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UNIVERSITY of DENVER

UNDP

ASSESSING THE IMPACT OF WAR IN YEMEN:

Pathways for Recovery

Taylor Hanna | David K. Bohl | Jonathan D. Moyer

DISCLAIMER

This report presents the findings of a commissioned study on the impact of war on development in Yemen and recovery pathways, through several scenarios using the Sustainable Development Goals lens. The views expressed in this study are those of the author(s) and do not necessarily represent those of the United Nations, including the United Nations Development Programme (UNDP), or the Member States of the United Nations. Furthermore, the designations employed herein, their completeness and presentation of information are the sole responsibility of the author(s) and do not necessarily reflect the opinion of UNDP.

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FOREWORD BY KHALIDA BOUZAR

UN ASSISTANT SECRETARY GENERAL, UNDP ASSISTANT ADMINISTRATOR AND UNDP DIRECTOR OF THE REGIONAL BUREAU FOR THE ARAB STATES

The United Nations Development Programme (UNDP) is proud to present an approach to development that is grounded not only in the expertise of our staff and partners, but also in critical thinking and rigorous, data-driven and analyses. In partnership with the Frederick S. Pardee Center for International Futures, UNDP offers a vision to get back on track to achieve the Sustainable Development Goals (SDGs) once a peace deal is struck. It is possible for Yemen and Yemenis to have a prosperous future.

This report is the final in an *Impact of War in Yemen* trilogy series, which has examined how Yemen's development and future generations have been impacted by the conflict. Our first report in the series found that, in only four years of war, Yemen's development had been thrust back by at least 21 years. The second report examined the country's SDG trajectory and determined that Yemen will not fully achieve them until 2061 – a full 30 years after their agreed upon date.

This third report is based upon Pardee's 'International Futures' modelling system and a thorough literature review. It demonstrates the critical and central connection between long-term investment in development, lasting peace, and an end to humanitarian suffering. It also highlights the critical role women play in the recovery and reconstruction process in Yemen – a country that currently ranks lowest in most of the gender index reports. The case is made that the recovery scenarios presented herein – strengthening human capabilities, empowerment of women, investment in agriculture, and governance, together with leveraging the private sector – are the building blocks of successful recovery and work more effectively together than alone.

While this report presents an analytical framework, the effectiveness of such a people-centred integrated approach is also borne from UNDP's decades-long work in some of the world's most vulnerable and fragile contexts, including Yemen. This vision is also at the heart of our Strategic Plan 2022 – 2025 to promote green and sustainable transformations, build resilience and ensure no one is left behind.

To achieve this, we at UNDP believe that by working effectively together with partners, stakeholders, and donors across the Arab States Region, we can better address the challenges Yemen and other countries face. Whether supporting Member States in their response to COVID-19, in working toward the fulfilment of the Paris Agreement, or in striving to roll back poverty and attain the SDGs, we work through collaborative partnerships with the region's governments, civil society, private sector, international institutions, and donors. This enables us to support truly sustainable and inclusive development.

Humanitarian and emergency assistance remain of paramount importance in Yemen and, together with our partners, we can bridge the gap between humanitarian and sustainable development responses. From our rich regional and global experience, we know that an inclusive development approach is not only the foundation, but a prerequisite, for lasting peace and that there can be no peace without development.

FOREWORD BY AUKE LOOTSMA

UNDP YEMEN RESIDENT REPRESENTATIVE

UNDP has been present in Yemen for over 55 years; we know the country and its beautiful people well. We are surrounded by friends, colleagues, and neighbors and live with the hope that someday peace will come; we all strongly believe it will. And once peace prevails over Yemen, we can help build Yemen back better than before the conflict and restore dignity to all Yemenis.

When exploring a topic for the third and final *Impact of War* series, we wanted to begin to look toward that future and to prepare for a Yemen without conflict – to show a positive perspective to the world. We know that despite the tragic setbacks of the conflict, Yemen and Yemenis are resilient – they can recover, and they cannot – they will not – be left behind.

This report represents that hope and the resilient spirit of Yemenis. It should be a reminder to the world that all is not lost, and a dignified future is still possible for Yemen despite being the world's worst humanitarian and development crisis.

Think of this report as a roadmap and an opportunity for Yemenis, decision-makers, stakeholders and the international community to understand how the conflict has impacted Yemen's development. We must know this to understand what needs to be done to reverse the development losses and make progress towards achieving the Sustainable Development Goals.

In planning for peace, recovery, and reconstruction, we must look at how we can build forward better together. Yemen is rife with innovators – those who have found ways to overcome the crises. Similarly, in recovery and reconstruction, UNDP sees unique windows of opportunity to apply new, efficient and green technologies like renewable energy options found in wind, water and the sun. At the same time, we must also continue to look at Yemen's past – its rich culture and history as a leader in fishing, coffee and honey production – to help prepare the country to achieve greatness once again.

UNDP strives to make these a reality through our critical programmes throughout Yemen. In partnership across the United Nations system, with national and local implementing partners, authorities, donors, stakeholders and beyond, we work to support local institutions to preserve local capacities, mitigate development damage, and preserve human dignity.

UNDP has always been deeply committed to working with Yemenis; we will not wane in our efforts. Our aim is to achieve the most positive of the scenarios outlined in the report – a scenario of peace, prosperity and dignity and a future of sustainable and inclusive development for all in Yemen.

PREFACE

In April 2019, the first of three reports, *Assessing the Impact of War on Development in Yemen*, commissioned by the United Nations Development Programme (UNDP) Yemen, revealed that the war had already set back development by more than two decades and caused more deaths from indirect causes such as hunger and disease than deaths from conflict-related violence.

The second report, *Assessing the Impact of War in Yemen on Achieving the Sustainable Development Goals (SDGs)*, released in September 2019, predicted that if conflict persists past 2019, Yemen will have the greatest depth of poverty, second poorest imbalance in gender development, lowest caloric intake per capita, second greatest reduction in economic activity relative to 2014, and second greatest income inequality of any country in the world.

For the third and final report of the *Impact of War* trilogy series, UNDP Yemen has once again partnered with the Frederick S. Pardee Center for International Futures. The report, *Assessing the Impact of War in Yemen: Pathways for Recovery*, continues to apply integrated modeling techniques to better understand the dynamics of the conflict and its impact on development in Yemen.

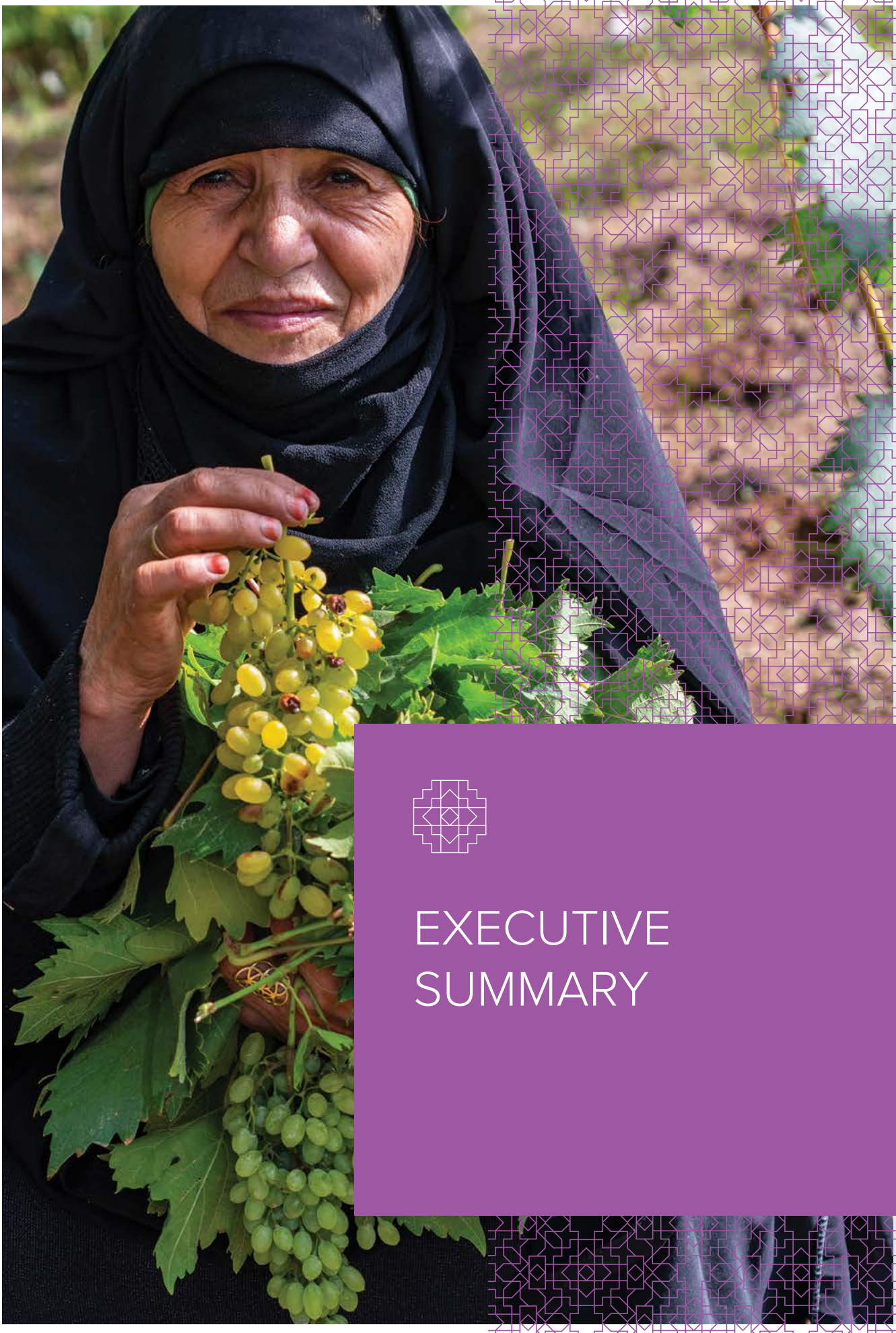
Released in November 2021, the report explores post-conflict recovery and finds that war has continued to devastate the country; the conflict's death toll has already grown 60 per cent since 2019. However, if a sustainable and implementable peace deal can be reached, there is still hope for a brighter future in Yemen.

Seven different recovery scenarios were modelled to better understand prospects and priorities for recovery and reconstruction in Yemen. The analysis identified key leverage points and recommendations for a successful recovery – including empowering women, making investments in agriculture, and leveraging the private sector. Moreover, by combining these, it is possible to save hundreds of thousands of additional lives and put Yemen on a path not only to catch up with – but to surpass – its pre-war SDG trajectory by 2050.

Through achieving a peace deal, pursuing an integrated recovery strategy, and leveraging key transformative opportunities, it is possible for Yemen to make up for lost time and offer better opportunities to the next generation.

LIST OF ABBREVIATIONS

ACLED	Armed Conflict Location and Event Data Project
GDP	Gross Domestic Product
HDI	Human Development Index
IFs	International Futures
IMF	International Monetary Fund
MER	Market Exchange Rates
PPP	Purchasing Power Parity
SDG	Sustainable Development Goal
SME	Small and Medium Enterprises
UNDP	United Nations Development Programme
WASH	water, sanitation, and hygiene



EXECUTIVE SUMMARY

The protracted conflict in Yemen has led to urgent, widespread humanitarian and development crises and resulted in significant damage to the economy, physical infrastructure, service provision, health, and education systems, as well as social fabric. It has also caused hundreds of thousands of deaths. While many of these are the result of war's direct violence, others are due to the war's indirect effects, including a lack of food and degraded living conditions.

By comparing the current reality in Yemen to a scenario where no conflict ever occurred, we can provide an estimate of the total death count – the number of deaths caused both directly and indirectly from the conflict. By doing so, we found that by the end of 2021, Yemen's conflict will lead to 377,000 deaths – nearly 60 per cent of which are indirect and caused by issues associated with conflict like lack of access to food, water, and healthcare.

These deaths are overwhelmingly made up of young children who are especially vulnerable to under and malnutrition. In 2021, a Yemeni child under the age of five dies every nine minutes because of the conflict. This is a significant increase since our 2019 report, *Assessing the Impact of War on Development in Yemen*, that – through the same assessment – found this to be approximately every 12 minutes.

The impact of the conflict continues to be devastating. When comparing Yemen's current situation to a scenario without conflict, the country has lost a cumulative US$126 billion in potential gross domestic product (GDP) since 2015. In addition, 15.6 million people have been pushed into extreme poverty and 8.6 million more people into undernutrition.

If conflict continues, it will become even more destructive. If war in Yemen continues through 2030, we estimate that 1.3 million people will die as a result, with more than 70 per cent of those deaths being from indirect causes. Most of these indirect deaths are children under the age of five. By 2030, a child will die because of the conflict every *five minutes*. Compared to a scenario without conflict, 22.2 million more people may potentially be forced into poverty and 9.2 million more people may also experience malnutrition.

The cost of the conflict for all parties has been great. While the road to peace is likely to be difficult, the consequences of continued war are clear, and hope remains that effective Yemeni, regional, and international leadership can achieve a lasting and inclusive political settlement. In the spirit of that hope, this report examines a set of possible futures for Yemen's recovery, beginning with a peaceful end to the conflict.

The first possible future path is that of a **Fragmented Recovery**. This scenario represents an end to fighting but paints a difficult road to recovery that is characterized by a lack of coordination and ineffective governance. Reconstruction initiatives are slow and fail to address fundamental underlying challenges that existed prior to conflict, leaving Yemen highly vulnerable to falling back into conflict.

In this recovery scenario, GDP per capita rebounds and reaches its pre-conflict level by the 2040s. Poverty and malnutrition are reduced, though slowly. In this scenario, the lack of access to food, water, and healthcare kills between 45,000 and 62,000 additional people annually between 2022 and 2030 as compared to a **No Conflict** scenario.

