special Inspector General for Afghanistan Reconstruction. (2022, July 30). *Quarterly Report to the United States Congress*. p. 100. <https://www.sigar.mil/pdf/quarterlyreports/2022-07-30qr.pdf>; World Food Program. (2022, July 12). *WFP Afghanistan: Situation Report*. <https://reliefweb.int/report/afghanistan/wfp-afghanistan-situation-report-07-july-2022>; UNICEF. (2022). *Afghanistan Humanitarian Situation Report #4, 1-31 March 2022*. <https://www.unicef.org/afghanistan/media/7006/file/UNICEF-Afghanistan-Humanitarian-SitRep-March-2022.pdf>

dehydration, measles, cholera, and pertussis.⁶¹ In general, global deaths of children under five (and over one month old) are most associated with communicable diseases.⁶²

The spiraling pattern of war-induced poverty, food insecurity, communicable diseases, and death is repeated across the war zones: In Iraq, the U.S.-led war has been among other factors contributing to widespread child malnutrition; the primary drivers of death amongst Iraqi children under five are lower respiratory tract infections, diarrhea, and measles.⁶³ In Syria, there is a strong correlation between war-related food insecurity and death, including from polio, measles, typhoid, influenza, acute diarrhea, and leishmaniasis.⁶⁴ Yemen's war, in combination with Saudi Arabia's blockade on areas controlled by Houthis and environmental disasters, has caused economic collapse and a hunger catastrophe.⁶⁵ More than 17.4 million Yemenis are food insecure and 7.3 million facing emergency levels of hunger.⁶⁶ Since the beginning of the war, an estimated 85,000 children under five may have died due to starvation.⁶⁷ Yemenis have suffered significant outbreaks of infectious diseases, including the largest cholera epidemic of modern times (2016-2018) and diphtheria (a vaccine preventable disease).⁶⁸ One study documented that high-conflict districts were 11 times more likely to have cases of diphtheria.⁶⁹

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- ⁶¹ World Health Organization Afghanistan. *Infectious Disease Outbreaks Situation Report*. Accessed August, 2022. http://www.emro.who.int/images/stories/afghanistan/AFG_INFECTIOUS_DISEASE_OUTBREAKS_WEEK_34.pdf?ua=1; UNICEF. (2022). *Afghanistan Humanitarian Situation Report #4, 1-31 March 2022*. <https://www.unicef.org/afghanistan/media/7006/file/UNICEF-Afghanistan-Humanitarian-SitRep-March-2022.pdf>; World Health Organization Afghanistan. *Infectious Disease Outbreaks Situation Report*. Accessed August, 2022. http://www.emro.who.int/images/stories/afghanistan/AFG_INFECTIOUS_DISEASE_OUTBREAKS_WEEK_34.pdf?ua=1
- ⁶² United Nations Inter-agency Group for Child Mortality Estimates. (2022). *Levels & Trends in Child Mortality, Report 2022*. p. 9. <https://childmortality.org/wp-content/uploads/2023/01/UN-IGME-Child-Mortality-Report-2022.pdf>
- ⁶³ Lafta, R., Al-Nuaimi, M. (2019, October 9). *War or health: a four-decade armed conflict in Iraq*. *Medicine, Conflict and Survival*, 35(3): 209-226.
- ⁶⁴ Syrian Center for Policy Research. (2020, May 27). *Justice to Transcend Conflict: Impact of Syrian Conflict Report*. p. 97-98. <https://www.scpr-syria.org/justice-to-transcend-conflict/>
- ⁶⁵ Sheline, A. (2022, March). *The Yemen War in Numbers: Saudi Escalation and U.S. Complicity*. Quincy Institute for Responsible Statecraft. Brief No. 22. p.14. <https://quincyinst.org/wp-content/uploads/2022/03/QUINCY-BRIEF-NO.-22-MARCH-2022-SHELINE-1-1.pdf>
- ⁶⁶ UN News. (2022, March 14). *Yemen facing 'outright catastrophe' over rising hunger, warn UN humanitarian*. United Nations. <https://news.un.org/en/story/2022/03/1113852>. Malnutrition is the top risk factor driving death and disability in Yemen. The Institute for Health Metrics and Evaluation. (2022). *Yemen*. The Institute for Health Metrics and Evaluation, University of Washington. Retrieved from: <https://www.healthdata.org/yemen>
- ⁶⁷ Save the Children. (2021). *2.3 Million Children Are On the Brink of Starvation in Yemen*. Retrieved from: <https://www.savethechildren.org/us/charity-stories/yemen-severe-acute-malnutrition>
- ⁶⁸ Gormley, M. (2018, June 1). *Untangling the causes of the 2016–18 Cholera epidemic in Yemen*. *Lancet Global Health*, 6(6) p. e600-e601.
- ⁶⁹ The study documented 116 deaths due to diphtheria between October 2017 to August 2018. Dureab, F., et al. (2019, May 19). *Diphtheria outbreak in Yemen: the impact of conflict on a fragile health system*. *Conflict and Health*, 13(19).

Beyond general economic collapse, evidence highlights that wartime attacks have more specifically eroded people's livelihood sources in Yemen, Somalia, and elsewhere. Beginning in 2015, for instance, the Saudi- and United Arab Emirates-led coalition in Yemen has created massive destruction with airstrikes and heavy weapons. Poverty was already high, but this increased violence led to 35% of the population losing their main source of income in the subsequent two years.⁷⁰

“After the Saudi- and United Arab Emirates-led coalition started bombing artisanal fishermen in the waters off Al-Hudaydah, one woman said her ‘son was no longer able to go fishing.’ They ‘decided to flee,’ fearing [they] would either die from starvation or that [a Saudi/UAE-led coalition] aircraft would kill [them]. The sea ‘meant everything for the community’ but had become a place of fear. Some fishermen had no choice but to return to fishing, ‘because [they] have no other source of food or income.’”

Mwatana for Human Rights. (2021, Sept. 1). *Starvation Makers: The Use of Starvation by Warring Parties in Yemen as a Method of Warfare*. p.16. <https://mwatana.org/en/starvation-makers/>

Though U.S. drone strikes raise many issues beyond the scope of this paper, here it is relevant that they significantly impact people's livelihood sources. In at least 21 incidents, U.S. drones or ground raids killed Yemeni civilians, many of them primary breadwinners. A U.S. airstrike on December 22, 2017, for instance, killed Abdallah Ahmed Hussein Al Aameri, age 47, who worked transporting goods between his remote village and Rada'a city. His income had supported his eleven children, his two wives, his brother's children and his mother, who now struggle to survive.⁷¹

There have been similar consequences of U.S. airstrikes documented in Somalia, where bombs have damaged farms and livestock (there have been 237 U.S. strikes in Somalia since 2003).⁷² Nurto Mohamed Nor Issak owned a seven-acre plantation of coconut trees before a U.S. airstrike destroyed three-quarters of them, vastly depleting her income. Another man, Abdifatah, could no longer farm his land after a U.S. airstrike hit his village and Al-Shabaab subsequently refused to let him clear the brush, so as to provide better cover against aerial attacks.⁷³ The severe impact of such economic setbacks on populations who depend on the land for their survival cannot be underestimated.

⁷⁰ Anzellini, V., Benet, J., Hajžmanová, I., Leduc, C., et al. (2020). *A decade of displacement in the Middle East and North Africa Region 2010-2019*. Internal Displacement Monitoring Centre. https://www.internal-displacement.org/sites/default/files/publications/documents/IDMC_MenaReport_final.pdf#page=35

⁷¹ The U.S. Central Command has only admitted to killing one civilian through its drone strikes in Yemen, and refused to pay compensation to the family members of the victim out of supposed fears that the money would end up in the hands of militant groups. Mwatana for Human Rights. (2021, March). *Death Falling From the Sky: Civilian Harm from the United States' Use of Lethal Force in Yemen (January 2017-January 2019)*; Jamal, Bonyan. (2022, May 19). Personal communication.

⁷² U.S. airstrikes in Somalia have also killed approximately 1,507 to 1,990 people directly. New America. *The War in Somalia: America's Counterterrorism Wars*. Accessed 2022, August. <https://www.newamerica.org/international-security/reports/americas-counterterrorism-wars/the-war-in-somalia/>

⁷³ Sperber, A. (2019, December 16). *The “Collateral Damage” of the U.S.'s Unofficial War in Somalia*. In *These Times*. <https://inthesetimes.com/article/us-air-strikes-somalia-al-shabab-isis-pentagon-civilian-casualties>

The case of Somalia demonstrates another facet of how wartime food insecurity leads to indirect deaths: U.S. counterterrorism laws there have hampered humanitarian relief efforts, intensifying the effects of famine. U.S. laws require aid organizations to provide firm assurances that there is minimal risk of aid being diverted to designated terrorist groups, and in 2009, the U.S. suspended over \$50 million in humanitarian aid for Somalia, including all deliveries via the World Food Program (WFP), over concern that it would benefit Al-Shabaab.⁷⁴ In 2010, the WFP pulled out of southern Somalia, which was largely controlled by Al-Shabaab, and subsequently, Al-Shabaab announced that it was banning WFP and other humanitarian groups, accusing these organizations of political motives. The following year, amidst a major drought in July 2011, the UN declared a famine in this region affecting over three million.⁷⁵ The international community mobilized significant aid, but it was insufficient. At least 258,000 people, including 133,000 children under five, died between October 2010 and April 2012.⁷⁶

Currently, Somalia is facing the possibility of another famine.⁷⁷ According to UNICEF, “Somalia’s cruel lesson is that excess mortality among severely wasted children does not happen gradually. Mortality shoots up suddenly, when malnutrition combines with disease outbreaks – as is happening right now. The humanitarian community has a tiny window to prevent mass excess deaths among children across the Horn of Africa.”⁷⁸

War-induced poverty has many other negative health consequences, such as preventing people from accessing healthcare and clean water (more on this, below). Poverty also increases child labor and child marriages, both with heightened risk of death, illness, injury, and developmental and psychological effects. During the war in Afghanistan, child labor surged; one study documented it on the rise in all 10 provinces being

⁷⁴ Pantuliano, S., Mackintosh, K., Elhawary, S., Metcalfe, V. (2011, October). *Counter-terrorism and humanitarian action: Tensions, impact and ways forward*. Humanitarian Policy Group. <https://cdn.odi.org/media/documents/7347.pdf>; Maxwell, D., Fitzpatrick, M. (2012, December). *The 2011 Somalia famine: Context, causes, and complications*. Global Food Security, 1(1), 5–12.