Using the **Fragmented Recovery** as a baseline, we then constructed five recovery scenarios that explored the use of careful planning and concerted effort to accelerate Yemen's recovery. Each focused on a specific aspect of post-conflict recovery and development and were assessed across core development indicators through 2050 to help frame and understand the inter-related policy choices in Yemen's post-conflict recovery. These can be thought of as 'building blocks' of post-conflict recovery. These include:

1. **Agricultural Investments:** Focusing upon improving access and reducing food insecurity.
2. **Economic Development:** Concentrating upon boosting investment and productivity while utilizing diverse sources of finance.
3. **Empowered Women:** Demonstrating the effect of improving women's health, education, and participation in the economy and society.
4. **Human Capabilities:** Addressing human development, especially population health and education.

5. **Governance Quality:** Modeling a more secure peace, greater transparency and government effectiveness, and effective public-private partnerships in infrastructure development.

And finally, we combine the interventions in the five building block scenarios to form an **Integrated Recovery** scenario. This scenario models a future in which:

- Policymakers solve problems by including women in political leadership and the economy.
- The international community is an active and engaged partner with Yemen and supports the recovery efforts with significant financial resources.
- There are effective and trustworthy partnerships between public and private resources and investments flow into the country.
- Significant investments in infrastructure, agriculture, education, and health put the country on a new development trajectory.

This scenario simulates a world in which a continuous cycle of investment and planning results in outcomes beyond pre-conflict levels within a decade and eventually erase many of the conflict-attributable losses to human development.

FIGURE 1 | Weighted average distance from SDG achievement (select SDGs) across scenarios used in this report. Vertical axis represents distance from SDG achievement benchmarked to 2015 values in the conflict scenarios. Source: IFs 7.67.

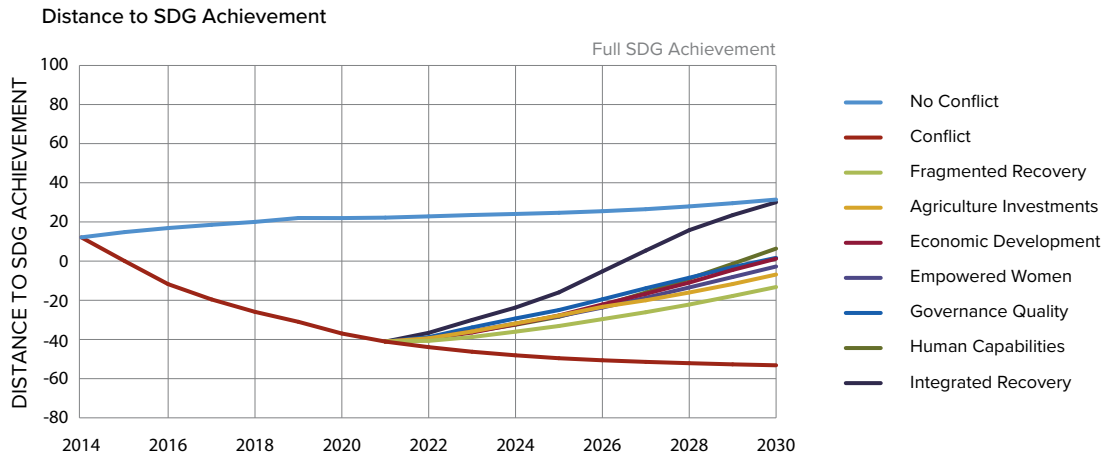


Figure 1 shows scenario results in terms of distance away from achieving the Sustainable Development Goals (SDG) by 2030. Constructed from a weighted average of the distance from SDG achievement, we used indicators from SDGs 1 (No Poverty); 2 (Zero Hunger); 3 (Good Health and Well-being); 4 (Quality Education); 6 (Clean Water and Sanitation); 7 (Affordable and Clean Energy); 10 (Reduced Inequalities); and 17 (Partnerships).

Yemen has clearly reversed progress toward the SDGs since conflict began. And while the **Fragmented Recovery** begins to make up some lost progress, in 2030, the country would still be behind where it was at the beginning of the conflict. All the recovery building blocks improve progress even further beyond the baseline **Fragmented Recovery**, but only the combined **Integrated Recovery** scenario fully makes up for lost SDG progress by 2030.

By combining the scenarios – each addressing different challenges and barriers to development and recovery – it is possible to set Yemen on an accelerated recovery pathway. In terms of GDP per capita, the **Integrated Recovery** scenario not only catches up with, but even surpasses, the **No Conflict** scenario by 2050.

Below, Figure 2 shows the difference in key variables between the **Fragmented Recovery** and each recovery building block scenario. All the scenarios show some improvement, though result in different benefits. For example, **Agriculture Investments** results in an immediate and significant reduction in malnutrition. **Economic Development** has the greatest effect on poverty, which can be seen both in the medium term (by 2030) and the long term (2050). **Empowered Women** has significant effects in the medium term through reducing poverty and improving the Human Development Index (HDI). Population education – which tends to change very slowly as children must grow through the education system – is most significantly impacted in 2050, by both the **Empowered Women** and **Human Capabilities** scenarios.

Across variables, the **Integrated Recovery** is the most successful scenario. In terms of extreme poverty, the **Integrated Recovery** results in greater poverty reduction by 2030 (5.8 million as compared to the **Fragmented Recovery** scenario) than **Economic Development** does by 2050 (5.5 million).

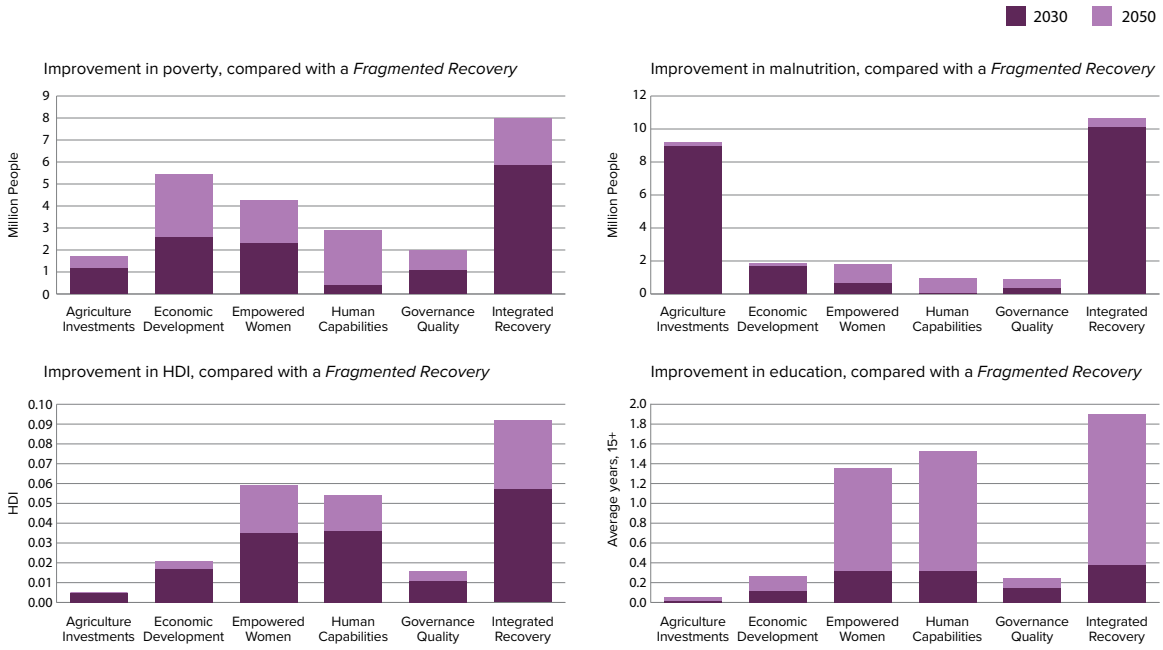
This research suggests the following recommendations for post-conflict recovery in Yemen:

- **Prioritize a sustainable and lasting peace.** The most important determinant of successful recovery is sustained peace. This pertains both to the terms of any negotiated settlement as well as to the pathway of post-conflict recovery, emphasizing improvement in governance and strengthening institutions. To prevent conflict recurrence and open the opportunity for a better future, Yemen cannot return to the previous status quo.

- **Coordinate international, national, and local recovery efforts.** Recovery will require immense resources and coordination to maximize efficiencies and effectiveness.
- **Invest in human health and education for long-term sustainable development.** Human development has been set back two decades already. But focusing on building human capabilities now can begin to make up for that loss and result in significant improvements in the future.
- **Invest in women's empowerment to unlock significant potential through inclusive recovery.** Yemen ranks last globally in the UNDP's Gender Inequality Index. This problem has been exacerbated by the conflict but represents an opportunity in recovery.
- **Focus on food security within the constraints of Yemen's agricultural limitations.** With a growing population and numerous geographic challenges, Yemen will likely be reliant on imports for food in the future. However, actions can be taken to address acute hunger now while developing a more secure and sustainable agricultural portfolio to support Yemen over the long run.
- **Leverage the private sector to generate growth, employment, and funding.** With limited government resources, the private sector will be especially important in supporting post-conflict recovery.
- **Take an integrated approach to post-conflict recovery.** Development works through systems, so a systemic approach is required to institute lasting change. An Integrated Recovery unlocks synergistic improvements and mitigates tradeoffs resulting from limited resources.

These recommendations are broad and considerable work remains to determine what policies can produce these outcomes; without a peace settlement, it is not possible to know the specific steps that must be taken for recovery.

FIGURE 2 | The difference in various indicators in the Integrated Recovery and Fragmented Recovery scenarios in 2030 and 2050. Variables are, clockwise from top left: Population in extreme poverty at the $1.90/day level; Malnutrition in terms of million people; Average years of education attained by the population 15 and older; and the Human Development Index (HDI). Source: IFs 7.67.

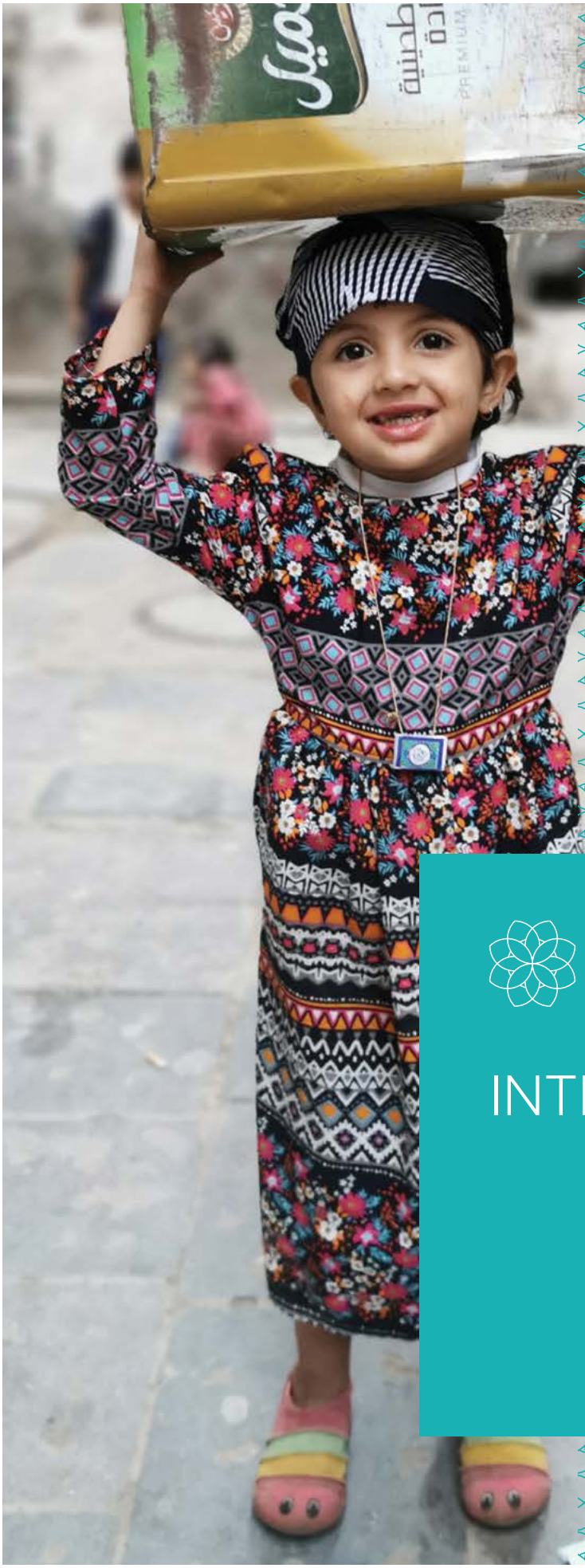


The report is not meant to be a policy programing document that outlines specific measures for achieving recovery in a post-conflict Yemen. Rather, it is meant to be a strategy document that explores the effects of Yemen's conflict on development, the general development outcomes associated with pursuing alternative policy strategies, and a framework for understanding what is possible in a post-conflict country. The report also serves as an advocacy document, as it both highlights the costs of ongoing conflict in Yemen and the importance of coordinated and integrated recovery strategies.

The 2030 Agenda is organized around five pillars referred to as the Five Ps: **people, prosperity, planet, peace, and partnership**. Yemen's future envisioned in the **Integrated Recovery** scenario will only be realized with attention to all five pillars of sustainable development. This report incorporates that framework and emphasizes the importance of understanding development as an interconnected system.

A successful recovery will improve outcomes for Yemen's **people** first and foremost. It will build **prosperity** through transforming systems and the economy and reducing inequalities. It will attend to the **planet** as the country must improve food security sustainably and within the constraints of considerable water scarcity. It will recognize that **peace** is both a prerequisite and not to be taken for granted – sustaining peace through continued improvements to security, living conditions, and inclusiveness will be critical at every step. Finally, a successful recovery will not occur without **partnerships**, including not only considerable international support but also the promotion of partnerships between the public and private sector and within civil society.

While this is an ambitious recovery agenda, it is also what we should collectively aim to achieve. Our research shows that most of the suffering from this conflict has been heaped on the shoulders of the country's most vulnerable. While achieving the **Integrated Recovery** will be both costly and complicated, it can support improvements to development to place the country on track to exceed the trajectory it was on prior to the conflict. This does not erase the pain and loss that has been suffered so far but can help ensure a prosperous future for all Yemenis going forward.