⁷⁵ Humanitarian response was further complicated by very large population movements, some of it forced return of IDPs by Al-Shabaab. Maxwell, D., Fitzpatrick, M. (2012). *The 2011 Somalia famine: Context, causes, and complications*. Global Food Security, 1(1), 5–12.

⁷⁶ Checchi, F., Robinson, W. (2013, May 2). *Mortality among populations of southern and central Somalia affected by severe food insecurity and famine during 2010-2012*. Food and Agriculture Organization of the United Nations, Famine Early Warning Systems Network. <https://reliefweb.int/report/somalia/mortality-among-populations-southern-and-central-somalia-affected-severe-food>

⁷⁷ World Food Programme. “Somalia emergency.” Retrieved March 22, 2023 from <https://www.wfp.org/emergencies/somalia-emergency>; UN News. (2022, April 12) *Humanitarians urge action to avert famine in Somalia and South Sudan*. United Nations. <https://news.un.org/en/story/2022/04/1116072>; As of 2019, malnutrition is the top risk factor driving the most death and disability in Somalia, followed by air pollution and problems associated with water, hygiene and sanitation. The Institute for Health Metrics and Evaluation. (2022). *Somalia*. The Institute for Health Metrics and Evaluation, University of Washington. Retrieved from: <https://www.healthdata.org/somalia>

⁷⁸ UNICEF. (2022, May). *Severe Wasting: An Overlooked Child Survival Emergency*. UNICEF Child Alert. Retrieved from: <https://www.unicef.org/media/120346/file/Wasting%20child%20alert.pdf>

monitored.⁷⁹ Globally, an estimated 22,000 children are killed at work each year.⁸⁰ Afghanistan has also seen an increase in child marriages, which likewise have negative physical and mental health consequences.⁸¹

The Death of Abdoulaye

In Burkina Faso, where people have in recent years suffered many attacks by Islamist militants and government forces, this report's author met, in 2019, a community of people who had been forced by violence to flee their homes and were living in an abandoned school building on the outskirts of the capital. Actively overlooked by the government, which wanted to discourage Internally Displaced People (IDPs) from settling in Ouagadougou, the 40 men, women, and children depended on the charity of surrounding villagers. They had only enough rice or millet to eat once per day. One child, Abdoulaye, age three, contracted malaria, and the adults scrambled to find money to bring him to the health clinic. By the time they managed to get him here, he was so sick that it was too late. Abdoulaye died. His immune system, weakened by anemia and malnutrition, could not beat the illness.

Abdoulaye is doubly uncouned: as a displaced person and as a war death. Though he is mourned painfully by his mother and community, officially, he never existed. His story is emblematic of how this kind of death, and its omission in counts of the dead, happens in any number of conflicts, including the post-9/11 wars.

Causal Pathway (2): Destruction of Public Services and Health Infrastructure

Peace time governments provide varying degrees of public services to protect population health, and war destroys such infrastructure – however inadequate it was to begin with. Hospitals, clinics, and medical supplies, water and sanitation systems, electricity, roads and traffic signals, infrastructure for farming and shipping goods, and much more are destroyed, damaged and disrupted, with lasting consequences for human health. Some indirect deaths occur immediately, as for instance when a hospital patient passes away because a bomb blows up the hospital's electricity grid or generator, or in a car crash as a driver attempts to avoid shelling. But in general, the reverberating effects due to loss of services build over time.

⁷⁹ Conflict eliminates people's ability to plan for or invest in the future (for example by investing in a child's education), instead requiring people to focus on day-to-day survival, often by sending children out to work. Afghanistan Public Policy Research Organization. (2018, April). *Chronic Conflict, Poverty, and Child Labor: Evidence from Kandahar, Bamyan, Herat, and Balkh*. <https://fdocuments.net/document/chronic-conflict-poverty-and-child-labor-evidence-from-kandahar-bamyan-2018-09-04.html?page=1>

⁸⁰ Raqib, S. (2018, June 12). *Time to Get Kids out of Hazardous Workplaces*. Human Rights Watch. <https://www.hrw.org/news/2018/06/12/time-get-kids-out-hazardous-workplaces>

⁸¹ Afghanistan Public Policy Research Organization. (2018, April). *Chronic Conflict, Poverty, and Child Labor: Evidence from Kandahar, Bamyan, Herat, and Balkh*. <https://fdocuments.net/document/chronic-conflict-poverty-and-child-labor-evidence-from-kandahar-bamyan-2018-09-04.html?page=1>

Some types of damage lead to a greater amount of illness and death, notably the destruction of healthcare infrastructure. But damage to other types of infrastructure also has severe effects, particularly the loss of water and sanitation systems which can lead to water-borne diseases, sometimes killing thousands, as in the largest cholera epidemic of modern times in Yemen (2016-2018). And at the height of the U.S.-led war in Iraq, the disastrous state of roads and traffic systems led to as many if not more fatalities than the conflict itself. The destruction of ports, urban buildings, and electrical systems also have negative effects.

Destroyed and Inaccessible Healthcare

This section describes how the post-9/11 wars have eviscerated healthcare infrastructure, an impact that is relatively well documented, in part because the causal pathway is so clear. Lack of care for people who are sick and the failure of preventative care, such as vaccination campaigns, often have quick and fatal consequences. Lack of pre- and post-natal care leads to significant death rates for newborn babies, as well as for their mothers. High-conflict regions suffer disproportionately.

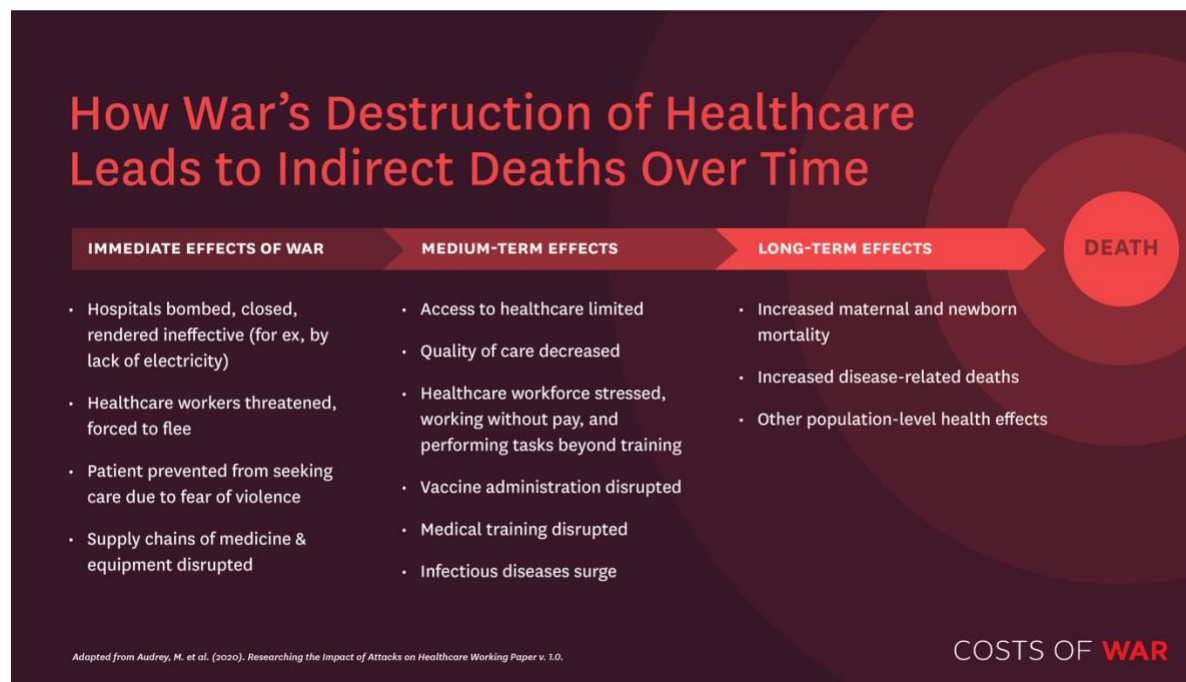
Because of the profound consequences for population health of attacks on healthcare as well as the larger challenge of estimating numbers of indirect deaths, researchers have suggested that measuring the impacts of these attacks could provide an alternative indicator of the scale of war's impact on health. For instance, during a period in the Syrian war, "each attack on a healthcare facility corresponded to an estimated 260 reported civilian casualties in the same month."⁸² This is evidence that each attack on a health facility – which are sometimes more easily counted than individuals – can lead to hundreds of indirect deaths. In Syria, the vast majority, over 80%, of attacks on healthcare have been committed by the aligned Syrian and Russian armed forces to intentionally restrict access to healthcare in opposition-controlled areas.

The causal pathway of war's impact on healthcare infrastructure is as follows: hospitals and clinics are bombed, closed, and rendered ineffective through lack of electricity; healthcare workers are abducted, threatened and forced to flee; patients intimidated; essential medical supplies and equipment lost, looted, and destroyed. In the medium term, this limits people's access to care, and the quality of care decreases. Healthcare workers perform tasks beyond their training, go without pay, and face incredible stressors that deteriorate their mental health. Patients change their behaviors, starting to avoid healthcare facilities. Vaccination campaigns are disrupted, and preventable diseases like measles and polio surge. Medical education and training are interrupted. In the long term, such factors in the post-9/11 wars have increased maternal

⁸² Ri, S., Blair, A.H., Kim, C.J., Haar, R.J. (2019, June 10). *Attacks on healthcare facilities as an indicator of violence against civilians in Syria: An exploratory analysis of open-source data*. PLoS ONE, 14(6): e0217905. p.1.

and newborn mortality, disease-related deaths, and generated other population-level effects.⁸³ See Figure 4, below, for a summary of these effects and how they build over time.

Figure 4. How War's Destruction of Healthcare Leads to Indirect Deaths Over Time



It is important to highlight that war-induced poverty, discussed in the previous section, is closely related to lack of access to healthcare and related negative outcomes. In Syria, for instance, the cost of transportation reduced child vaccination rates, while the cost of healthcare delayed or deferred seeking treatment. In a 2021 survey, 90% of households reported that cost of treatment and consultation were among the foremost obstacles to accessing care.⁸⁴

Across the war zones, healthcare infrastructure has been crippled. After the U.S. withdrawal from Afghanistan, all foreign funding for healthcare abruptly stopped, and a month later, more than 80% of Afghanistan's healthcare facilities were reported to be dysfunctional.⁸⁵ While some U.S. and foreign aid has begun to trickle in again, there are limitations on foreign aid to the Taliban-led government. During wartime research in Kabul, anthropologist Anila Daultzai heard countless stories of Afghans who had trouble

⁸³ Audrey, M., Blanchet, K., Haar, R., Fast, L., Rubenstein, L., Kostandova, N. (2020, December). *Conceptual issues and methodological approaches to evaluating the wider and longer-term impact of attacks on healthcare in conflict*. RIAH Working Paper v. 1.0. p. 28.

⁸⁴ UN OCHA. (2022, February). *Humanitarian Needs Overview, Syrian Arab Republic*. Humanitarian Programme Cycle 2022. Retrieved from: https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/hno_2022_final_version_210222.pdf. Pp. 74, 108.

⁸⁵ Dawji, A. (2022, March 7). *Afghanistan Faces Return to Highest Maternal Mortality Rates*. VOA News. <https://www.voanews.com/a/afghanistan-faces-return-to-highest-maternal-mortality-rates-/6474248.html>

accessing healthcare for even the most common illnesses; if they did get to a hospital, the results could be deadly because of the lack of trained staff and missing supplies such as water, soap, and anesthetics.⁸⁶

Other countries have also been severely impacted. In Syria in 2021, just 56% of primary healthcare facilities and 63% of hospitals were fully functional. The conflict has disrupted basic supply chains of medicines and health supplies, limited the number of healthcare workers and constrained medical training.⁸⁷ In Yemen, half of all health facilities are not functional due to lack of staff and supplies, limited access, and inadequate funding.⁸⁸ The Iraqi government has failed to rebuild its healthcare system, and the quality of public healthcare remains so poor that many Iraqis, even those of little means, choose to seek private care abroad in Lebanon, Iran, Jordan and Turkey. Many sell their homes, cars, and other possessions in order to do so.⁸⁹ Before his son Mostafa's death of cancer, Hesham Abdullah quit his job and sold his house and all his family's valuables to pay for his cancer treatment, including overseas care and black-market medicines.⁹⁰

Whereas before Libya's war, the country's human development index was ranked the highest in Africa, the war disrupted healthcare and closed hospitals across the country. The war years brought about a large decrease in life expectancy (nine years for men and six for women), and infectious diseases such as tuberculosis surged.⁹¹ In the Libyan city of Sirte, a U.S. air campaign conducted around 500 strikes in just five months in 2016, a bombardment more intense than in comparable periods of U.S. air campaigns in Syria and

⁸⁶ Daulatzai, A. (2022, May 31). Personal communication.

⁸⁷ UN OCHA. (2022, February). *Humanitarian Needs Overview, Syrian Arab Republic*. Humanitarian Programme Cycle 2022. Retrieved from:

https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/hno_2022_final_version_210222.pdf. Pp. 74, 108.

⁸⁸ UNICEF. (2019). *Yemen: Parenting In A War Zone 1/4: Crossroads At Childbirth*.

<https://www.unicef.org/yemen/media/2701/file/Yemen-parenting-in-a-war-zone-1-2019-en.pdf.pdf>

⁸⁹ The New Humanitarian. (2013, May 2). *Iraq 10 years on: War leaves lasting impact on healthcare*.

<https://www.thenewhumanitarian.org/feature/2013/05/02/iraq-10-years-war-leaves-lasting-impact-healthcare>

⁹⁰ Iraqi families who had traveled to Beirut for cancer care and were interviewed by anthropologist Mac Skelton each spent \$20,000 to \$100,000 for travel and treatment. Skelton, M. (2013, March). *Health and Health Care Decline in Iraq: The Example of Cancer Oncology*. Costs of War, Watson Institute, Brown University.

<https://watson.brown.edu/costsofwar/files/cow/imce/papers/2013/Health%20and%20Health%20Care%20Decline%20in%20Iraq.pdf>; Aboulenein, A., Levinson, R. (2020, March 2). *The medical crisis that's*

aggravating Iraq's unrest. Reuters Special Report. <https://www.reuters.com/investigates/special-report/iraq-health/>;

Al-Saiedi, A., Haddad, M. (2021, April 7). *Challenges Faced by the Iraqi Health Sector in Responding to COVID-19*. Physicians for Human Rights. <https://reliefweb.int/report/iraq/challenges-faced-iraqi-health-sector-responding-covid-19-enar>

⁹¹ Daw, M. (2017, May 9). *Libyan healthcare system during the armed conflict: Challenges and restoration*.

African Journal of Emergency Medicine. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6234156/> and

Africanews. (2016, July 25). *Libya's health sector crumbling as hospitals face unprecedented crisis*.

<https://www.africanews.com/2016/07/25/libya-s-health-sector-crumbling-as-hospitals-face-unprecedented-crisis/>

Iraq.⁹² A 2018 UN Habitat report noted the destruction of the Sirte central hospital and many primary healthcare facilities.⁹³

Lack of access to pre- and post-natal healthcare has particularly deadly, large-scale effects. The first month of a newborn's life is the most vulnerable – neonatal deaths constituted nearly half of under-five deaths around the world in 2021. This one-month period is associated with causes of death related to antenatal care and the birth process, such as premature births and complications such as birth asphyxia and trauma.⁹⁴ These are deaths that many times could be prevented if pregnant women and newborns had access to care. In Afghanistan, approximately one in ten newborn babies died between January and March 2022, over 13,000 in just three months.⁹⁵

Afghanistan had notoriously high rates of maternal mortality before 9/11, and foreign aid for reproductive healthcare succeeded in halving these rates to about 47 deaths for every 1,000 live births by 2019 – still a concerning figure.⁹⁶ Today limited foreign aid, along with worsening poverty and the Taliban's restrictions on women, have led experts to suggest that maternal mortality rates could be as high now as they have ever been.⁹⁷ Children whose mother dies in childbirth are at far greater risk of death themselves.

Yemen faces a similar crisis. In the absence of pre- and postnatal care, along with a crisis of acute malnutrition affecting over one million pregnant and breastfeeding women,

The Story of Khaizaran

In Yemen in December 2018, Khaizaran's husband had no money or means to transport her to a health center when she went into labor, and she died of severe bleeding within five hours of the birth of her son, Ali. She could have been saved by emergency obstetric care at a hospital. She left behind seven other children, all under age 16, who in their devastation dropped out of school. Baby Ali's survival depended on his aunt to breastfeed him, in addition to her own child.

Adapted from UNICEF. 2019. "Yemen: Parenting In A War Zone 1/4: Crossroads At Childbirth." <https://www.unicef.org/yemen/media/2701/file/Yemen-parenting-in-a-war-zone-1-2019-en.pdf.pdf>

⁹² Turse, N., Moltke, H., Speri, A. (2018, June 20). *Secret War*. The Intercept.

<https://theintercept.com/2018/06/20/libya-us-drone-strikes/>

⁹³ UN-Habitat. (2018, April). *City Profile of Sirte, Libya: Rapid city profiling and monitoring system*.

https://unhabitat.org/sites/default/files/documents/2019-04/city_profile_of_sirte.pdf

⁹⁴ United Nations Inter-agency Group for Child Mortality Estimates. (2022). *Levels & Trends in Child Mortality, Report 2022*. p. 9. <https://childmortality.org/wp-content/uploads/2023/01/UN-IGME-Child-Mortality-Report-2022.pdf>

⁹⁵ Abbasi, F. (2022, March 17). *Time Running Out to Address Afghanistan's Hunger Crisis*. Human Rights Watch. <https://www.hrw.org/news/2022/03/17/time-running-out-address-afghanistans-hunger-crisis>

⁹⁶ Sharma, E., Turkami, S., Duclos, D., Howard, N. (2022, March 11). *To sustain maternal and newborn health in Afghanistan under the Taliban regime, midwifery must be prioritized*.

<https://www.bmj.com/content/376/bmj.o653.full>

⁹⁷ Dawi, A. (2022, March 7). *Afghanistan Faces Return to Highest Maternal Mortality Rates*. VOA News.

<https://www.voanews.com/a/afghanistan-faces-return-to-highest-maternal-mortality-rates-/6474248.html>

one out of 260 women dies in pregnancy or childbirth and one in 37 newborn babies die in their first month.⁹⁸

Even with foreign aid, there are large variations in healthcare infrastructure between regions, with high conflict regions significantly worse off. Urban centers tend to fare better than rural areas, which lack basic infrastructure and skilled workers, and where there is often greater insecurity.⁹⁹ During the Afghanistan war, antenatal care, skilled birth attendance, and functioning infrastructure were among the healthcare services with significantly lower coverage in the most conflict-affected areas.¹⁰⁰ Hospitals without guards or boundary walls were vulnerable to attack, and some facilities were even used as fortresses by opposition forces and Afghan national security forces, placing the lives of healthcare workers and patients at risk.¹⁰¹

Direct attacks on and deliberate targeting of healthcare infrastructure as a war tactic are becoming more frequent. In 2020, the World Health Organization estimated that up to three million Afghans did not have access to essential health services because of various parties attacking healthcare facilities, pharmacies, and personnel with targeted killings, abductions, and IED attacks. On January 21, 2020, the Taliban set fire to and planted IEDs around a health center for women in Daikundi province, in order to prevent patients from accessing services funded by their enemies.¹⁰² On May 19, 2020, Afghan national security forces conducted an airstrike on a health clinic treating Taliban members, killing an ambulance driver and a blood donor and wounding workers. Elsewhere, Afghan forces threatened health personnel and looted medical supplies. In a notorious incident on May 12, 2020, unknown gunmen attacked a maternity ward in a Kabul hospital, killing 19 women, including a healthcare worker, and three children, and injuring 23 more.¹⁰³

⁹⁸ UNICEF. (2019). *Yemen: Parenting In A War Zone 1/4: Crossroads At Childbirth*.