INTRODUCTION

Frequently referred to as the greatest humanitarian disaster in the world, the conflict in Yemen has been devastating to human development – particularly to those most vulnerable and marginalized in society.

Previous research has estimated that, through 2019, the conflict was responsible for 233,000 deaths and killed more people from a lack of access to food and health services (indirectly) than through combat-related deaths (directly). A child under five died every 12 minutes and human development was set back by more than two decades (Moyer, Bohl, et al., 2019). Research has also shown that the most effective way to improve human development in Yemen is to end the conflict (Moyer, Hanna, et al., 2019).

The effects of conflict extend well beyond the loss of human life by reducing economic activity, pushing people into poverty, and increasing malnutrition. While the conflict has proven to be both lasting and devastating, these costs should encourage serious reflection on the future path of the country and motivate all sides towards a sustained and inclusive political settlement.

The path forward for a post-conflict Yemen should be characterized by strategies that emphasize leaving no one behind – the central motivating idea behind the United Nations' SDG framework. The SDG Agenda is often organized into five pillars or Five Ps: people, prosperity, planet, peace, and partnership. This emphasizes the SDGs as part of an interconnected framework rather than independent, siloed goals. In this report, we show the importance of addressing all Five Ps in thinking about post-conflict recovery and development.

Yemen's people are its future, and the conflict has been devastating to Yemen's population. It has impoverished millions, led to hunger and disease, disrupted education, and exacerbated existing gender inequalities. The scenarios in this report show that focusing on the livelihoods, health, and education of

BOX 1 | Previous work: *Assessing the Impact of War in Yemen*

This report is the third and final report in a trilogy series that analyzes the effect of conflict on development in Yemen in collaboration with UNDP and the Frederick S. Pardee Centre for International Futures at the University of Denver Josef Korbel School of International Studies.

Released in April 2019, the first report, ***Assessing the Impact of War on Development in Yemen***, found that the first five years of war had already set back human development by more than two decades and, should the conflict continue through 2030, this would jump to 40 years (Moyer, Bohl, et al., 2019). It also quantified the indirect human cost of conflict – deaths resulting from disease and hunger that can be traced to the conflict itself. Through the end of 2019, the war resulted in an estimated 233,000 deaths – 131,000 from indirect causes. Moreover, conflict killed 140,000 children younger than five through direct and indirect causes. The conflict is generational and will have lasting effects on millions for years to come.

The second report, ***Assessing the Impact of War in Yemen on Achieving the Sustainable Development Goals***, included a deeper dive into four Sustainable Development Goals (SDGs) [SDG 1: No Poverty; SDG 2: Zero Hunger; SDG 8: Decent Work and Economic Growth; and SDG 10: Reduced Inequalities] and assessed prospects for improvement while the conflict was ongoing (Moyer, Hanna, et al., 2019). It concluded that while targeted interventions toward child malnutrition, food distribution, household consumption, and water and sanitation did result in improvements, they were unable to reverse the trend during conflict. An immediate end to the conflict, however, could return the country to its pre-conflict situation in terms of SDG achievement by 2030.

Both reports used the International Futures model and compared a calibrated Conflict scenario with a counterfactual No Conflict scenario, using the same methods described in this report. This report builds upon the previous two in the series by updating estimates with the latest data through 2021 and assessing prospects for recovery once the conflict ends.

citizens leads to gains across the board. Notably, we show that an emphasis on empowering women, especially in a country with some of the worst gender inequality in the world, is especially powerful for improving the lives and welfare of the entire population.

The scenarios built for this report address pre-existing structural challenges in Yemen and transform systems to build prosperity. Economic growth opens the door for improved living conditions and innovation while addressing societal and economic inequalities in a move to reach the furthest behind first. Through ensuring that the population has the capabilities to thrive and a strong, sustainable, and inclusive system to thrive in, an integrated recovery strategy can lead to greater prosperity.

Of course, it will be critical for recovery to address and account for the planet. Yemen is one of the most vulnerable countries in the world to climate change due to a high risk and low level of readiness to adapt (C. Chen et al., 2015). The country is already food insecure and water scarce, so sustainable agricultural initiatives will be critical to navigating these challenges.

Peace is a prerequisite to post-conflict recovery but sustaining it should also remain an important goal. If Yemen is to make a successful recovery, it first and foremost needs to avoid conflict relapse. Prioritizing peace means both coming to a sustainable and implementable peace settlement as well as ensuring improvements to security, living conditions, and inclusiveness that help to prevent future conflict.

Finally, the above agenda cannot be implemented without partnership. Support from the international community will be important, especially in funding what is sure to be a costly recovery. The World Bank (2020)

estimates that core infrastructure and service delivery needs require between US$ 20 – US$ 25 billion investment to rebuild Yemen.[1] International aid will be needed to meet that target; however, it will need to be spent carefully, guided by – and in partnership with – local leadership. Partnerships between the public and private sector will be important, as will those with civil society organizations.

A true successful recovery will need to incorporate all Five Ps. A strong, transformative, and integrated approach is challenging to pursue. But this report shows that with an Integrated Recovery, it is possible for the next generation of Yemenis to see a world in which development outcomes are even better than they would have been had Yemen continued along its previous trajectory without conflict.

Purpose of this Report

In this report, we analyze recovery scenarios for inclusive human development in Yemen by making assumptions about (a) the duration and magnitude of the conflict and (b) the coordination and character of the rebuilding effort. The purpose of the report is to build upon other studies and lay a foundation to coordinate future aid and investment to rebuild from Yemen's protracted conflict. We outline reasonable expectations for different recovery options, as well as insights about investment needs and how recovery scenarios interact.

This report serves as an advocacy tool to highlight and quantify the costs of the conflict in Yemen and the importance of achieving a lasting peace along with coordinated recovery policies. It also underscores the historical and ongoing costs of conflict across multiple dimensions of development, updating the information through 2021.

The document serves as a strategy tool for policymakers – allowing for a broad view of the impact of changes to policy outcomes across development systems and time. A better understanding of these systems can help policymakers both in planning and prioritization, as well as understanding the implications of alternative policy choices on long-term human development. As such, this study can serve as a supporting framework for thinking about specific policies; however, it should not be seen as a policy or programme document as it lacks concrete instructions for recommendations or costing of required resources to achieve these outcomes.

This study does not negate the importance of continued on-the-ground humanitarian work nor of detailed field research that can complement this broad macro-level analysis. The results introduced here are model-based estimates and projections based upon the best data available from Yemen and existing literature on relationships between variables. This allows us to make informed estimates where it is otherwise difficult to get real-time, on-the-ground information about variables such as the conflict's indirect deaths.

Estimates should not be seen as predictions of current or future conditions in Yemen, rather they should help frame our understanding of the conflict's consequences and recovery choices. And because many of our data inputs come from a conflict zone, those are also subject to uncertainty as data collection can be particularly difficult in a conflict context.

While this analysis assumes that the conflict ends for all recovery scenarios, we make no assessment or assumption regarding how this may occur. This report does not aim to provide guidance for achieving and sustaining peace as it is beyond our scope. Instead, focus is given to different pathways forward, how key investments can unlock future human well-being in Yemen, and the cost of inaction.

1 The Dynamic Needs Assessment was carried out using primarily remote data sources (satellite imagery) for 16 cities and, where available and feasible, at the regional and country levels. These estimates are useful for assessing damage and planning. However, more work will be required, including detailed on-the-ground assessments, to thoroughly understand the costs associated with recovery.

POST-CONFLICT RECONSTRUCTION AND DEVELOPMENT: BACKGROUND

To better understand how post conflict development in Yemen could unfold, we summarize the relevant literature below. Broadly speaking, post-conflict political settlements can be very tenuous and countries returning to conflict after brief bouts of peace are quite common. In addition, post-conflict recovery patterns can differ significantly even if conflict does not reemerge, and there are various examples of post-conflict development that have been successful.

Post-Conflict Development: Literature

Conflict destroys productive assets, diverts resources, and damages human capital. Countries in conflict suffer from lowered economic growth (Collier, 1999; Gates et al., 2012; Mueller, 2013; Stewart et al., 2000). After a conflict ends, recovery and rebuilding efforts begin. And while peace does allow for the rebounding of indicators suppressed during conflict, the damage of the war may also have long-lasting consequences.

In the immediate years after a conflict ends, most countries experience a boom in growth. Collier and Hoeffler (2002) find a growth spurt of roughly 2 percentage points in the first full post-conflict period. Chen, Loayza, and Reynal-Querol (2008) find that growth in GDP per capita is roughly 2.4 percentage points higher after war, with countries reaching the strongest growth four to five years after conflict. Mueller, Piemontese, and Tapsoba (2017) find that growth rebounds up to 2.5 to 3 percentage points in the immediate aftermath of conflict.

After periods of intense conflict and economic recession, resuming production may be enough to result in especially high-growth years. For example, GDP growth exceeded 120 per cent in Libya in 2012; 89 per cent in Bosnia in 1996; 35 per cent in Rwanda in 1995; and 26 per cent in Sierra Leone in 2000.[2] However, recovery is rarely sufficient to make up for longer term, larger economic setbacks, as found in a Murdoch and Sandler (2004) study declaring civil war lowers growth by 31 per cent. Six years after the war in Rwanda, for example, household consumption was still lower in areas that had been heavily affected by violence (Serneels & Verpoorten, 2015). And while Hodler (2019) suggests the country has caught up with its previous growth trajectory, the process took 17 years – even after only one year of conflict.

Our research indicates that it is critical to leverage governance and peacebuilding opportunities in all aspects of recovery. Physical reconstruction facilitates service provision and builds trust and confidence (Seneviratne & Amaratunga, 2011). Rebuilding health systems can contribute to state building through providing services, stability, security, and legitimacy (Witter, 2012). And the restoration of education can help to build social cohesion and community resilience (Barakat et al., 2013).

The following sections briefly review literature on those processes and discuss the challenges of financing reconstruction.

PHYSICAL CAPITAL

As damaged physical infrastructure like roads and buildings create barriers to resuming productive activity, reconstruction is one of the first priorities after conflict ends and is an early indicator of economic recovery (Nkurunziza, 2008). Furthermore, rebuilding health and educational facilities and restoring water and sanitation infrastructure is part of recovering human development. Housing repair and reconstruction is important to restoring security, health, and dignity (Barakat, 2003). Moreover, rebuilding physical assets helps build trust among residents and confidence among foreign and domestic investors (Seneviratne & Amaratunga, 2011).

Physical reconstruction post-conflict, however, should not only focus on rebuilding destroyed assets. Damage due to lapses in maintenance, changes in population needs due to the war, bridging gaps in infrastructure

2 The IFs model and database is the most frequently used source of data and forecasts in this report. If no external attribution is provided for an in-text statistical reference, the source is International Futures (IFs) modeling system, Version 7.67. Frederick S. Pardee Center for International Futures, Josef Korbel School of International Studies, University of Denver, Denver CO. The IFs historical database houses over 4,500 data series. Primary sources and metadata can be found by accessing the database.

access and pre-existing poor quality (Anand, 2005) must be taken into consideration. Local partners must be engaged from the beginning as an active part of design and implementation. While physical reconstruction is often seen as focusing on concrete, tangible investments, it is also an opportunity to build capacity among – and promote – local institutions, involve local participation, and build toward sustainable peace (Anand, 2005).

HUMAN CAPITAL

War often has devastating effects on human capital – not only in directly causing death and injury, but also in its effects on health and education. These impacts are likely to be felt long after a conflict ends as recovering from loss of human capital takes longer than recovering from loss of physical capital (Barro & Sala-i-Martin, 2003).

Conflict destroys and degrades population health directly and indirectly in ways that are visible for decades. Conflict has been identified as a key driver of severe wasting among children under five (Moyer et al., 2020). Exposure to conflict in utero and at young ages has damaging effects on long-term health outcomes (Mansour & Rees, 2012; Minoiu & Shemyakina, 2014), including reduced stature (Akbulut-Yuksel & Yuksel, 2017; Akresh et al., 2012) which is associated with lower education and earnings later in life (Behrman & Rosenzweig, 2004; Strauss & Thomas, 1998). These health effects cause immediate suffering and are likely to have implications on population productivity long after a conflict ends (Mueller et al., 2017).

Health recovery – both of people and the health system – is complex and requires simultaneous attention to immediate health needs in the short term as well as the restoration of essential health services and broad system rehabilitation (Waters et al., 2009). Post-conflict countries face immense challenges in this regard including financing difficulties, shortages and high turnover of healthcare workers, and administrative delays resulting from preparation and planning efforts (Cometto et al., 2010; Newbrander et al., 2011).

With public health systems lacking capacity, donors and non-governmental organizations often step in to address humanitarian concerns and immediate health needs. Although this strategy can be successful, stakeholders should take care to avoid pitfalls of dependency on aid and donor-led programmes. Programmes should be implemented in coordination and collaboration with national governments and local actors to help develop ownership, capacity, and legitimacy (Haar & Rubenstein, 2012; Witter, 2012).

Additionally, attention should be paid to sustainably developing a health system that can operate effectively in the long run as opposed to solely focusing on vertical programmes (Haar & Rubenstein, 2012; Witter, 2012).

Conflict may also disrupt education, such as through destroying schools and displacing populations. Common reasons for children in conflict to stop attending school include: insecurity (Justino, 2011); displacement (Justino, 2011; Oyelere & Wharton, 2013); the need to work (Di Maio & Nandi, 2013; Rodríguez & Sánchez, 2012); and/or being abducted into child soldiering (Blattman & Annan, 2010). Exposure to conflict at an early age is associated with lower educational attainment in both the short and longer term (León, 2012), resulting in reduced lifetime earnings (Akbulut-Yuksel & Yuksel, 2017; Ichino & Winter-Ebmer, 2004).

The post-conflict environment presents numerous challenges to educational recovery including building facilities, staffing teachers, stabilizing financing, and identifying administrators (World Bank, 2005). Primary educational enrollment is often quick to recover after a conflict, while secondary and tertiary enrollment rates recover more slowly and are often not as highly prioritized by donors and international agencies (World Bank, 2005).