<https://www.unicef.org/yemen/media/2701/file/Yemen-parenting-in-a-war-zone-1-2019-en.pdf.pdf>

⁹⁹ Ghulami, Z., Martin, L. (2017, August). *State-Civil Society Relations in Service Delivery in Health and Education in Kabul, Herat, Nangarhar and Takhar*. Afghanistan Public Policy Research Organization. <http://docplayer.net/174847770-Afghanistan-public-policy-research-organization.html>

¹⁰⁰ Mirzazada, S., et al. (2020, June 10). *Impact of conflict on maternal and child health service delivery: a country case study of Afghanistan*. *Conflict and Health*, 14(38). ; In 2017, Integrity Watch Afghanistan (IWA) carried out inspections of 184 health facilities in eight provinces in Afghanistan and found that 53% of facilities had maintenance and structural problems and 33% needed urgent repair. Around 20% of facilities did not have any electricity supply and more lacked stable electricity supply, disrupting the quality of care. Integrity Watch Afghanistan. (2017, August). *Life Matters: Caring for the country's most precious resource: A survey based study of the state of public health care delivery in Afghanistan*. https://integritywatch.org/wp-content/uploads/2017/08/IWA_Health-care-deivery-in-Afghanistan_English_6.pdf.

¹⁰¹ Integrity Watch Afghanistan. (2017, August). *Life Matters: Caring for the country's most precious resource: A survey based study of the state of public health care delivery in Afghanistan*. https://integritywatch.org/wp-content/uploads/2017/08/IWA_Health-care-deivery-in-Afghanistan_English_6.pdf

¹⁰² United Nations Assistance Mission in Afghanistan, United Nations Human Rights Office of the High Commissioner. (2021, February). *Afghanistan Annual Report on Protection of Civilians in Armed Conflict: 2020*. P. 36. https://unama.unmissions.org/sites/default/files/afghanistan_protection_of_civilians_report_2020.pdf.

¹⁰³ United Nations Assistance Mission in Afghanistan. (2020, June). *Afghanistan Protection of Civilians in Armed Conflict. Special Report: Attacks on Healthcare During the COVID-19 Pandemic*. https://unama.unmissions.org/sites/default/files/unama_special_report_attacks_on_healthcare_during_the_covid-19_pandemic_20_june_2020.pdf

Syria has also been a hotspot of attacks on healthcare. Various parties, including the governments of Syria, Russia, and the U.S., and militant groups such as the Islamic State and the al-Nusra Front, have bombed hospitals and health facilities (hundreds of which have been destroyed by aerial attacks since 2011), looted and destroyed ambulances and vaccine convoys, and killed, arrested and tortured healthcare workers. In 2017, a U.S. air campaign to oust the Islamic State from its stronghold in Raqqa resulted in thousands of deaths.¹⁰⁴ U.S. coalition forces launched air strikes on buildings full of civilians using wide-area effect munitions, which could be expected to destroy the buildings, including at least two dozen health facilities.¹⁰⁵ Many have called for war crime investigations by the UN Security Council and International Criminal Court of various parties' destruction of Syrian health infrastructure.¹⁰⁶

Another trend contributing to indirect deaths is that the post-9/11 wars have caused healthcare workers to flee their countries, notably Iraq. The UN economic sanctions of the 1990s caused many health providers to leave Iraq, and in the five years following the U.S. invasion in 2003, an estimated 18,000 doctors – over half those remaining at the time – fled the country. In December 2011, when U.S. soldiers officially withdrew, doctors in Baghdad were being killed at a rate of 47.6 per 1,000 professionals per month, and nearly 5,400 doctors were emigrating annually. Since 2014, the rise of the Islamic State and the Iraqi and U.S. fight against it have further exacerbated the medical brain drain. Doctors suffer violence and threats from grieving families, tribes, and militias, and are still fleeing in the thousands.¹⁰⁷ Those who stay face constant challenges to carrying out their work and improving their skills.¹⁰⁸

The post-9/11 wars have also reduced trust in vaccination campaigns and decreased rates of vaccination. In 2011, the U.S. Central Intelligence Agency (CIA) orchestrated a fake door-to-door vaccination campaign in Pakistan to try to locate Osama Bin Laden. As a result, there was a backlash against vaccination campaigns and a resurgence of polio.¹⁰⁹ As of 2016, Pakistani officials estimated that about 50,000 families

¹⁰⁴ Ri, S., Blair, A.H., Kim, C.J., Haar, R.J. (2019, June 10). *Attacks on healthcare facilities as an indicator of violence against civilians in Syria: An exploratory analysis of open-source data*. PLoS ONE, 14(6): e0217905. p. 2. ; Muzzall, E., et al. (2021, September 1). *Overview of attacks against civilian infrastructure during the Syrian civil war, 2012–2018*. BMJ Global Health, 6:e006384. p. 2.

¹⁰⁵ Amnesty International. (2018, June 5). *Syria: "War of annihilation": Devastating toll on civilians, Raqqa - Syria*. Report. p. 8. <https://www.amnesty.org/en/documents/mde24/8367/2018/en/>.

¹⁰⁶ Muzzall E., Perlman B., Rubenstein L.S., et al. (2021, September 1). *Overview of attacks against civilian infrastructure during the Syrian civil war, 2012–2018*. BMJ Global Health, 6:e006384. p. 11.

¹⁰⁷ Enabling Peace in Iraq Center. (2017, March 7). *Iraq's Public Healthcare System in Crisis*. <https://enablingpeace.org/healthcare-in-crisis/>; Aboulenein, A., Levinson, R. (2020, March 2). *The medical crisis that's aggravating Iraq's unrest*. Reuters Special Report. <https://www.reuters.com/investigates/special-report/iraq-health/>

¹⁰⁸ Lafta, R., Al-Nuaimi, M. (2019, October 9). *War or health: a four-decade armed conflict in Iraq*. *Medicine, Conflict and Survival*, 35(3): 209-226.

¹⁰⁹ Al-Dewachi, O (2015, September). *Blurred Lines: Warfare and Healthcare*. *Medical Anthropology Theory*, 2(2):95.

had refused polio vaccines, but other estimates were that closer to 150,000 families had turned down vaccinations.¹¹⁰

The post-9/11 wars have obstructed access to healthcare in countless additional ways, from attacks on markets that prevent food from reaching hospitals to attacks on residential buildings that prevent health providers from getting to work.¹¹¹

Disabled Water and Sanitation Infrastructure

Destroyed and outdated water supply, water purification and sanitation systems are significant and less recognized sources of disease and death across the post-9/11 war zones. This has taken perhaps the largest scale human toll in Yemen, where bombing destroyed water and sanitation infrastructure, a war-related fuel shortage disrupted sewage and wastewater treatment, and the war reduced access to the electricity needed to run water pumps. In 2017, the World Health Organization (WHO) estimated that approximately 15 million Yemenis lacked access to potable water and sanitation. This was a major contributor to Yemen's mass cholera epidemic in 2016-2018, which infected 7 to 14 million people out of a 25 million population and killed over 2,000.¹¹²

In part because of the Libyan war's destruction of infrastructure, Libya "is one of the most water scarce countries in the world." In 2021, 50% of households in Libya relied on bottled water and only 22% had access to safe sanitation. Poorly functioning solid waste management systems have increased water- and vector-borne diseases, especially amongst vulnerable populations.¹¹³

Northeast Syria is the site of a water crisis due to war-related electricity shortages, mostly caused by insufficient fuel for power plants, along with reduced Euphrates River flow. In rural and urban areas, electricity is only available for a few hours a day, leading many municipalities to bypass water treatment systems and pump untreated water because of restricted pumping hours. Some large water systems are located in territories that are controlled by different factions, so conflict sometimes shuts down water systems entirely. For instance, during three months in 2021, the Alouk water station was shut down, affecting 460,000 residents of Al-Hasakeh city and also nearby Internally Displaced Persons (IDP) camps. Sanitation has also been heavily affected. No wastewater treatment exists for massive IDP sites in northern Syria, and wastewater is openly discharged. This water crisis has led to significant increases in waterborne diseases such as acute diarrhea,

¹¹⁰ Kanwal, S., Hussain, A., Mannan, S., Perveen, S. (2016, March). *Regression in Polio Eradication in Pakistan: A National Tragedy*. Journal of the Pakistan Medical Association, 66(3): 328-333.

¹¹¹ Audrey, M. et al. (2020, December.) *Conceptual issues and methodological approaches to evaluating the wider and longer-term impact of attacks on healthcare in conflict*. RIAH working paper v 1.0. p. 10.

¹¹² Qadri, F., Islam, T., Clemens, J. (2017, November 23). *Cholera in Yemen - An Old Foe Rearing Its Ugly Head*. The New England Journal of Medicine, 377:2005-2007.; Gormley, M. (2018, June 1). *Untangling the causes of the 2016-18 Cholera epidemic in Yemen*. Lancet Global Health, 6(6) p. e600-e601.

¹¹³ UNICEF. *Libya, Country Office Annual Report 2021*. <https://www.unicef.org/media/117151/file/Libya-2021-COAR.pdf>

hepatitis A, typhoid, and leishmaniasis.¹¹⁴ A 2019 estimate was that 15.5 million people across Syria were in need of water, sanitation, and hygiene services.¹¹⁵

In Basra, Iraq, the water supply is not suitable for consumption, and citizens are forced to purchase water from unhygienic distribution tanks at a rate of \$2.50/liter. This led to high rates of water-borne infections such as diarrhea, worms, and outbreaks of cholera in September 2007, August 2008, and October 2012.¹¹⁶

Damaged Roads

War harms transportation infrastructure such as roads and traffic lights, causing indirect deaths due to traffic accidents. Traffic accidents and road fatalities are underreported in war zones, because the emphasis of so much reporting is on combat violence.¹¹⁷ More research is needed, but the little that exists suggests that damage to traffic systems could lead to a surprisingly high number of deaths, relative to other causes.

The best documentation is in Iraq, where the war obstructed public maintenance and investment in transport infrastructure, and where it was dangerous to drive because of bad road conditions and lack of working traffic lights, pedestrian crossings, road markings, road signs, and speed limits. Rates of traffic injuries and deaths have been high. In 2011, a study found that the number of deaths from traffic injuries in Iraq was four times greater than those from terrorist attacks.¹¹⁸ Another analysis of injury fatalities between 2010-2013 showed that approximately one in four Iraqi deaths were due to, respectively, conflict, road traffic, and other unintentional injuries.¹¹⁹

¹¹⁴ UN OCHA. (2022, February). *Humanitarian Needs Overview, Syrian Arab Republic*. Humanitarian Programme Cycle 2022. Retrieved from: https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/hno_2022_final_version_210222.pdf. p. 74, 84.

¹¹⁵ ICRC. (2022, January.) *Explosive Weapons With Wide Area Effects: A Deadly Choice in Populated Areas*. ICRC, Geneva. p. 44.

¹¹⁶ Rawaf, S., et al. (2014, May). *Living Conditions in Iraq: 10 Years after the US-Led Invasion*. *Journal of the Royal Society of Medicine*, 107 (5): 187–93. ; Mowafi, H. (2011, May 16). *Conflict, displacement and health in the Middle East*. *Global Public Health*, 6(5), 472–487.

¹¹⁷ Stern, J. (2013, September 30). *Afghanistan: Why are Traffic Accidents and Road Fatalities Underreported?* Pulitzer Center. <https://pulitzercenter.org/fr/node/12475>

¹¹⁸ Rawaf, S., et al. (2014, May 15). *Living Conditions in Iraq: 10 Years after the US-Led Invasion*. *Journal of the Royal Society of Medicine*, 107 (5): 187–93.

¹¹⁹ Bilukha, O., et al. (2016). *Injury-related fatalities in selected governorates of Iraq from 2010 to 2013: Prospective surveillance*. *American Journal of Disaster Medicine*, 11(1):49-58.

In Afghanistan, the war damaged and blocked roads, making it difficult for people to travel to healthcare facilities.¹²⁰ In Yemen and Syria, the media has covered stories of the difficulties of transporting victims of violence to the nearest medical centers.¹²¹

Damaged Buildings, Electrical Systems, and Commercial Infrastructure

Wars damage ports, commercial buildings, electrical systems, and farming infrastructure, which in turn has negative effects on food security and public services and can lead to injuries and death. Though this topic is understudied, it has been relatively more researched in Iraq, where war came on top of decades of economic sanctions, which also had negative effects. A 2010 survey of over 1,000 Iraqi households showed a high rate of injuries from the war-induced breakdown of urban infrastructure, including from electric shock and explosions, falls, and unintentional gunshot wounds.¹²²

Airstrikes damage essential commercial infrastructure like ports, with significant reverberating effects. In 2015, Hodeidah port in Yemen, which received 70-80% of Yemen's commercial imports, was heavily damaged by aerial bombing. This led to a rise in food insecurity by disrupting the transportation of basic food items and decreasing the availability of fuel needed to operate the country's water systems and health facilities.¹²³

Causal Pathway (3): Environmental Contamination

Residents of the post-9/11 war zones and soldiers suffer the health consequences of war's environmental wreckage. Bombs and other munitions used in these and prior wars, particularly the 1991 Gulf War in Iraq, have contained toxic substances, including heavy metals, white phosphorous, depleted uranium, and dioxin, that, in addition to causing horrific injuries, contaminate soil, water, and vegetation in the aftermath of fighting. Explosive weapons are also particularly detrimental to the environment when used in cities, for the destruction of buildings generates a great deal of debris and releases hazardous materials such as asbestos, industrial chemicals, and fuels. Explosives also damage industrial facilities, resulting in chemical spills, and destroy water supplies and

¹²⁰ Delesgues, L. (2007). *Afghan roads reconstruction: deconstruction of a lucrative assistance*. Integrity Watch Afghanistan. <https://iwaweb.org/wp-content/uploads/2014/12/afghan-road-deconstruction-deconstruction-of-a-lucrative-assistance-2006.pdf>; Integrity Watch Afghanistan. (2020). *Blackout: An Assessment of the Electricity Sector in Afghanistan*. <https://iwaweb.org/wp-content/uploads/2020/04/Energy-Research-Report.pdf>

¹²¹ Singh, N. S., et al. (2021, February 6). *Delivering health interventions to women, children, and adolescents in conflict settings: what have we learned from ten country case studies?* *The Lancet*, 397(10273), 533–542.

¹²² Donaldson, R., Wai Hung, Y., Shanovich, P., Hasoon, T., Evans, G. (2010, December). *Injury burden during an insurgency: the untold trauma of infrastructure breakdown in Baghdad, Iraq*. *The Journal of Trauma and Acute Care Surgery*, 69(6):1379-85.

¹²³ ICRC. (2022, January.) *Explosive Weapons With Wide Area Effects: A Deadly Choice in Populated Areas*. ICRC, Geneva. p. 45.

sanitation facilities, leading to pollution from sewage and solid waste.¹²⁴ In rural areas, aerial bombing decreases soil quality and inhibits agriculture by disrupting topography, forming craters, and altering drainage patterns, contributing to food insecurity.¹²⁵ Unexploded remnants of war remaining in the land injure and kill people for years after the active fighting has ended.

All of this contamination has serious and often fatal consequences for human health across the post-9/11 war zones, but as these are generally long-term effects and extremely difficult to prove, given the many other factors that cause environmental damage, this causal chain is less understood and requires far more systematic research. Of all the war zones, Iraq has been relatively better investigated, though much more remains to be done. Remnants of depleted uranium, used by the U.S. and U.K. in tank armor, ammunition, and for other military purposes in the Gulf War and after 2003, are spread over 1,000 locations in Iraq. The UN Environment Programme estimates that 2,000 tons of depleted uranium may have been used in that country. Sandstorms occur often, blowing radioactive particles from military dump sites into residential neighborhoods.¹²⁶

After the 2003 U.S. invasion of Iraq, water and sanitation systems were destroyed, and millions of tons of raw sewage were dumped into the rivers.¹²⁷ During the U.S.-led war, which officially lasted until 2011, the Iraq Ministry of the Environment documented several industrial problem spots, including a demolished metal plating facility with hazardous wastes, a looted pesticides warehouse, a looted and partially burned petrochemicals warehouse, a large sulfur mining complex damaged by fire, and a damaged military scrap yard site.¹²⁸ The conflict also limited national electricity supply, forcing many to buy generators, polluting the air.¹²⁹ Between 2014 and 2017, various combatants in Iraq destroyed 63 cities and 1,556 villages; the destruction of residential buildings alone generated over 55 million tons of debris. In 2019, the Iraq Ministry of the Environment identified 74 sites where conflict had led to oil pollution, four of them particularly serious. The town of Qayyarah was blanketed for months in thick clouds of black smoke.¹³⁰

¹²⁴ UN Environment Programme. (2021, November 5). *Environmental legacy of Explosive Weapons in Populated Areas*. <https://www.unep.org/news-and-stories/story/environmental-legacy-explosive-weapons-populated-areas>

¹²⁵ Clarkin, P. F. (2019, October). *The Embodiment of War: Growth, Development, and Armed Conflict*. Annual Review of Anthropology, 48:423–442. p. 426.

¹²⁶ Billing, L. (2021, December 29.) *After the Wars in Iraq, 'Everything Living is Dying.'* Inside Climate News. <https://insideclimatenews.org/news/29122021/iraq-ecocide/>.

¹²⁷ Levy, B. S., Sidel, V. W. (2016, March). *Documenting the Effects of Armed Conflict on Population Health*. Annual Review of Public Health, 37, 205–218.

¹²⁸ Ibid. p. 215.

¹²⁹ Rawaf, S., Hassounah, S., Dubois, E., Abdalrahman, B Raheem, M., Jamil, H., and Majeed A. (2014, May 15). *Living Conditions in Iraq: 10 Years after the US-Led Invasion*. Journal of the Royal Society of Medicine, 107 (5): 187–93.

¹³⁰ UN Environment Programme. (2021, November 5). *Environmental legacy of Explosive Weapons in Populated Areas*. <https://www.unep.org/news-and-stories/story/environmental-legacy-explosive-weapons-populated-areas>

U.S. military bases in Iraq, Afghanistan, and elsewhere contaminate their surrounding environments with spills of oil and other toxic chemicals used in maintenance of military equipment, toxic ash, unexploded ordnance, and depleted uranium. U.S. military burn pits – open air incinerators used to burn broken-down tanks, the detritus of weapons, computers, batteries, aerosols, metals, and many other types of industrial, military, and medical debris – contaminate the air, ground water, and soil. Exposure to burn pits has caused serious health problems for U.S. veterans, over 200,000 of whom have served in the Middle East and reported problems to the Department of Veterans Affairs. U.S. service members have suffered from respiratory problems, headaches, and cancers due to their exposure to burn pits in Iraq, and local people living near burn pits say they have similar symptoms. Local residents also report children born with severe birth defects.¹³¹

While the health impacts of this environmental contamination have not, as yet, been systematically proven or officially acknowledged, evidence suggests they have been severe. Medical doctors in Iraq report an unusually high rate of miscarriages, premature births, and birth defects, including congenital anomalies such as cleft palates and spinal deformities, and heart and nervous system defects. Iraq has seen growing death rates due to cancer since the 1990s, and Iraqi public health officials have blamed the depleted uranium used by the U.S. in the Gulf War (though this is disputed by the U.S. military).¹³² In the wake of the U.S.-led bombardment of Fallujah in 2004, studies documented increased rates of infant mortality, leukemia, and cancer and some suggested that these increases were related to the effects of uranium and other heavy metals used in munitions.¹³³ One study showed that levels of lead in children in Basra, Iraq, were four to 50 times higher than in neighboring countries that were not at war, and pointed to the possible prenatal effects of war-related pollution.¹³⁴ Iraqi cancer patients interviewed in another study identified a broad range of war-related harmful substances in the environment, including the detritus of weapons, bad medicine, and raw sewage.¹³⁵

In Iraq, anecdotal evidence of cancers, miscarriages, and birth defects are widespread. “In Iraq, we often say that every family includes someone with cancer,” said 43-year-old Yasin Omar, who lives near a massive landfill.¹³⁶ In a refugee camp,

¹³¹ Billing, L. (2021, December 29.) *After the Wars in Iraq, 'Everything Living is Dying.'* Inside Climate News. <https://insideclimatenews.org/news/29122021/iraq-ecocide/>.