Higher education, however, can play an important role in supporting and sustaining recovery (Milton & Barakat, 2016) and – if implemented carefully – restoring the education system can contribute to peacebuilding by boosting social cohesion and community resilience (Barakat et al., 2013). Furthermore, it can also present opportunities to reform systems that may have contributed to societal divisions and inequalities (Bush & Saltarelli, 2000).

GOVERNANCE

Governance is one of the central concerns in post-conflict recovery, although it can also be difficult to separate from the creation of a political settlement. Conflict can be understood as the breakdown of the social contract, making it a critical post-conflict objective to restore that contract and strengthen the relationship between the citizen and the state (Addison & Murshed, 2001). Rebuilding the social contract requires not only building institutions but also making new agreements around leadership, process, and governance character.

Successfully building and maintaining peace – preventing conflict recurrence – is the most important factor in sustaining economic growth and human development after a conflict ends (Mueller et al., 2017). Countries that have already experienced a civil war are at a significant risk of falling into a conflict trap (Hegre et al., 2017), with a 40 per cent risk of conflict recurrence in the first 10 years after a conflict ends

(Collier et al., 2008). Governance improvements are especially important for post-conflict recovery as good governance and quality institutions significantly reduce the risk of conflict recurring (Hegre & Nygård, 2015; Walter, 2015). Aspects of governance quality that reduce the risk of conflict in the long term include institutional quality, transparency or lack of corruption, lack of repression, and rule of law and legal institutions (Hegre & Nygård, 2015; Walter, 2015).

Many studies on governance during post-conflict recovery focus on democracy and formal democratic institutions. The findings on democracy's role in post-conflict recovery are complicated. Some studies find that democracies are less likely to experience internal war (Henderson & Singer, 2000; Krain & Myers, 1997) and that a stable and strong democracy provides the strongest foundation for an enduring peace (Hegre et al., 2001). However, the literature also suggests that a weak democracy or the process of democratization may make a country more susceptible to conflict recurrence in the short run (Cederman et al., 2010; Collier et al., 2008; Fearon & Laitin, 2003). Therefore, it is especially important for countries to improve along all aspects of governance, including institutional quality, effectiveness, and transparency (Hegre & Nygård, 2015).

Governance is also important for its role in supporting or hindering recovery efforts. Strong institutions and effective governments can improve growth and development generally, accelerate improvements in infrastructure, health, and education, and make aid more productive (Collier & Hoeffler, 2002). However, many countries emerging from conflict face a 'governance dilemma' (Anand, 2005) where it may take a fragile state decades to restore governance quality and establish functioning institutions (Pritchett & de Weijer, 2011). Crisis conditions require immediate action and populations in need cannot wait for improvements in governance; however, not investing enough in institution building puts countries at risk of conflict recurrence.

FINANCING FOR RECOVERY

Rebuilding after conflict is costly. It involves capital-intensive reconstruction as well as rebuilding institutional capacity and social capital – all in an economy ravaged by war. Aid is typically the most important funding instrument in a post-conflict environment, as countries tend to have low government revenues, limited domestic savings, and considerable capital flight (Nkurunziza, 2008). Aid is made especially effective in contributing to recovery when paired with good policy (Collier & Hoeffler, 2002) but should be invested with care to both address immediate humanitarian needs and support building sustainable systems for the long run.

While donors should be aware of the often-limited capacity of post-conflict countries, they should also not relegate national and local governments to the back seat (Witter, 2012). It is important that national and local actors participate in and drive recovery processes to ensure a sustainable recovery and help build back local, national, and institutional capacity damaged during war.

The private sector is also an important consideration when financing recovery as government resources after a conflict are often especially low. For example, the total domestic revenue collection in Yemen fell below 5 per cent of GDP (World Bank, 2020). An active and strong private sector can help boost growth, prevent conflict recurrence, and help fund sustainable development after conflict (Bray, 2009). And public-private partnerships in infrastructure and other sectors, when implemented carefully, can help unlock additional resources.

Imagining Yemen's Future

Yemen's conflict is among the most destructive of those that have occurred since the Cold War (Moyer, Bohl, et al., 2019). Moreover, its indirect effects have been immense, setting back human development by more than two decades (Moyer, Bohl, et al., 2019). The impact of the conflict has been especially devastating because of the country's development context prior to the 2015 conflict and the ways that conflict has affected development systems.

According to the World Bank's latest Dynamic Needs Assessment, the conflict has resulted in damage to one-quarter of mobile network assets, over one-third of educational facilities, 40 per cent of health facilities, 40 per cent of housing assets, 40 per cent of water, sanitation and hygiene (WASH) assets, and over half of power sector assets. The estimated cost of core infrastructure recovery needs is between US$ 20 and US$ 25 billion over five years (World Bank, 2020). However, a successful recovery will require more than rebuilding damaged infrastructure.

The conflict has significantly worsened population health and reduced educational attainment – the effects of which will likely linger for decades. It damaged the capacity and legitimacy of the state, ensuring the need for institutional capacity and governance to be rebuilt. Pre-existing development constraints will also need to be addressed to avoid reverting to the previous status quo. Moreover large-scale conflict often results in permanent structural economic change and shifts in population density, trade, and demand patterns (Verwimp et al., 2019).

Recovery must deal with (a) pre-existing structural development challenges; (b) damage caused directly and indirectly by the conflict; and (c) new and sometimes unanticipated post-conflict challenges.

One of those challenges will be addressing Yemen's persistent food insecurity. Even prior to the conflict, the country relied upon imports for roughly 90 per cent of its food (ACAPS, 2020). The primary driver of food insecurity is not a lack of food in the country but its affordability. Because almost all Yemen's food is imported, food prices are especially vulnerable to fluctuation due to issues such as currency instability, changes in transport and logistical costs, and importers' reduced access to credit.

Yemen was not always so reliant upon imports – just 18 per cent of its cereal was imported in 1970, compared with roughly 75 per cent in recent years (Ajl, 2018). But over the following decades, an influx of remittances and the discovery and export of oil led to a stronger currency (Ansari, 2016). Staple food production could not compete with cheap imports and Yemen's agricultural portfolio shifted toward water-intensive cash crops, particularly qat. As land used for traditional crops fell out of cultivation, maintenance of much of Yemen's agricultural terracing systems was abandoned, adding additional challenges to any effort to resume production (Ajl, 2018). Any attempt to transform the agricultural sector for domestic consumption will need to address the pre-existing problems of water scarcity and land degradation.

Another challenge is constant concern over Yemen's balance of payments and foreign reserves as oil and gas exports were an important source of both government revenues and foreign currency. The conflict has temporarily halted oil exports which still have not recovered to their pre-conflict level.

The next most important sources of foreign currency – remittances and aid – fell sharply in 2020 as a result of the COVID-19 pandemic (ACAPS, 2020; Sana'a Center Economic Unit, 2020). Importers have struggled to access credit and hard currency – an issue complicated by the split of the Central Bank of Yemen, resulting in competing currency systems and regulations (ACAPS, 2020). Maintaining some level of currency stability will be critical to support economic recovery.

Despite challenges, there are good reasons to have hope for a post-conflict Yemen. If conflict can be brought to a halt and lasting peace built, there is potential for Yemen to recover and for the lives of millions of Yemenis to greatly improve.

METHODOLOGY

Following the methodology established in Moyer et al. (2019), we use the International Futures (IFs) tool for the quantitative analysis provided in this report. IFs is an open-source integrated assessment modeling platform that represents 12 dynamically interconnected systems: agriculture, demographics, economics, education, energy, environment, finance, governance, health, infrastructure, international politics, and technology.[3]

To best represent how conflict is affecting development in Yemen, we compare a counterfactual No Conflict scenario to a Conflict scenario calibrated to simulate ongoing conflict through 2030. For more detailed information about the calibration process and data sources used, see Annex 1.

For this report we incorporate recent data updates into the latest version of the IFs model. In the Conflict scenario, we update GDP growth with the latest growth projections from the International Monetary Fund (IMF). We also use updated data on conflict-related deaths in Yemen from the Armed Conflict Location and Event Data Project (ACLED).

Expanding beyond our previous Conflict and No Conflict scenario framework, we create several new scenarios that simulate possible recovery paths for Yemen (Table 1). In all recovery scenarios, conflict is assumed to continue through 31 December 2021 and peace begins on 01 January 2022.

The Fragmented Recovery scenario models a world in which reconstruction is delayed and slow and where international assistance is limited and fails to support long-term sustained development. Government and recovery initiatives are characterized by a lack of coordination, ineffectiveness, incapacity, and corruption. Recovery initiatives neither address the country's pre-conflict development challenges, nor do they successfully make up for the economic and human damage done by the war. Additionally, in the Fragmented Recovery, significant regional disparities are likely to exist resulting in some areas moving toward stability and recovery while others are left behind. In this scenario, the country remains highly vulnerable to crisis and is likely to return to conflict.

To simulate this Fragmented Recovery pathway in IFs, we slowly release the calibration interventions made for the Conflict scenario over a period of 10 years. The speed of this recovery is similar to other historical examples of countries that experienced slow recoveries from conflict.

We then create five building block scenarios – each emphasizing a different focus during recovery – that are built on top of the Fragmented Recovery scenario:

1. Agriculture Investments focuses on improving problems of food access and agricultural production.
2. Economic Development emphasizes investment and calling on multiple sources to finance recovery.
3. Empowered Women addresses longstanding gender inequality in the country.
4. Human Capabilities is targeted toward issues of human development like health and education.
5. Governance Quality simulates improved effectiveness, transparency, and security in governance.

More details about the recovery building blocks and their specific interventions can be found in Annex 1.

The final scenario – Integrated Recovery – is the combination of the interventions from the five building block scenarios into a single scenario. This scenario models a future in which recovery and reconstruction efforts begin quickly and efficiently – with a focus not on returning to the status quo before the conflict, but on implementing sustainable reforms and generating transformative progress to build back better. This includes a focus on improving development for, and inclusion of, women.

International assistance is significant in the Integrated Recovery scenario and, just as importantly, it is invested with the aim of peacebuilding and long-term sustainability. Additionally, progress is made toward addressing long-standing challenges, and improvements in government effectiveness and

3 For more information about the IFs model, see Hughes (2019) or resources at pardee.du.edu.

transparency help to rebuild social contracts between state and citizen. This scenario requires good governance, a stable political settlement, and the likelihood for future conflict is low.

We also control for some developmental impacts of COVID-19 by imposing GDP growth figures in 2020 and 2021 to reflect the pandemic. It is clear that the virus has continued to affect countries worldwide well into 2021 and others have written about the effect of the global pandemic on development and conflict in Yemen (Karasapan, 2020; Nasser, 2020).

The Conflict and all Recovery scenarios include updated GDP growth figures that reflect the latest IMF (2021) projections considering COVID-19. We can also assume that the pandemic would have affected Yemen's economy even in the absence of conflict. To control for the effects of the pandemic in a No Conflict scenario, we lowered the GDP growth rate in 2020 to (-5) per cent to reflect Yemen's actual growth rate.

TABLE 1 | Summary of scenarios used in this report

Scenario		Description
No Conflict		A counterfactual scenario in which Yemen's conflict from 2015 to present did not occur. This projects the path the country was on prior to conflict escalation and includes an adjustment to account for the economic effect of the COVID pandemic in 2020 and 2021.
Conflict		A scenario reflecting the consequences of conflict on development through the end of 2021 and projecting a continuation of conflict through the end of 2030.
Fragmented Recovery		A scenario in which Yemen's conflict ends after 2021,[4] but recovery is weak and ineffective. Progress is stymied by a lack of resources, friction, and entrenched challenges are not addressed.
Recovery building blocks	Agriculture Investments	Conflict ends after 2021. A push toward utilizing agriculture in Yemen addresses immediate food access needs while investing in agricultural production in line with Yemen's constraints. Otherwise, recovery generally reflects the Fragmented Recovery scenario
	Economic Development	Conflict ends after 2021. A push for economic development increases investment and the utilization of different financing sources (such as aid and remittances). Otherwise, recovery generally reflects the Fragmented Recovery scenario.
	Empowered Women	Conflict ends after 2021. A push toward gender equality results in greater participation of women in labor and in leadership positions, improved access to education for girls, and lowered fertility. Otherwise, recovery generally reflects the Fragmented Recovery scenario.
	Human Capabilities	Conflict ends after 2021. A push toward improved human development results in improved access to electricity, safe water and sanitation, and improved educational attainment. Otherwise, recovery generally reflects the Fragmented Recovery scenario.
	Governance Quality	Conflict ends after 2021. A push to improve governance results in improved effectiveness, security, and transparency, as well successful utilization of public-private partnerships in infrastructure. Otherwise, recovery generally reflects the Fragmented Recovery scenario.
Integrated Recovery		A scenario in which conflict in Yemen ends after 2021, and recovery is characterized by a strong and effective push toward reconstruction, as well as transformative and sustainable development. This scenario combines the interventions from the five building block recovery scenarios detailed above.

4 In this and all recovery scenarios, conflict is assumed to continue through 31 December 2021 and peace begins on 01 January 2022.

Methodological Limitations

This study has various limitations. As earlier noted, the report's purpose is not to offer a policy or programming blueprint as Yemen, at the time of writing, is still in active conflict. Without knowing the specific contours of a peace settlement, it is not possible to know what particular policies need to be taken to achieve the recovery pathways in this report. Instead, this document can serve as a tool for both advocacy and for strategic thinking, helping policymakers and stakeholders understand the long-term implications of policy choices and the interactions between those choices.

This study does make assumptions about the outcomes of a potential peace settlement for the purposes of modeling. After conflict ends in all recovery scenarios, we assume that Yemen remains the same state (i.e., is not broken up into two or more states) and that conflict does not recur during the period examined (through 2050). In the conflict scenario, we assume conflict at a constant level relative to the past several years, so do not model the conflict quieting or flaring up until 2030.