¹³² Skelton, M. (2020, Winter). *The Long Shadow of Iraq's Cancer Epidemic and COVID-19.* MERIP 297. <https://merip.org/2020/12/the-long-shadow-of-iraqs-cancer-epidemic-and-covid-19-297/>.

¹³³ Ahmed, N. (2013, October 13). *How the World Health Organisation covered up Iraq's nuclear nightmare.* The Guardian. <https://www.theguardian.com/environment/earth-insight/2013/oct/13/world-health-organisation-iraq-war-depleted-uranium>

¹³⁴ Savabieasfahani, M., Sadik, Ali S., Bacho, R., Savabi, O., Alsabbak, M. (2016, September). *Prenatal metal exposure in the Middle East: imprint of war in deciduous teeth of children.* Environmental Monitoring and Assessment, 188(9):505.

¹³⁵ Skelton, M. (2013, March). *Health and Health Care Decline in Iraq: The Example of Cancer Oncology.* Costs of War, Watson Institute, Brown University. <https://watson.brown.edu/costsofwar/files/cow/imce/papers/2013/Health%20and%20Health%20Care%20Decline%20in%20Iraq.pdf>

¹³⁶ Billing, L. (2021, December 29.) *After the Wars in Iraq, 'Everything Living is Dying.'* Inside Climate News. <https://insideclimatenews.org/news/29122021/iraq-ecocide/>.

anthropologist Kali Rubaii walked down an aisle between thousands of tents, where families who had heard a foreign researcher was visiting lined up their children on display. Dr. Rubaii felt a shock as she noticed how many of the children had physical disabilities or abnormalities. The older children commented how lucky they were to be born before their siblings, as they attributed the birth defects in those born after 2004 to 2005 to the war.¹³⁷

In Fallujah, over a decade after a heavy U.S.-led bombing campaign in 2004, local women told Dr. Rubaii that doctors were counseling them not to conceive. They were suffering from consecutive miscarriages and babies born with birth defects. They could not bear healthy children, doctors told them, and the attempt to do so was killing them. One woman, Dina, insisted that her miscarried children should be counted among the war's death toll. She used the word "genocide" to describe what was happening to her and others. Sunnis from Anbar province, these women felt that their enemies – whoever they were, Americans or sectarian militias – were trying to annihilate them by robbing them of their ability to bear children.

Iraqis who feel the effects of environmental contamination in their bodies and see them in their children trace their symptoms to war – one reason why ethnographic research like Dr. Rubaii's is so important – but the scientific evidence has been subject to global controversy. Scientists and public health experts have not been able to definitively prove that the wars in Iraq caused carcinogenic diseases and birth defects, for critics argue that the war years could simply be correlated with these effects. There are also many other sources of environmental contamination, including industrial pollution from such things as unregulated oil refineries and the dumping of manufacturing waste into Iraq's waterways.¹³⁸ In the case of Fallujah, the question of causation versus correlation has been heavily politicized. In 2014, partially in response to local doctors documenting rates of deformity as high as 144 in 1,000 children and tracing these rates to war-related contamination, the World Health Organization (WHO) released a study that not only denied that war had caused this problem, but also denied that there was a problem at all. Several ex-officials and medical experts critiqued this WHO study as deeply flawed, and some suggested U.S. political pressure led the WHO to downplay the health consequences of war.¹³⁹

There are fewer studies on war-related environmental contamination and its health consequences in other post-9/11 war zones, but it is likely there are similar environmental costs of war. In Syria, the World Bank assesses that one-third of housing has been damaged or destroyed. An estimated 15 million tons of debris were generated in Aleppo and 5.3 million tons in Homs.¹⁴⁰

¹³⁷ Rubaii, Kali. Personal communication, May 26, 2021. This is also the source for the following text box.

¹³⁸ Billing, L. (2021, December 29.) *After the Wars in Iraq, 'Everything Living is Dying.'* Inside Climate News. <https://insideclimatenews.org/news/29122021/iraq-ecocide/>.

¹³⁹ Ahmed, N. (2013, October 13). *How the World Health Organisation covered up Iraq's nuclear nightmare.* The Guardian. <https://www.theguardian.com/environment/earth-insight/2013/oct/13/world-health-organisation-iraq-war-depleted-uranium>

¹⁴⁰ UN Environment Programme. (2021, November 5). *Environmental legacy of Explosive Weapons in Populated Areas.* <https://www.unep.org/news-and-stories/story/environmental-legacy-explosive-weapons-populated-areas>

Unexploded ordnance – bombs, shells and rockets that initially failed to explode – kill and maim people, especially children, long after active fighting has subsided. About three to five percent of U.S. bombs, shells, and rockets fail to explode on initial contact, according to U.S. military officials; this rate could be 15% in areas with soft sand, according to the UN Environment Program.¹⁴¹ And of course there are many other combatants also using munitions that remain in the land. In Afghanistan in 2021, before reporting was disrupted, the UN estimated that 160 people per month were being killed by explosive remnants of war – almost 2,000 in a single year, more than 79% of whom were children.¹⁴² Of an estimated 33 million population in 2015, around 1.5 million Afghans had a physical disability; many of them are survivors of such explosions.¹⁴³ Estimates in 2019 were that over 1,700 square kilometers of Afghanistan’s land were contaminated by explosive remnants of war.¹⁴⁴ Not only does unexploded ordnance kill people immediately, but it also contributes to many of the causal pathways described in this report, blocking access to agricultural fields, damaging infrastructure such as health clinics and roads, causing high levels of psychological stress, and posing particular problems for IDP camps.¹⁴⁵

In 2021 and 2022, the UN and aid groups called for urgent global attention to the deaths of dozens of children due to unexploded ordnance in Afghanistan, Pakistan (along the Afghan border), Iraq, Libya, Syria, and Yemen.¹⁴⁶

Causal Pathway (4): Reverberating Trauma and Violence

Living through war and forced displacement is traumatic and devastating, with long lasting impacts on mental health, which can lead to suicide and increase domestic, sexual,

¹⁴¹ Levy, B. S., Sidel, V. W. (2016, March). *Documenting the Effects of Armed Conflict on Population Health*. Annual Review of Public Health, 37, 205–218, p. 215.

¹⁴² UNMAS. (2022). *Afghanistan*. <https://www.unmas.org/en/programmes/afghanistan>

¹⁴³ Glinski, S. (2019, April 4). *As casualties soar, Afghanistan struggles to treat civilians maimed by conflict*. The New Humanitarian. <https://www.thenewhumanitarian.org/news-feature/2019/04/04/casualties-soar-afghanistan-struggles-treat-civilians-maimed-conflict>

¹⁴⁴ Fiederlein, S., Rzegocki, S. (2019, September 19). *The Human and Financial Costs of the Explosive Remnants of War in Afghanistan*. Costs of War, Watson Institute, Brown University.

<https://watson.brown.edu/costsofwar/files/cow/imce/papers/2019/Explosive%20Remnants%20of%20War%20in%20Afghanistan%20Costs%20of%20War.pdf>

¹⁴⁵ Pound, B. et al. (2011). *Livelihoods Analysis of Landmine Affected Communities in Afghanistan*. The Geneva International Centre for Humanitarian Demining (GICHD). p. 89.

<https://www.gichd.org/en/resources/publications/detail/publication/livelihoods-analysis-of-landmine-affected-communities-in-afghanistan/>

¹⁴⁶ UNSMIL. (2022, November 23). *UNICEF and UNMAS Concerned by the Continued Loss of Civilian Lives Due to Unexploded Ordnance in Populated Areas*. <https://unsmil.unmissions.org/unicef-and-unmas-concerned-continued-loss-civilian-lives-due-unexploded-ordnance-populated-areas> ; Handicap International. (2022, June 8). *Explosive ordnance in Syria: impact and required action – Report, May 2022*.

<https://reliefweb.int/report/syrian-arab-republic/explosive-ordnance-syria-impact-and-required-action-report-may-2022> ; UNICEF. (2022, February 2). *Four children killed by explosive ordnance in Iraq*.

<https://www.unicef.org/press-releases/four-children-killed-explosive-ordnance-iraq> ; UNICEF. (2021, June 6). *UNICEF deeply concerned by death and injury of children due to landmine and grenade explosions in Pakistan*. <https://www.unicef.org/pakistan/press-releases/unicef-deeply-concerned-death-and-injury-children-due-landmine-and-grenade>

and other kinds of interpersonal violence. These types of incidents tend to be more lethal in contexts where there are weapons, particularly firearms, that circulate and remain in circulation post conflict. Such weapons are also sold illegally and used for illicit activities, linking legacies of conflict with increased violent crime.¹⁴⁷ Of all the causal pathways in this report, reverberating trauma and how it manifests as interpersonal violence is perhaps the least well studied, and involves one of the least clearly delineated, most multilayered chains of effects. Nonetheless, it is clear that these consequences are significant and severe, and are essential in accounting for the impacts of war on population health.

The mental health effects of war reverberate through generations, impacting parents and children, and then their children after that. Globally, estimates are that anxiety and depression are two to four times greater among conflict-affected populations than the global average. These types of impacts are vastly understudied in the post-9/11 war zones.¹⁴⁸ In 2009, the first and only government mental health survey in Iraq showed that 17% of adults suffered from a mental health disorder in their lifetime, with a large percentage of these cases related to the period following the 2003 U.S. invasion.¹⁴⁹

Women tend to suffer more acutely of these effects due to gender-based violence, which is heightened in wartime.¹⁵⁰ In Iraq, rape and sexual violence increased sharply after 2003; one in five Iraqi women has suffered physical or psychological abuse since then.¹⁵¹ One result is that women tend to feel a greater burden of negative mental health effects.