Results from this study are not intended to be predictions of what will happen. They are subject to significant uncertainty not only because they are model-derived estimates, but also because the external data taken as inputs into the model were collected in conflict conditions – a notoriously difficult endeavor.

CONFLICT AND RECOVERY IN YEMEN

THE EFFECT OF CONFLICT ON DEVELOPMENT IN YEMEN: AN UPDATE

Throughout this report we frequently refer to conflict-attributable figures, or the damage that we attribute to the conflict itself.

Conflict-attributable effects are calculated as the difference between the Conflict scenario and the No Conflict scenario. Figure 3, for example, shows the estimated and projected total deaths in Yemen. Although deaths are expected in any population, in the Conflict scenario we find a much higher death rate due to combat and violence (direct deaths) as well as disease and malnutrition (indirect deaths). Together, direct and indirect deaths make up the total conflict-attributable death toll.

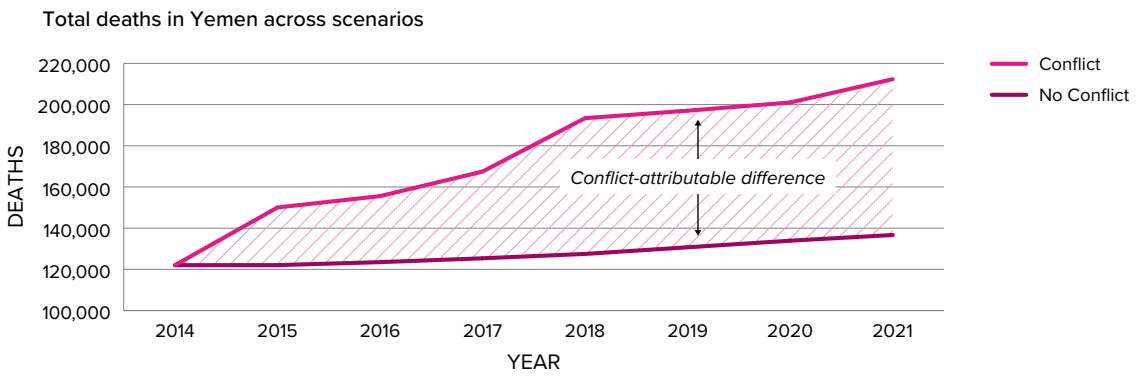
If conflict continues through the end of 2021, we estimate that it will have caused 377,000 deaths with 154,000 due to direct combat and violence and 223,000 – or nearly 60 per cent – indirectly caused by the conflict. Of the total deaths, 259,000 – nearly 70 per cent of total conflict-attributable deaths – are children younger than five years old. If the conflict continues through 2030, we project the total conflict-attributable death toll will be 1.3 million – more than 70 per cent of which will be from indirect deaths and 80 per cent of these deaths will be children under five.

Figure 4 shows a similar graph for GDP where each year, the conflict-attributable GDP loss is the difference between these two scenarios. We estimate that Yemen's 2021 economy is roughly half the size that it would have been in a No Conflict scenario.[5] Additionally, we estimate that the conflict will have cost Yemen US$ 126 billion in lost production by the end of 2021.

If conflict continues through 2030, Yemen's GDP (an estimated US$ 24 billion) will only be slightly more than one-third of the No Conflict scenario GDP and the lost production will be US$ 422 billion.

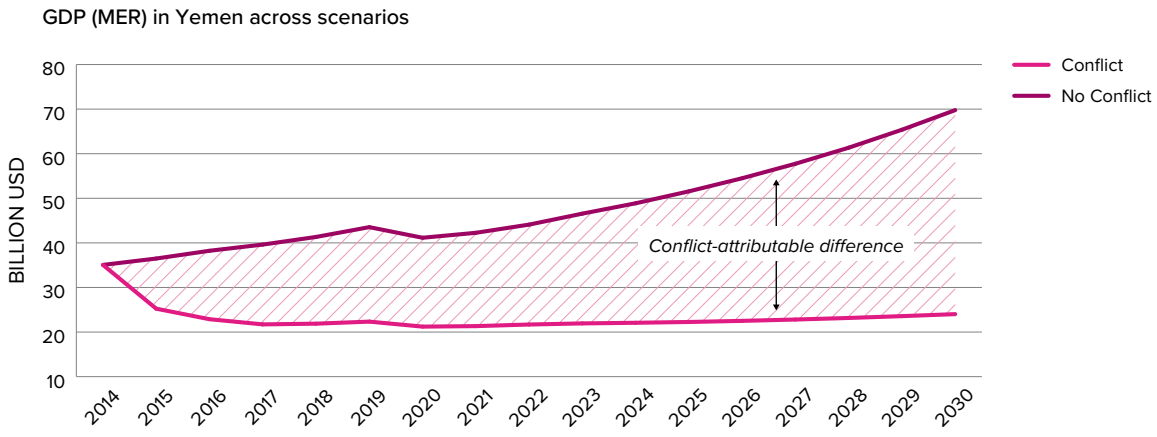
In 2021, 20 million people – 65 per cent of Yemen's population – live on less than US$ 1.90 per day (classified as extreme poverty), 15.6 million because of the conflict. By 2030, 24.8 million people are projected to be within this category – 22.2 million more than would have been in the No Conflict scenario. This includes 1.6 million more children and 8.6 more malnourished people – about twice the level projected in the No Conflict scenario.

FIGURE 3 | Total deaths in Yemen in the Conflict and No Conflict scenarios and conflict-attributable difference through 2021. Source: IFs 7.67



5 Throughout this report, unless otherwise specified, GDP and all currency figures are measured in 2011 US dollars. There are two ways to measure GDP and/or per capita output. Market exchange rates (MER) measure the value of output in local currencies against prevailing market exchange rates for the 2011 US dollar. Purchasing power parity (PPP) is calculated for each country relative to its cost of living and inflation rates. It considers how much of one currency would have to be converted into that of another country to buy a comparable basket of goods and services in that country. GDP measurements in PPP tend to be higher, particularly for developing countries. Unless otherwise noted, GDP measurements from IFs are in MER and GDP per capita measurements from IFs are in PPP

FIGURE 4 | GDP (at MER) in Yemen in the Conflict and No Conflict scenarios and conflict-attributable difference. Source: IFs 7.67



The conflict has negatively impacted Yemen's education and is expected to hamper progress as long as it continues. We project that gross primary enrollment has fallen from roughly 100 per cent to just over 75 per cent, and that gross secondary enrollment has fallen from 50 per cent before the conflict to just 28 per cent in 2021. The conflict has already reduced the average educational attainment among adults (15 and older) to 4.3 years – more than half of a year less than projected along the No Conflict scenario. By 2030, attainment falls to 4.2 years – a 25 per cent reduction (or 1.4 years) from the No Conflict level.

Conflict greatly affects development in various dimensions including, but not limited to: economic slowdown leaves vulnerable households impoverished and affects their ability to purchase food and necessities; physical destruction forces people from their homes and degrades living conditions, leaving children more susceptible to disease; and heightened transport and logistics costs due to insecurity and physical damage raise food prices, causing mass hunger. With each subsequent year of conflict, these pressures grow and aggravate each other, making the situation more dire.

TABLE 2 | Key outcome indicators for the Conflict and No Conflict scenarios as well as the conflict-attributable difference. Source: IFs 7.67

		2021			2030		
		Conflict	No Conflict	Conflict Attributable	Conflict	No Conflict	Conflict Attributable
Direct deaths (cumulative)	Thousand people	154	0	154	352	0	352
Indirect deaths (cumulative)	Thousand people	223	0	223	971	0	971
GDP at MER	Billion USD	21.3	42.3	20.9	24.0	69.8	45.8
Extreme poverty	Million people	20	4.4	15.6	24.8	2.6	22.2
Malnourished children	Million people	3.1	1.5	1.6	4.3	1.4	2.9
Malnourished population	Million people	17.4	8.8	8.6	18.4	9.2	9.2
Education years	Average 15+	4.3	4.9	0.6	4.2	5.6	1.4

In just two years since the first published report in this *Impact of War* series, the conflict's cumulative death toll has grown by more than 60 per cent. The updated 2021 figures show that the conflict's direct and indirect effects are responsible for the death of a child under five every nine minutes (as opposed to every 12 minutes in 2019). As conflict persists and development continues to deteriorate, it not only takes more lives but makes it harder for Yemen to successfully recover even after its end.

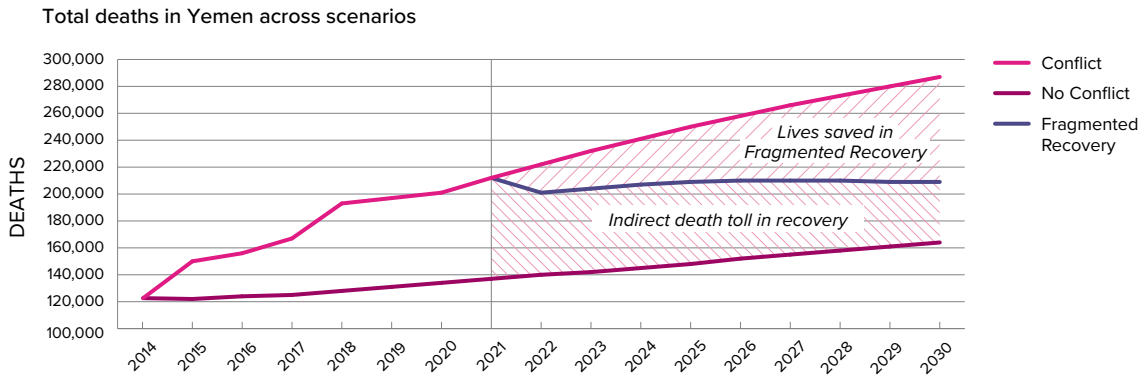
A Fragmented Recovery

Post-conflict recovery is difficult, and progress may be hindered by implementation delays, coordination challenges, weak government capacity, and financing difficulties. The Fragmented Recovery scenario simulates a slow and rocky recovery after conflict ends. Reconstruction allows for real progress in regaining economic and human development, but initiatives fail to support long-term sustained development or address pre-existing development challenges. The international resources for a sustained recovery are not available nor is the political will within the country cohesive enough to overcome conflict scars and govern effectively. All development indicators begin to rebound, improving outcomes for Yemenis across the board. But progress fails to make up for the conflict's losses and, with the constant threat of conflict recurrence, is incredibly precarious.

In this scenario, GDP begins to grow – although relatively slowly – averaging 3.9 per cent in the first five years after conflict. Cumulative GDP gains by 2030 in the Fragmented Recovery scenario – relative to the Conflict scenario – reach nearly US$ 34 billion. However, total GDP (US$ 32.4 billion) remains less than half that projected in the No Conflict scenario (US$ 69.8 billion). It is not until 2032 that Yemen reaches its pre-conflict annual GDP output.

Similarly, GDP per capita begins to rebound. By 2030, it reaches US$ 2,700 – more than one-third higher than the Conflict scenario GDP per capita, but still well below the No Conflict scenario projection of US$ 4,500. Yemen does not catch up to its pre-conflict GDP per capita until 2042.

FIGURE 5 | Total deaths in Yemen in the Fragmented Recovery scenario compared with the Conflict scenario (lives saved) and the No Conflict scenario (lingering indirect death toll of conflict). Source: IFs 7.67



Economic growth also brings poverty alleviation, although gradual. By 2030, nearly 10 million fewer people live in extreme poverty than in a Conflict scenario.

Malnutrition, however, remains an urgent concern after conflict ends. Due to population growth and slow progress, the number of malnourished children does not begin to fall until around 2026. Still, 1.2 million fewer children are malnourished in 2030 than compared with the Conflict scenario.

Despite difficulties, even a Fragmented Recovery scenario saves lives. In 2022, each day of recovery spares 60 Yemenis who would have died directly and indirectly due to Conflict. By 2030, the end of fighting combined with improvements in health and nutrition result in 442,000 fewer deaths than in a Conflict scenario.

However, it is also clear that the shadow of conflict remains deadly. By comparing the Fragmented Recovery scenario to the No Conflict scenario from 2022 onward, it is possible to assess the conflict's continuing indirect death toll. In 2022, for example, 61,000 more Yemenis will die than if the conflict had never occurred. By 2030, this number reaches 503,000.

The Fragmented Recovery scenario describes a flawed and incomplete recovery. Peace, however tenuous, brings absolute improvements in Yemenis' lives, but the conflict's significant damage results in continuing negative repercussions that leave development scarred and future generations to suffer.

Recovery Building Blocks

To better understand possibilities beyond the Fragmented Recovery scenario, we created five additional scenarios, each focusing on different aspects of recovery. These scenarios do not represent mutually exclusive development policy choices but are presented to encourage thinking about different development choices and their impacts on Yemen's outcomes. They can be thought of as key 'building blocks' of a successful recovery.

Scenarios are first examined individually and then collectively to form an Integrated Recovery scenario.

TABLE 3 | Interventions in each of the building block scenarios

Scenario	Description
Agriculture Investments	▶ Increased calories per capita ▶ Increased volume of agricultural imports in the conflict's immediate aftermath ▶ Increased volume of agricultural exports in the long run ▶ Increased land under cultivation ▶ Improved yields
Economic Development	▶ Shifted informal economic activity to formal economic activity ▶ Increased domestic and foreign investment ▶ Increased the volume of remittances ▶ Increased government cash transfers to poor households ▶ Increased the flow of foreign aid
Empowered Women	▶ Increased female labor participation ▶ Lowered fertility rate ▶ Increased gender diversity in leadership, represented by increased Gender Empowerment Measure Index ▶ Improved pay for women ▶ Increased access for women and girls to education
Governance Quality	▶ Strengthened government effectiveness ▶ Reduced risk of conflict ▶ Increased private sector investment in infrastructure
Human Capabilities	▶ Increased access to water and sanitation ▶ Increased access to electricity ▶ Increased primary and secondary educational attainment

AGRICULTURE INVESTMENTS

Yemen is likely to remain dependent on food imports for the foreseeable future due to a growing population, water scarcity, and many of the traditional terracing irrigation systems falling into disrepair (Ajl, 2018; Al-Eryani, 2021). This has made food prices especially vulnerable to disruptions at all points in the supply chain, contributing to Yemen's significant hunger crisis today.