Children are also particularly vulnerable to reverberating trauma and violence. Research shows that children who experience high levels of collective violence are twice as likely to develop chronic diseases. A 2014 survey showed that four out of ten school children (under age 16) in Mosul, Iraq had mental health disorders such as PTSD. A 2010 study documented Iraqi children experiencing depression, anxiety, aggressive behavior, and multiple phobias.¹⁵² Children are also deeply affected by caregiver mental health issues such as depression and posttraumatic stress disorder (PTSD) and related domestic violence and breakdown of family structures.¹⁵³

¹⁴⁷ Dressler, M., Duquet, N., Eckelmann, J. (2021). *Forgotten Weapons? Non-regularised firearms in the European Union*. Project Divert Report, Flemish Peace Institute.

<https://vlaamsvredesinstituut.eu/en/report/5040/>

¹⁴⁸ On mental trauma and suicide amongst U.S. service members, see, Suitt, T. H. (2021, June 21). *High Suicide Rates among United States Service Members and Veterans of the Post-9/11 Wars*. Costs of War, Watson Institute, Brown University.

https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Suitt_Suicides_Costs%20of%20War_June%2021%202021.pdf

¹⁴⁹ Mowafi, H. (2011, May 16). *Conflict, displacement and health in the Middle East*. *Global Public Health*, 6(5), 472–487. p. 481.

¹⁵⁰ Bendavid, E., et al. (2021, January 24). *The effects of armed conflict on the health of women and children*. *The Lancet*, 397(10273), 522–532. p. 529.

¹⁵¹ *ibid*

¹⁵² Lafta, R., Al-Nuaimi, M. (2019, August 29). *War or health: a four-decade armed conflict in Iraq*. *Medicine, Conflict and Survival*, 35(3): 209-226.

¹⁵³ Bendavid, E., et al. (2021, February 6). *The effects of armed conflict on the health of women and children*. *The Lancet*, 397(10273), 522–532. p. 529.

Some of anthropologist Anila Daulatzai's acquaintances in Afghanistan, adult men traumatized by war, confessed they were physically abusing their wives and children due to their war trauma. "I hit my child, and she doesn't do anything wrong, hopefully Allah will forgive me," one man told her. "There's something wrong with me," another man said. They knew what they were doing, but in the face of their PTSD, they felt helpless to stop their own violence against their family members.

"I don't even taste food anymore," and "I wish this life would just end," Afghans told Dr. Daulatzai.

Other scholars similarly point to anecdotal evidence that the negative mental health effects of war in Afghanistan are significant and widespread.¹⁵⁴ Some Afghans turn to heroin as a way to cope with war trauma. While drug abuse may hasten their deaths, some perceive heroin as "making life, not death," because it is the only way they can continue to live in the context of the serial losses and suffering of 40 years of war.¹⁵⁵

In Pakistan between 2004 to 2010, the U.S. conducted "double-tap" drone strikes, most of them on Pashtun villages in North and South Waziristan, along the Afghan border, in which a second strike follows an initial strike against survivors who go to the site to rescue the injured or dead. Reports document that residents of these regions suffered from PTSD, chronic anxiety, and constant fear. A local resident explained, "God knows whether they'll strike us again or not. But they're always surveying us, they're always over us, and you never know when they're going to strike and attack."¹⁵⁶

The WHO estimated in 2017 that one in five Syrians struggled with mental health problems.¹⁵⁷ A Médecins Sans Frontières (MSF) survey of internally displaced persons in a camp in northern Syria reported high levels of psychological distress; many had witnessed atrocities and lost family members. "In the two weeks prior to interview, 14.4% of the respondents felt so hopeless that they did not want to carry on living most of the time."¹⁵⁸ A 2018 survey of Syrian, Afghan, and Iraqi refugees showed that more than 60% were traumatized by war experiences, including attacks by military forces, coping with the

¹⁵⁴ Blanchet, Karl. Personal communication, May 19, 2022.; Dr. Daulatzai calls for more research, ideally carried out by Afghan researchers, on the mental health impacts of the war, or the "psychic toll of what racist violence does to a people and a place."

¹⁵⁵ Daulatzai, A. (2022, May 31). Personal communication.; Daulatzai, A. (2019). "Remaining Undone: Heroin in the Time of Serial War." In *War and Health: The Medical Consequences of the Wars in Iraq and Afghanistan*, edited by Catherine Lutz and Andrea Mazzarino. New York University Press.

¹⁵⁶ Kapadia, R. K. (2018). "Death by Double-Tap: (Undoing) Racial Logics in the Age of Drone Warfare." In *With Stones in Our Hands: Writing on Muslims, Racism, and Empire*, edited by S. Daulatzai & J. Rana. Minneapolis: University of Minnesota Press. p. 209.

¹⁵⁷ Syrian Center for Policy Research. (2020, May 27). *Justice to Transcend Conflict: Impact of Syrian Conflict Report*. p. 97-98. <https://www.scpr-syria.org/justice-to-transcend-conflict/>

¹⁵⁸ Vernier, L., et al. (2019, July 11). *High levels of mortality, exposure to violence and psychological distress experienced by the internally displaced population of Ein Issa camp prior to and during their displacement in Northeast Syria, November 2017*. *Conflict and Health*, 13:33.

murder or disappearance of relatives, living through torture and solitary confinement, and witnessing murders, abuse, and sexual violence. More than 6% had been raped.¹⁵⁹

There are few mental health services in the post-9/11 war zones to help people cope with trauma. Training programs for mental health practitioners are lacking. At the same time, cultural stigma around mental illness often prevents people from seeking care. If they do receive care, it is often at general healthcare facilities rather than through specialists.¹⁶⁰

Health Consequences of Displacement

Though the health effects of displacement are understudied, research suggests that forced displacement due to war, particularly within national borders, is linked with greater indirect deaths.¹⁶¹ When people flee their homes and communities, they lose their houses and livelihood sources and may be faced with, among other consequences, increased poverty, malnutrition and disease, reduced access to public services such as healthcare, vaccinations, safe drinking water, and sewage treatment, increased environmental precarity, and heightened mental trauma. In other words, displacement intensifies people's vulnerability to the negative health effects of all the causal pathways discussed above. Displacement also carries its own health risks: forcing people into crowded living conditions in camps or urban peripheries that encourage the spread of infectious diseases; fracturing communities, which weakens people's resilience strategies; and escalating the danger of sexual violence. Migrants also face the possibility of death and abuse during their journeys over land and sea routes – thousands of migrants to Europe die at sea every year.¹⁶² Often, displaced people lose passports, birth certificates, and other paperwork, which can worsen their precarity.

Since 2001 an estimated 38 million people have been displaced by the post-9/11 wars.¹⁶³ A portion of these are statistically at higher risk of death. A key study showed that populations displaced within national borders, Internally Displaced People (IDPs), face increased excess mortality, mostly due to infectious diseases. Refugees who flee to other countries, however, have death rates comparable to those of residents of the host

¹⁵⁹ Syrian Center for Policy Research. (2020, May 27). *Justice to Transcend Conflict: Impact of Syrian Conflict Report*. p. 97-98. <https://www.scpr-syria.org/justice-to-transcend-conflict/>

¹⁶⁰ Mowafi, H. (2011, May 16). *Conflict, displacement and health in the Middle East*. *Global Public Health*, 6(5), 472-487. p. 481.

¹⁶¹ There are no systematic, global statistics on the mortality effects of complex humanitarian emergencies on IDPs and refugees, so humanitarian organizations tend to collect their own health data at a very local level so that they can target and assess their interventions. See Heudtlass, P., Speybroeck, N., Guha-Sapir, D. (2016, July 20). *Excess mortality in refugees, internally displaced persons and resident populations in complex humanitarian emergencies (1998-2012) - insights from operational data*. *Conflict and Health*, 10(15).

¹⁶² United Nations. (2022, April 29). *Deaths at sea on migrant routes to Europe almost double, year on year*. <https://news.un.org/en/story/2022/04/1117292>

¹⁶³ Vine, D., et al. (2021, August 19). *Creating Refugees: Displacement Caused by the United States' Post-9/11 Wars*. Costs of War, Watson Institute, Brown University. https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_Vine%20et%20a%20l_Displacement%20Update%20August%202021.pdf

countries. The study's authors suggest this might be because refugees living in camps have greater access to humanitarian aid such as food and healthcare.¹⁶⁴ Other experts support this claim, which may also hold true for refugees who settle in urban areas, as is the case for many cross-border migrants in the Middle East.¹⁶⁵ According to anthropologist Sanaa Alimia, Afghan migration in urban Pakistan, the focus of her research, can be seen as a survival strategy. Whereas Afghans face unemployment, hunger, and death at home, if they can manage to cross the border, they may have increased, though still limited, prospects for income generation and access to healthcare (though they face discrimination and social injustices in Pakistan).¹⁶⁶ Other evidence, however, highlights that many Afghan refugees in Pakistan lack the most basic life necessities. In a 2021 survey, over 80% of Afghan refugees in Pakistan reported their greatest needs were for shelter, livelihoods and food. At the same time, 35% of women and girls reported feeling unsafe due to the presence of armed groups and gender-based violence.¹⁶⁷

As with other war-related effects, women and children are most heavily impacted by forced displacement. The majority of forcibly displaced people are children; globally, the proportion of displaced people who were children reached 53% in 2017.¹⁶⁸ Displaced women are frequent victims of rape and other sexual violence, and have reduced access to reproductive healthcare, leading to higher rates of maternal and newborn mortality.¹⁶⁹

In the Middle East, many battles have occurred in cities, where airstrikes and mortar fire have widely destroyed houses, hospitals, electricity plants, water supplies, and schools, not only displacing millions but creating serious obstacles to people returning. Over the last decade, secondary displacement has become common due to evictions, conflict, and natural disasters, as IDPs and refugees often settle on precarious land near river basins or on steep slopes where they are vulnerable to flooding and landslides.¹⁷⁰

More than half Syria's pre-conflict population has been displaced by violence, including 5.6 million refugees and 6.5 million IDPs, the highest number of IDPs in the world. In 2013 and 2014, when Islamic State militants took territory across Syria and Iraq and the U.S. and several Arab countries launched airstrikes against them, the combination

¹⁶⁴ Heudtlass, P., Speybroeck, N., Guha-Sapir, D. (2016, July 20). *Excess mortality in refugees, internally displaced persons and resident populations in complex humanitarian emergencies (1998-2012) - insights from operational data*. *Conflict and Health*, 10(15).