The Agriculture Investments scenario immediately addresses problems of food access by increasing the production, import, and availability of food – all of which is critical to addressing widespread hunger and child mortality. Solutions for this could include measures to reduce delays and lower cost of transporting food into and across the country (UNDP, 2021).

The scenario also simulates a more long-term increase in production for export. Producing and exporting more coffee and honey, for example, could help generate Yemen's employment and growth while providing a source of foreign currency necessary to purchase enough food to feed the population (Sana'a Center for Strategic Studies, 2018).

This scenario provides the most immediate hunger relief, cutting child malnutrition in half by 2032 and making the most progress in reducing infant mortality during the first decade of recovery. By quickly tackling an important cause of indirect mortality, the Agriculture Investments scenario saves 103,000 lives by 2030, compared with the Fragmented Recovery scenario. However, in both child hunger and mortality, progress slows after time and scenarios that address other drivers (i.e., purchasing power, calorie utilization through water and sanitation infrastructure) begin to close the gap with the Agriculture Investments scenario.

ECONOMIC DEVELOPMENT

Conflict and insecurity have hit Yemen's economy hard. Successful post-conflict recovery will cost money – and with total domestic revenue collection below five per cent of GDP (World Bank, 2020) – much of that money

must come from private and external sources. Sustainable economic recovery will require an effective and healthy private sector (Nasser, 2018), especially small and medium enterprises (SMEs).

SMEs make up the vast majority of businesses in Yemen (Assaf, 2013) but as of 2018, more than half were still entirely or partially closed (Afcar for Consultancy, 2018). Additionally, youth unemployment is especially high at around 24 per cent. Ensuring that the large youth population has access to quality jobs is important to both improving livelihoods and preventing conflict recurrence.

The Economic Development scenario calls upon multiple sources to help finance recovery and encourage the development of a strong private sector. However, economic development must be pursued carefully and sustainably. Short-term growth at any cost should not be the goal, nor should it be the aim of policies to eradicate the informal economy, which could stifle innovation and have harmful effects on informal workers (Williams, 2015).

The Economic Development scenario boosts growth through increased investments and pushes to formalize employment to improve productivity. By doing so, GDP growth averages 6.5 per cent a year through 2030. By then, the cumulative GDP gains compared to the Fragmented Recovery scenario total US$ 22.1 billion.

Through a combination of growth and measures that grow government resources and household incomes, this scenario results in the greatest poverty reduction among all individual recovery scenarios. By 2030, an additional 7 per cent of the population (2.6 million people) are raised out of extreme poverty above and beyond the Fragmented Recovery scenario. Additionally, with more money in the economy, government, and in households, the Economic Development scenario results in moderate improvements across all indicators, including malnutrition, health, and education.

However, the gains are not enough to push Yemen significantly closer to its No Conflict trajectory and taper off in the long run without targeted programmes aimed at the challenges in those areas.

EMPOWERED WOMEN

Yemen's gender inequality is among the worst in the world, ranking last in the Gender Inequality Index. Women play an important role in recovery from conflict and there is evidence that greater integration of women into the economy and civil society leads to improvements at the household and community level (Justino et al., 2012). With Yemen's female labor force participation rate of just 6 per cent, increasing women's participation in the economy and society has potential to unlock significant economic gains.

The Empowered Women scenario addresses gender inequalities not only through increased pay and labor participation rates, but also through addressing disparities in health and education. By 2050, this scenario has a greater effect on GDP per capita than even the Economic Development scenario, illustrating the importance and power of a gender-inclusive approach to recovery.

Largely attributable to more women entering the workforce, this scenario shows significant GDP gains above the Fragmented Recovery scenario, totaling a cumulative US$ 12.5 billion by 2030 and US$ 270 billion by 2050. It reduces fertility rates, resulting in cutting maternal mortality in half by 2029. Economic growth and slowed population growth will lead to 2.3 million fewer people in extreme poverty in 2030 and 4.3 million fewer by 2050. Through boosting the education of women and girls, it nearly closes the gender gap in adult education by 2050.

GOVERNANCE QUALITY

Governance is central to post-conflict recovery for its role in providing services as well as maintaining peace and preventing conflict recurrence. The most important elements of governance quality for a successful recovery include reducing corruption, improving institutional quality and capacity, and improving government effectiveness.

The Governance Quality scenario includes interventions to improve government effectiveness, strengthen security (eliminating the risk of conflict recurrence), and government programmes that incentivize public-private partnerships – especially in infrastructure development. Because of model linkages in IFs, this scenario also reduces corruption.

By 2030, the Governance Quality scenario results in an additional cumulative US$ 9.8 billion in GDP (US$ 230 billion by 2050) and a 6 per cent increase in GDP per capita relative to the Fragmented Recovery scenario (15 per cent by 2050). In 2030, government revenues are nearly half a billion greater. And by 2050, the government has US$ 6.9 billion more in revenues to invest.

Improving governance alone has a significant effect. But more importantly, effective governance acts as a multiplier on all other scenarios, giving the government more resources to devote to improving human development and, in doing so, improving its efficiency.

HUMAN CAPABILITIES

Even prior to the conflict, Yemen had one of the lowest HDI scores in the Middle East and North Africa region, reflecting poor population health, education, and income. More than 40 per cent of Yemen's population lacked access to improved sanitation and 10 per cent lacked access to safe water, contributing to an infant mortality rate of 40 per 1,000 live births and child malnutrition rate of 40 per cent. The average Yemeni adult had just 4.4 years of education, and while gross primary enrollment was nearly universal, gross secondary enrollment was below 50 per cent.

The conflict has damaged existing health, water, and sanitation infrastructure and disrupted education, reversing decades of hard-earned progress. In post-conflict recovery, Yemen must go beyond rebuilding existing infrastructure and build sustainable and strong systems to transform progress.

The Human Capabilities scenario addresses major barriers to enhancing population health and education.

It includes speeding up reconstruction and expansion of access to water and sanitation for child health and advancing education at all levels.

Human capital investments, however, take time. Through the first five years of recovery, the Human Capabilities scenario has the smallest effect on infant mortality across all the individual recovery scenarios explored in this section. But as WASH access gains momentum, this scenario catches up and by 2035 surpasses the others in improving infant mortality.

As children progress through the school system and into the labor force, education investments will begin to impact other development sectors. But this also takes time. The Human Capabilities scenario encourages enrollment and graduation across education levels so, by 2030, the average adult (15 and older) will have five years of education – nearly half a year more than projected in the Fragmented Recovery scenario.

Education surpasses the projected No Conflict scenario level by 2039; however, a gender gap persists as men average 1.6 years more education than women in 2030 and 0.8 years more in 2050.

CONCLUSION

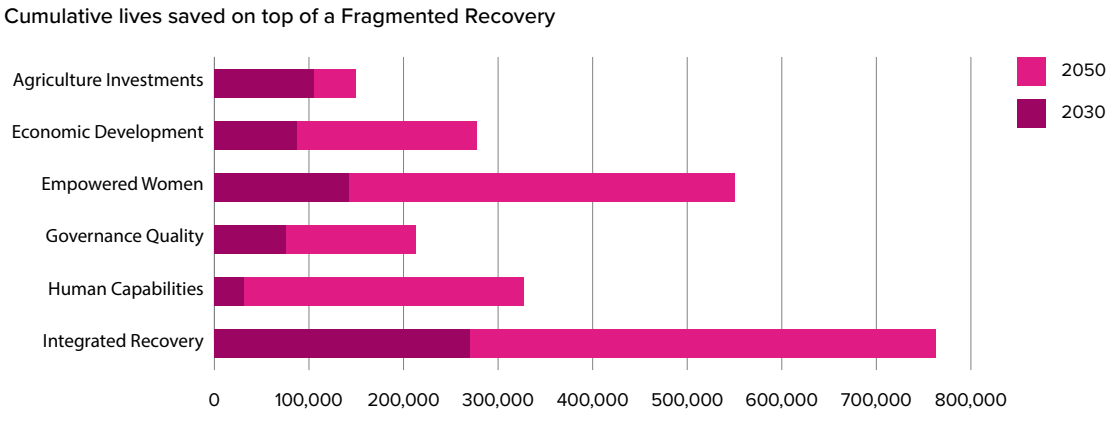
Each of the intervention scenarios results in a positive impact that works through a different recovery pathway to address Yemen's specific development and recovery challenges. Table 5 in the following section shows the results of these interventions on several outcome indicators, including GDP per capita.

The conflict has already reduced Yemen's GDP per capita more than 40 per cent from its pre-conflict level. By simultaneously boosting economic growth and easing demographic pressures, Empowered Women results in the greatest GDP per capita gains by 2050. Women's economic participation in post-conflict recovery is often associated with improved household and community welfare (Justino et al., 2012). This scenario shows that empowering women can unlock transformative progress for the country.

Other intervention scenarios lead to GDP per capita growth beyond the Fragmented Recovery. Economic Development yields immediate benefits through increasing the flow of financial resources to poor and vulnerable populations, as does Governance Quality, which focuses on how effective the government is in achieving policy solutions and bringing together public and private enterprise to invest in Yemen. Agriculture Investments raises GDP per capita in the immediate post-war years while addressing an acute need. On the other hand, Human Capabilities involves long-term investments in health and education that result in GDP per capita gains by 2050.

Throughout our *Impact of War* reports, we have assessed the magnitude of indirect mortality caused by the conflict. Beyond those who die as a direct result of conflict and violence, most of Yemen's conflict-attributable deaths are the result of deteriorating development conditions and access to resources. As outlined in the previous section, damage from conflict can have a lasting impact for decades after it ends.

FIGURE 6 | Lives saved in each recovery scenario in addition to those saved by Fragmented Recovery in 2030 and 2050. Source: IFs 7.67



In the Fragmented Recovery scenario, the indirect death toll in recovery reaches 503,000 by 2030. By addressing key development challenges in Yemen, each of the intervention scenarios help diminish conflict's impact and save additional lives.

These scenarios also reduce the conflict's mortality shadow – those who die indirectly due to poor developmental outcomes caused by the conflict, even after it ends. By 2030, the greatest reductions come from Empowered Women and Agriculture Investments. The Human Capabilities scenario has the smallest effect in 2030, but by 2050 becomes the second-best for reducing deaths, as its investments in WASH, health and education take longer to pay off. Both Governance Quality and Economic Development save lives, but because they do not *directly* address the key health and nutritional deficits responsible for many of the deaths, their effects are more moderate in isolation.

An Integrated Recovery

There is no single solution to improving development in post-conflict Yemen. To assess the impact of simultaneously combining the recovery building blocks, we created the Integrated Recovery scenario which combines all of their interventions into one. This scenario also represents an integrated development push across the Five Ps of the SDG framework.

If conflict ended at the end of 2021, within the first eight years (2022-2030), annual GDP growth rates average 8.3 per cent, leading to a cumulative increase in GDP of US$ 85 billion above the Conflict scenario and US$ 51 billion more than the Fragmented Recovery. By 2050, the Integrated Recovery scenario catches up to the No Conflict scenario with a cumulative US$ 1.2 trillion more than the Fragmented Recovery. Table 4 presents the average GDP growth rates across the main scenarios.

In terms of per-capita GDP, the Integrated Recovery reaches Yemen's pre-conflict level by 2033, nine years earlier than the Fragmented Recovery. By 2050, Yemen's GDP per capita in the Integrated Recovery scenario (US$ 8,900) is slightly higher than the No Conflict scenario and would classify the country as an upper-middle income economy today.

By 2030, the Integrated Recovery scenario results in 15.7 million fewer people in extreme poverty than in the Conflict scenario, and 5.8 million fewer than in a Fragmented Recovery. The extreme poverty rate catches up to the No Conflict trajectory by the late 2040s and results in achieving the SDG 1 goal of bringing extreme poverty below 3 per cent by 2047.

Calories per capita grow from a tragically low 1,700 per person in 2021 to exceed the current global average by 2038. HDI values also grow and recover to the No Conflict baseline by 2031, quickly achieving levels seen in countries like Bangladesh or Ghana today. By 2025, malnutrition is cut by more than half as compared with 2021. It continues to steadily decline through 2050, resulting in over 5 million fewer people living with malnutrition than in a No Conflict scenario.

In recovery, economic growth and human development save lives. As incomes grow, families can buy food, public services are restored, and the conflict's indirect death toll is reduced and eventually eliminated. However, this recovery is far from immediate.

In the first year of recovery, there are still 53,000 more deaths than in the No Conflict scenario. But improvements continue and by 2030, the cumulative

TABLE 4 | Average GDP growth rates by scenario. Source: IFs 7.67

Growth rate	No Conflict	Conflict	Fragmented Recovery	Integrated Recovery
2022 – 2030	5.7	1.3	4.8	8.3
2031 – 2040	6.7	-	6.7	9.6
2041 – 2050	6.1	-	6.5	8.5

indirect death toll in the Integrated Recovery scenario is 236,000 – less than half of the indirect deaths seen in the Fragmented Recovery scenario. And by 2035 the mortality pattern in the Integrated Recovery is like that in a No Conflict scenario.

See Table 5 for a summary of results across scenarios, time and indicator. See Annex 2 for a summary of all results.