¹⁶⁵ Khan, Sarah. Personal communication, August 25, 2022.

¹⁶⁶ Sanaa Alimia, Zoom talk on "Refugee Cities," November 21, 2022.

¹⁶⁷ UNHCR, UN Women, Women Count. (2022, February 28). *Afghanistan Crisis Update: Women and Girls in Displacement*. <https://data.unhcr.org/en/documents/download/91108>

¹⁶⁸ Bendavid, E. et al. (2021, February 6). *The effects of armed conflict on the health of women and children*. *The Lancet*, 397(10273), 522–532. p. 526.

¹⁶⁹ Heudtlass, P., Speybroeck, N., Guha-Sapir, D. (2016, July 20). *Excess mortality in refugees, internally displaced persons and resident populations in complex humanitarian emergencies (1998-2012) - insights from operational data*. *Conflict and Health*, 10(15). ; Bendavid, E. et al. (2021, February 6). *The effects of armed conflict on the health of women and children*. *The Lancet*, 397(10273), 522–532. p. 528.

¹⁷⁰ Anzellini, V., Benet, J., Hajžmanová, I., Leduc, C., et al. (2020) *A decade of displacement in the Middle East and North Africa Region 2010-2019*. Internal Displacement Monitoring Centre. https://www.internal-displacement.org/sites/default/files/publications/documents/IDMC_MenaReport_final.pdf#page=35

of militant attacks and airstrikes drove hundreds of thousands of people from their homes. Since then, Syrian and Russian government military offensives have displaced millions.¹⁷¹ Displacement on such a large scale has led to overcrowded camps and shelters where people live with inadequate sanitation and waste disposal, insufficient safe water, and food insecurity. Measles and hepatitis B are common among displaced Syrians. Syrian refugees in Jordan and Lebanon have reported high levels of tuberculosis, due to overcrowding, malnutrition – which can lead to the reactivation and progression of tuberculosis – and limited vaccination campaigns, creating the conditions for the cultivation of drug-resistant tuberculosis.¹⁷² Large IDP camps in Syria lack wastewater treatment, leading to outbreaks of waterborne diseases such as diarrhea, hepatitis A, and typhoid.¹⁷³

Over the war years, many Syrian IDPs have returned or attempted to return home; studies show that this population faces particular challenges of economic hardship, insecurity, and overcrowding in shelters. In the province of Idlib in 2019, 75% of surveyed returnee families were unable to access enough food, and half were short of water. A deepening economic crisis and tougher U.S. sanctions starting in June 2020 have led to skyrocketing prices of basics such as food and water, with a severe impact on IDPs.¹⁷⁴

In Afghanistan there were approximately four million internally displaced people in March 2022, almost 60% of whom were children under age 18.¹⁷⁵ These IDPs experience malnutrition and mental health challenges and lack access to healthcare, with particularly serious consequences for maternal and infant mortality.¹⁷⁶

After the Saudi-led coalition entered the Yemen conflict in 2015, the heavier fighting led to the highest number of displacements in the world that year, 2.2 million people. Since then, coalition airstrikes have continued to displace millions; there were 3.6 million Yemeni IDPs as of 2019.¹⁷⁷ There has not been a largescale refugee flow from Yemen because there are so many obstacles to crossing borders. IDPs have been displaced repeatedly, as many have returned to damaged homes in high conflict areas because of the unsustainability of life elsewhere. IDPs face extremely high food insecurity and few services or livelihood

¹⁷¹ *ibid*

¹⁷² Abbara, A., et al. (2020, January 1) *The challenges of tuberculosis control in protracted conflict: The case of Syria*. International Journal of Infectious Diseases, 90:53-59.

¹⁷³ UN OCHA. (2022, February). *Humanitarian Needs Overview, Syrian Arab Republic*. Humanitarian Programme Cycle 2022. Retrieved from: https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/hno_2022_final_version_210222.pdf. Pp. 74, 84.

¹⁷⁴ Anzellini, V., et al. (2020) *A decade of displacement in the Middle East and North Africa Region 2010-2019*. Internal Displacement Monitoring Centre. https://www.internal-displacement.org/sites/default/files/publications/documents/IDMC_MenaReport_final.pdf#page=35

¹⁷⁵ United Nations Office for the Coordination of Humanitarian Affairs. (2022, August 28). *Internal Displacement Due to Conflict: Afghanistan, 2001 – 2021*. Humanitarian Response. <https://www.humanitarianresponse.info/en/operations/afghanistan/idps>

¹⁷⁶ Martellucci, C., Qaderi, S., Tanimoto, T., Ozaki, A. (2021, December 18). *Afghan women and children's health: Three main challenges under Taliban and COVID-19*. Journal of Global Health, 11:03126.

¹⁷⁷ Anzellini, V., et al. (2020) *A decade of displacement in the Middle East and North Africa Region 2010-2019*. Internal Displacement Monitoring Centre. https://www.internal-displacement.org/sites/default/files/publications/documents/IDMC_MenaReport_final.pdf#page=35

opportunities. More than a third live in vulnerable shelters. Displaced Yemenis have suffered many outbreaks, including cholera, measles and hepatitis B.¹⁷⁸

The 2003 U.S. invasion of Iraq displaced millions, and in 2010, 2.8 million Iraqis were still living as IDPs. These IDPs faced widespread food insecurity; almost half had no access to public food aid. In 2006, a study showed lower vaccination rates for displaced Iraqi children - only 48% were covered by basic vaccines for polio, measles, and diphtheria.¹⁷⁹ In 2014, due largely to Islamic State attacks, as many as 2.2 million Iraqis were internally displaced, bringing the total to 3.3 million living in displacement, the third highest in the world that year. Between 2015 and 2017, millions continued to be displaced by militant attacks and the Iraqi and U.S. governments' military operations. Throughout these years, people also returned home; due to government and humanitarian initiatives, numbers of returnees have outnumbered the newly displaced since 2017. There are currently 1.17 million IDPs in Iraq and 287,000 Iraqi refugees living abroad.¹⁸⁰

Many Iraqi refugees settled in cities throughout the Middle East, bringing with them the noncommunicable diseases associated with the health profile of a middle-income country (which Iraq was, before decades of economic sanctions and consecutive wars). Amongst Iraqi refugees in Syria in 2010, for instance, nine out of ten chronic diagnoses were for noncommunicable diseases, and the largest number of patient visits were related to hypertension.¹⁸¹

In Libya, up to one million people were internally displaced by the civil war. Since the signing of a ceasefire agreement in 2020, many have been able to return to their places of origin. Returnees face essential needs like access to food and water. There are approximately 134,000 IDPs remaining; they lack healthcare, safe drinking water, and adequate housing.¹⁸²

Conclusion

This report has laid out significant pathways of indirect deaths and related health problems in the post-9/11 wars, including those related to economic collapse, the destruction of public services and infrastructure, environmental contamination, and reverberating trauma and violence – all of which can be exacerbated in cases where people are forcibly displaced. Some populations suffer more than others from these reverberating

¹⁷⁸ Bendavid, E. et al. (2021, February 6). *The effects of armed conflict on the health of women and children*. *The Lancet*, 397(10273), 522–532. p. 528.

¹⁷⁹ Mowafi, H. (2011, May 16). *Conflict, displacement and health in the Middle East*. *Global Public Health*, 6(5), 472–487. p. 478.

¹⁸⁰ UNHCR Operational Data Portal (2023, February). Retrieved March 21, 2023 from <https://data.unhcr.org/en/country/irq>.

¹⁸¹ Mowafi, H. (2011, May 16). *Conflict, displacement and health in the Middle East*. *Global Public Health*, 6(5), 472–487. p. 477.

¹⁸² Internal Displacement Monitoring Centre. *Libya Country Profile*. <https://www.internal-displacement.org/countries/libya> and UNICEF *Libya End of Year Humanitarian Situation Report: 31 December 2022*. (2023, January 30). UN Children's Fund. <https://reliefweb.int/report/libya/unicef-libya-end-year-humanitarian-situation-report-31-december-2022>

health impacts, particularly children and women. The report's numbers – 4.5-4.6 million people dead in these wars and 7.6 million children experiencing wasting – convey the scale of the suffering in order to raise awareness of the reverberating effects of the wars and the urgent need to mitigate the damage.

Far more research is needed on the topics covered in this report, most of which are understudied, including more precise figures of indirect post-9/11 war deaths. War is not only deadly, but impedes the collection of adequate data to guide life-saving interventions. While it is known, for instance, that children under five suffer more conflict-related indirect deaths than any other age group, reliable, timely data on child mortality is lacking; in war zones, the most recent data points on child mortality are on average over seven years old.¹⁸³ The research covered in this report highlights that more studies are necessary on the impact of war's destruction of public services, especially beyond the healthcare system, on population health. Damage to water and sanitation systems, roads, and commercial infrastructure such as ports, for instance, have significant but less understood consequences. Additionally, far more sustained, large-scale research is needed on the health effects of war's environmental contamination and on harm to mental health, and the ripple effects of mental trauma, in war zones. The population-level health impacts of forced displacement in post-9/11 wars also requires a great deal more systematic research.

Information such as this can help inform global, regional, and local interventions to prevent further loss of life. It can also assist people and organizations in calling on their governments, including that of the United States, to alleviate human suffering resulting from the post-9/11 wars. These wars are ongoing for millions around the world who are living with and dying from their effects. Reparations, though not easy or cheap, are imperative.

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¹⁸³ United Nations Interagency Group for Child Mortality Estimates (UN IGME). (2022). *Levels & Trends in Child Mortality: Report 2022*. <https://childmortality.org/wp-content/uploads/2023/01/UN-IGME-Child-Mortality-Report-2022.pdf>