TABLE 5 | Select key outcome indicators by scenario. Source: IFs 7.67

Scenario	2014	2021	2030	2050
GDP per capita at PPP, thousand US dollars				
No Conflict	3.8	3.7	4.5	8.3
Conflict	3.8	2.1	2.0	-
Fragmented Recovery	3.8	2.1	2.7	4.8
Agriculture Investments	3.8	2.1	2.8	5.2
Economic Development	3.8	2.1	3.0	5.9
Empowered Women	3.8	2.1	3.0	6.2
Governance Quality	3.8	2.1	2.8	5.6
Human Capabilities	3.8	2.1	2.7	5.6
Integrated Recovery	3.8	2.1	3.4	8.9
Population in extreme poverty, millions				
No Conflict	4.7	4.4	2.6	1.1
Conflict	4.7	20.0	24.8	-
Fragmented Recovery	4.7	20.0	14.9	8.6
Agriculture Investments	4.7	20.0	13.8	7.1
Economic Development	4.7	20.0	12.4	3.4
Empowered Women	4.7	20.0	12.7	4.6
Governance Quality	4.7	20.0	13.9	6.8
Human Capabilities	4.7	20.0	14.6	5.9
Integrated Recovery	4.7	20.0	9.1	0.9
Malnourished population, millions				
No Conflict	8.1	8.8	9.2	8.7
Conflict	8.1	17.4	18.4	-
Fragmented Recovery	8.1	17.4	16.6	13.9
Agriculture Investments	8.1	17.4	7.7	4.7
Economic Development	8.1	17.4	15.0	12.0
Empowered Women	8.1	17.4	16.0	12.0
Governance Quality	8.1	17.4	16.3	13.0
Human Capabilities	8.1	17.4	16.5	12.9
Integrated Recovery	8.1	17.4	6.5	3.2

Continued on next page

Scenario	2014	2021	2030	2050
Human Development Index (HDI)				
No Conflict	0.54	0.57	0.60	0.68
Conflict	0.54	0.47	0.48	-
Fragmented Recovery	0.54	0.47	0.54	0.65
Agriculture Investments	0.54	0.47	0.54	0.65
Economic Development	0.54	0.47	0.56	0.67
Empowered Women	0.54	0.47	0.57	0.71
Governance Quality	0.54	0.47	0.55	0.66
Human Capabilities	0.54	0.47	0.58	0.70
Integrated Recovery	0.54	0.47	0.60	0.74
Infant mortality rate, deaths per 1,000 live births				
No Conflict	39.4	31.5	23.8	12.2
Conflict	39.4	76.6	86.5	-
Fragmented Recovery	39.4	76.6	51.9	20.5
Agriculture Investments	39.4	76.6	41.9	17.3
Economic Development	39.4	76.6	42.6	16.9
Empowered Women	39.4	76.6	48.9	14.8
Governance Quality	39.4	76.6	44.4	17.8
Human Capabilities	39.4	76.6	46.4	14.6
Integrated Recovery	39.4	76.6	31.1	9.8
Education years, average attained by the population 15+				
No Conflict	4.2	4.9	5.6	7.1
Conflict	4.2	4.3	4.2	-
Fragmented Recovery	4.2	4.3	4.6	6.4
Agriculture Investments	4.2	4.3	4.6	6.4
Economic Development	4.2	4.3	4.7	6.7
Empowered Women	4.2	4.3	5.0	7.8
Governance Quality	4.2	4.3	4.7	6.6
Human Capabilities	4.2	4.3	5.0	8.0
Integrated Recovery	4.2	4.3	5.0	8.3

The Integrated Recovery scenario outperforms the No Conflict scenario by 2050 for all indicators explored here, and in some cases outperforms the No Conflict scenario by 2030. This suggests that, with targeted policy interventions, Yemeni development can exceed what it would have been the development trend if no conflict had occurred and the pre-conflict trajectory had continued. This finding is important because it highlights that a concerted effort, in spite of all of Yemen's structural development challenges, could lead to an outcome where the next generation of Yemenis enjoy a better standard of living, more inclusive society, and better governance than their parents and grandparents.

CONCLUSION

Yemen's conflict has already cost hundreds of thousands of lives and caused untold suffering through displacing millions, destroying vital infrastructure, ruining livelihoods, and causing mass hunger.

By the end of 2021, we estimate that it will be responsible for:

- 377,000 deaths, 70 per cent of which are of children younger than five.
- 15.6 million people pushed into extreme poverty.
- More than doubling the malnourished population.
- US$ 126 billion in lost GDP.

As long as the conflict continues, the situation is likely to deteriorate. It is important for humanitarian work to continue to mitigate the damage as much as possible, but significant progress cannot be achieved without an end to the conflict.

At the moment, prospects for Yemen's peace remain tenuous. Still, it is important to plan for post-conflict reconstruction and recovery now. After conflicts end, time is often lost to complex planning and coordination processes, delaying relief. Moreover, it is important to demonstrate a realistic vision for a successful recovery.

The end of fighting will bring immediate relief to many suffering from poverty and hunger. But the most important component to successful post-conflict recovery is sustained peace. Countries exiting conflict are especially vulnerable to falling back into war, resulting in a conflict trap and vicious cycle of destruction and suffering. With a Fragmented Recovery, Yemen remains at a high risk for renewed conflict.

Achieving sustained peace involves transformative changes to systems of development and governance. It requires significantly improving living conditions and prospects for citizens – restoring and strengthening the social contract and fostering social cohesion and resilience.

By combining the individual recovery pathway scenarios, the Integrated Recovery scenario addresses urgent needs while simultaneously investing in a foundation for a sustainable long-term recovery. By 2030, the Integrated Recovery scenario saves 267,000 lives on top of the Fragmented Recovery scenario, or 710,000 lives compared to continued conflict.

The post-conflict environment provides an opportunity for not just reconstructing but reforming systems, placing Yemen on a path to recover from conflict and surpass its pre-conflict development trajectory, even meeting some SDG targets by 2050.

By examining recovery scenarios, we have been able to provide development practitioners, decision makers and donors alike with some short-term, medium-term, and long-term solutions that will likely help Yemen not only recover but build back better. For example, addressing food access constraints is important for providing immediate hunger relief. At the same time, investing in human development and improving infrastructure may not yield immediate results in the short term but is important to reducing malnutrition and improving health outcomes in the long run.

Additionally, a focus on improving productivity and providing income support to the most vulnerable is critical to poverty relief, but without strengthening health and education systems, will not transform human development. Similarly, effective, and transparent governance is important to building trust and yields results on its own, but it is most powerful when in combination with targeted development investments and programmes.

We also find that a focus on female empowerment can unlock significant potential for Yemen's economic and human development. Even prior to the conflict, Yemen's gender equality was among the worst worldwide. Increasing women's health, educational outcomes, and economic positions unlocks new avenues for growth.

Recovery strategies must be inclusive and equitable in order to ensure sustained peace and to maintain the commitment to leave no on behind. The recovery building blocks each address different aspects of equity directly.

- Economic Development scenario: Includes a measure of cash transfers, providing additional income to poor households to reduce income inequality.
- Human Capabilities scenario: Attempts to make access to water and sanitation infrastructure and education more equitable.

- Governance Quality: Has the potential to drive an inclusive recovery through improving the efficiency and efficacy of government service provision and increasing revenues.
- Agriculture Investments scenario: Alleviates issues of food access, which are felt most strongly by Yemen's poor and vulnerable. It also increases production in the agriculture sector, which provides employment for much of the country's poor.
- Empowered Women scenario: Improves gender equality directly through increasing girls' education and women's participation in the economy and in society.

While some aspects of equity are a part of each building block, a truly inclusive recovery is only possible when the scenarios are integrated. However, it will be important to emphasize at all stages that the policies enacted in recovery are inclusive and equitable.

Promoting and encouraging investment can boost an economy and opens many possibilities, but it does not necessarily lead to inclusive growth. To do so, investment should be directed in a way that benefits – and provides opportunities for – women, youth, and marginalized populations.

Additionally, improvements in transparency and effectiveness must be paired with careful policy to ensure that their benefits are felt by all groups, and improvements in health and education need to reach all populations.

The results from this analysis reinforce the importance of the Five Ps. Sustainable human development happens within and across systems, and it is necessary to understand how development works for issues like health, education, the environment, and governance, as well as how they interact with one another.

Each of the Ps highlights an important aspect of development, and this analysis points to the particular importance of Partnerships in creating a post-conflict environment that can unlock the potential of Yemeni development for the next generation and support a dignified life for all.

Just as conflict affects development in an integrated way, post-conflict recovery should take an integrated approach. A recovery framework that targets the empowerment of women and of youth and emphasizes building capabilities, creating livelihoods, and economic expansion can restore hope and help pave the way to sustainable reconciliation and peace in Yemen.

Key Recommendations for Post-Conflict Recovery in Yemen

1. **Prioritize a sustainable and lasting peace.** The most important determinant of successful recovery is sustained peace. This pertains both to the terms of any negotiated settlement as well as post-conflict recovery. In order to lay the groundwork for a lasting peace, a new peace deal must be inclusive in its negotiation and its terms. And once conflict is ended, people-centered recovery policies must result in meaningful improvements to the lives of Yemenis. Any slide back into conflict reduces the opportunity to achieve the SDGs in a timely manner.

2. **Coordinate international, national, and local recovery efforts.** Recovery will require immense resources and coordination to maximize effectiveness.

3. **Invest in human health and education for long-term sustainable development.** Human development in Yemen has already been set back two decades. But focusing on building human capabilities now can make up for that loss and result in significant improvements in the future.

   - Recover and expand access to safe water and sanitation to improve child health and mortality.
   - Expand access to electricity near universally.
   - Build up population capabilities through expanding access to and quality of primary and secondary education so Yemen's next generation can take advantage of greater employment and growth opportunities.

   The Human Capabilities scenario brings Yemen's HDI back to its pre-conflict level by 2026, improves the average Yemeni adult's educational attainment by 0.4 years by 2030 (1.6 years by 2050), and through lowering child mortality prevents the deaths of 29,000 children younger than five by 2030 (325,000 by 2050).

4. **Invest in women's empowerment to unlock significant potential through inclusive recovery.** Yemen ranks among the worst countries in the world in terms of gender equality. This problem has been exacerbated by the conflict but represents an opportunity in recovery.

   - Encourage and support greater female participation in the labor force and in society.
   - Improve access to education and educational outcomes for women and girls.
   - Expand women's access to reproductive and maternal healthcare, lowering fertility rates and maternal mortality rates.

   The Empowered Women scenario improves GDP per capita by nearly 30 per cent by 2050 – the greatest improvement out of all of the individual scenarios. It also results in 2.3 million fewer people in extreme poverty by 2030 (4.3 million by 2050).

5. **Focus on food security within Yemen's agricultural constraints.** With a growing population and numerous geographic challenges, Yemen will likely continue to be reliant on imports for food. However, actions can be taken to address acute hunger now while developing a more secure and sustainable agricultural portfolio to support Yemen into the future.

   - Ease hunger in the short term by addressing barriers to food access through improving supply chain issues and getting food to households in need.
   - Focus on supporting less water-intensive and more efficient agricultural products and techniques over the medium and long term.
   - Develop the supply chain to support key export products, such as fisheries, honey and coffee, which can help obtain hard currency and fund necessary food imports.

   The Agriculture Investments scenario results in 8.9 million fewer malnourished people by 2030, and agricultural exports grow to return to the pre-conflict peak level by 2032.

6. **Leverage the private sector to generate growth, employment, and funding.** With limited government resources, the private sector can be especially important to post-conflict recovery.

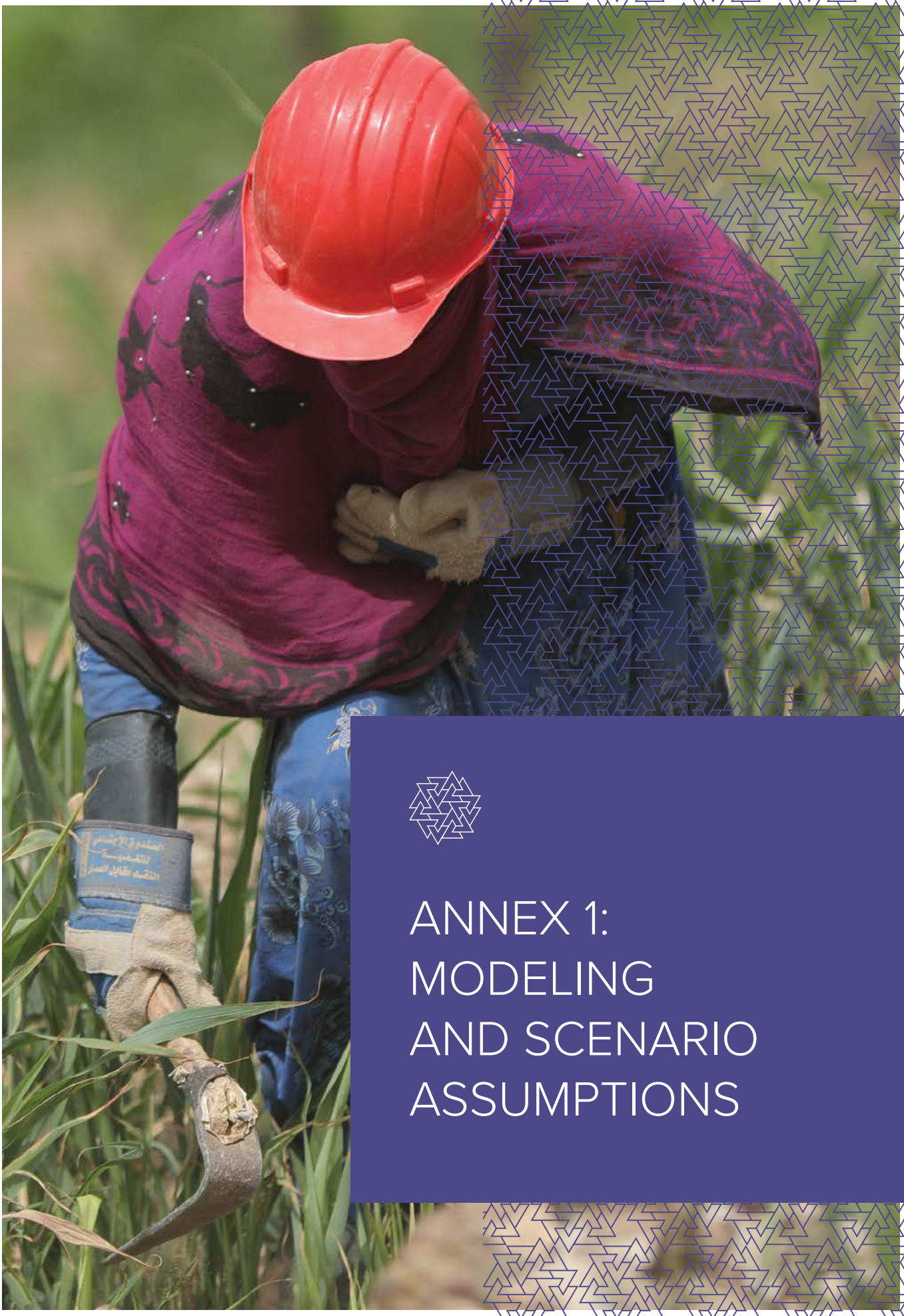
   - Support local business capacity, especially that of SMEs through skills trainings, grants, and wage subsidies.

- Establish a functioning financial sector and central bank, while steadily improving access to finance.
- Implement programmes to increase the flow of funding into the country and into households, including encouraging remittances, aid, and foreign direct investment (FDI).
- Provide economic support to low-income households through cash transfers.

The Economic Development scenario results in a cumulative US$ 22 billion in GDP gains by 2030 and US$ 450 billion by 2050, a 12 per cent increase in GDP per capita in 2030 relative to a scenario without conflict (23 per cent by 2050) and 2.6 million fewer people in extreme poverty by 2030 (5.5 million by 2050).

7. **Take an integrated approach to post-conflict recovery.** Development works through systems, so a systems-oriented approach is required to institute lasting change. An Integrated Recovery unlocks synergistic improvements and mitigates tradeoffs resulting from constrained resources.
   - An integrated approach involves combining the recommended approaches discussed above.

   In the Integrated Recovery scenario, Yemen has the potential to reach its pre-conflict development trajectory in terms of GDP per capita by 2046 and in terms of GDP by 2050. It could also achieve the SDG 1 goal of eliminating extreme poverty by 2047, just three years after it was projected to in the absence of conflict and assuming continuation of the pre-conflict development trend.



ANNEX 1: MODELING AND SCENARIO ASSUMPTIONS

The following sections review the data and core scenario assumptions used for this project.

The IFs system is highly complex and integrates multiple modules across systems, so an in-depth technical review of the tool is beyond the scope of this report. However, a more complete overview of the tool can be found in Hughes (2019) and more information, including model documentation, is available at **www.pardee.du.edu**.

IFs uses high quality data series from many standard international sources, such as the World Bank's World Development Indicators, the Food and Agriculture Organization, the United Nations International Children's Emergency Fund. But data collection is especially difficult during conflict, and many series are either missing or of questionable quality. An extensive data survey was completed at the outset of this project and revisited periodically to gather new or updated figures. A detailed review of that process is available in the first report of this series (Moyer, Bohl, et al., 2019). The following sections describe the calibration process and scenario assumptions used in this report.

Assumptions in the No Conflict Scenario

The **No Conflict** counterfactual scenario is largely a model run which is free of exogenous assumptions, allowing it to evolve from 2014 unconstrained by many of the conflict-induced setbacks simulated in the other scenarios. The only changes unique to the **No Conflict** scenario involve COVID-related adjustments to GDP and mortality and the exogenous elimination of the threat of conflict and conflict deaths.

CONFLICT DEATHS AND THE RISK OF ONSET

In IFs, several parameters exist around conflict deaths, intensity/magnitude, probability, and societal violence more generally. For the **No Conflict** scenario, we adjust parameters related to the conflict-attributable deaths so that related variables are zero throughout the horizon of this study. The variable related to the likelihood of internal conflict is estimated endogenously.

COVID-19

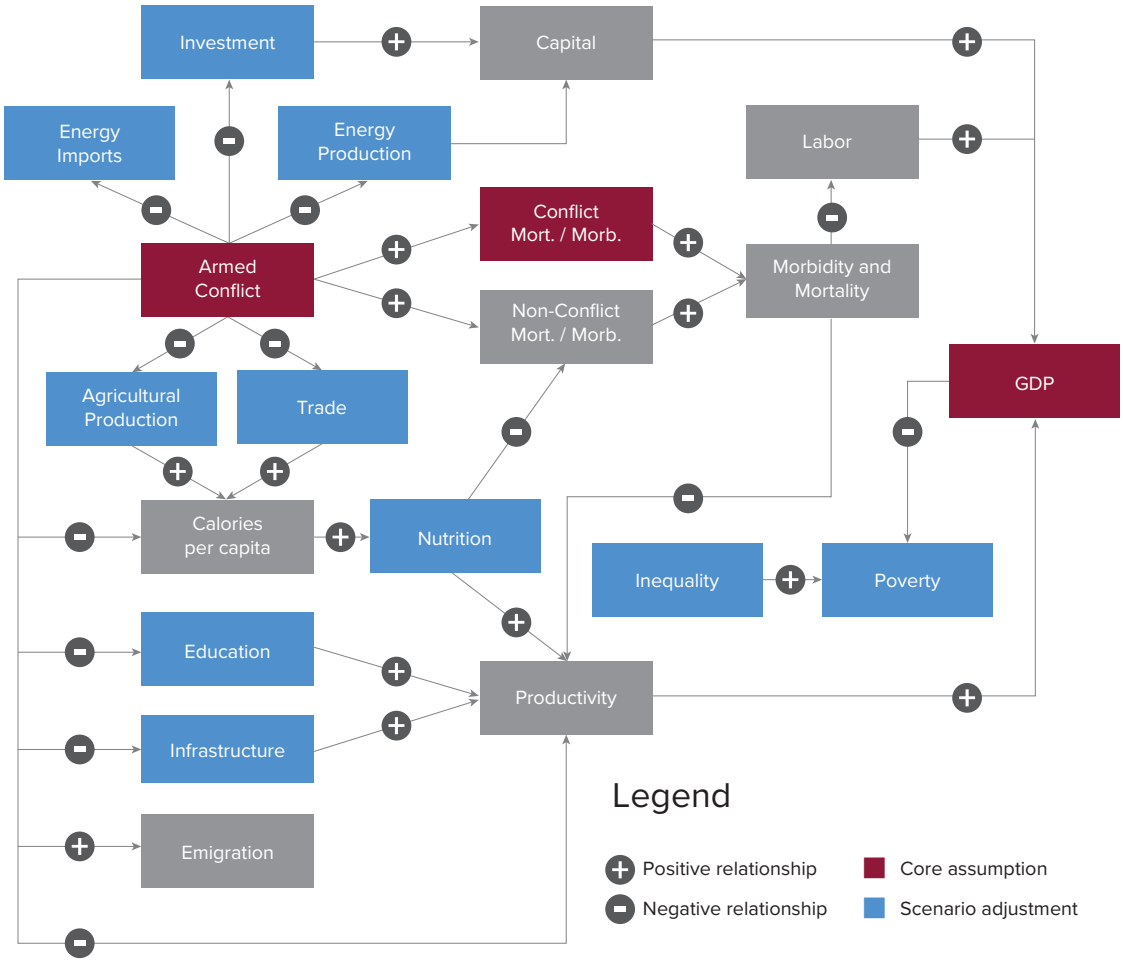
Projections of GDP growth rate in Yemen in absence of conflict are largely endogenous, except for adjustments in 2020 and 2021 made to account for the impact of COVID-19. For this impact we simply imposed the current IMF growth estimate for Yemen in the respective years. This is likely a conservative estimate as it is the result of not just the pandemic, but also the ongoing conflict.

We also adjust the elasticity of trade with income, imposing estimates from the World Trade Organization (WTO, 2020) for 2020 and 2021. We also include excess deaths from COVID-19 in 2020. These estimates are taken from the Institute for Health Metrics and Evaluation (IHME, 2020) COVID-19 projections.

Calibrating the Conflict Scenario and Allowing for a Fragmented Recovery

Because all recovery scenarios reflect conflict through 2021, the process used to calibrate the **Conflict** scenario is embedded in them as well. Thus, we first review the process that we undertook to calibrate the scenario. Subsequent sections discuss the data sources and assumptions used in each step of the calibration process for the **Conflict** scenario as well as how those assumptions were adjusted for the **Fragmented Recovery** scenario.

FIGURE 7 | Conceptual model framework used in this project and within the International Futures platform.



CALIBRATION PROCESS

After conducting a thorough data search for input or benchmarking data (depending on calibration round), we used these estimates to inform the parameterization of different variables within the model. This was done to more accurately reflect the data, reports, and assumptions describing Yemeni development over the past seven years. Calibration was done in stages.

First, we made core assumptions on three variables that measured the largest and most direct effects of conflict: direct conflict deaths, magnitude of conflict, and GDP growth rates. We explored the effect these assumptions had on other important indicators (for example, education and poverty) and compared the resulting values with figures identified during our data survey. Where necessary, we adjusted the parameterization of the **Conflict** scenario to reflect the data.

Figure 7 shows the conceptual framework used for this exercise. Note that this figure does not represent an exhaustive set of relationships in IFs. Rather, it is meant as an illustrative guide for the calibration process.

The subsequent sections describe the parameterizations for each core variable. In the **Conflict** scenario, they are maintained through 2030. In the **Fragmented Recovery** scenario, the parameterizations are gradually eliminated over a period of up to ten years, starting in 2022, to reflect a slow recovery.

FIGURE 8 | Direct conflict deaths assumptions across scenarios.

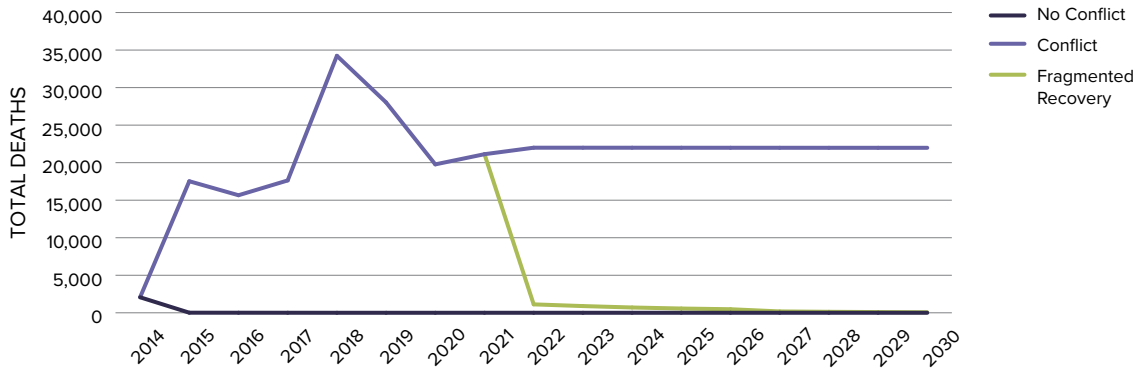


FIGURE 9 | State failure probability assumptions across scenarios.

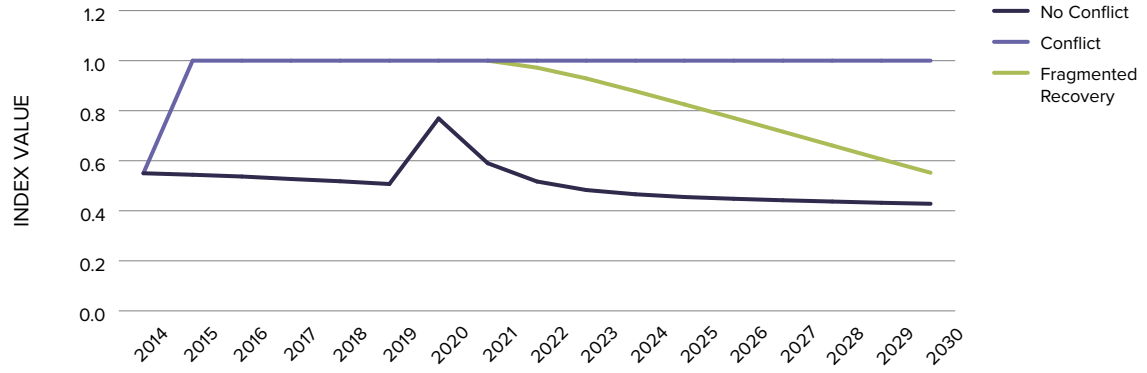
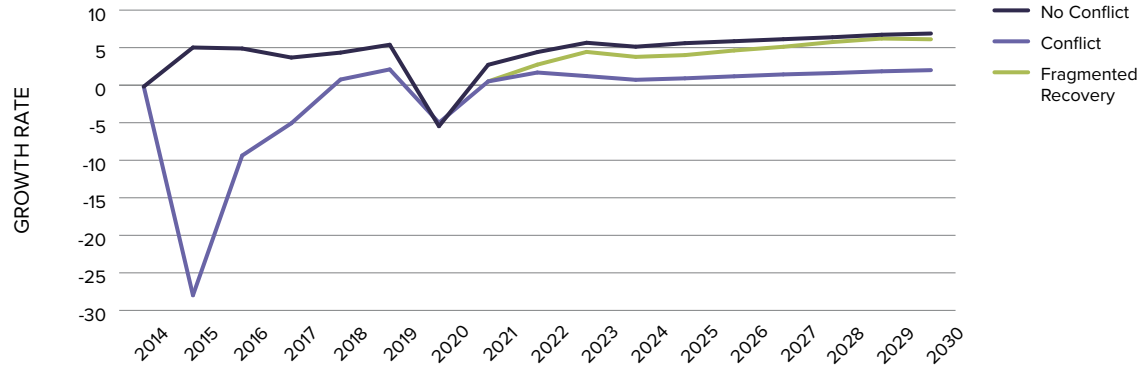


FIGURE 10 | GDP growth assumptions across scenarios.



CONFLICT DEATHS AND MAGNITUDE

We relied on three main parametric controls in IFs to simulate the scale and intensity of the Yemen conflict. The first is an exogenous parametric control on conflict deaths. We use conflict deaths data from ACLED. While it is impossible to perfectly account for direct conflict-related deaths, in our data survey we determined that ACLED was the best and most comprehensive representation of direct conflict violence in Yemen (Moyer, Bohl, et al., 2019). In the **Conflict** scenario, conflict deaths are held constant from 2022 through 2030, whereas in the **Fragmented Recovery** scenario they are exogenously reduced to 1/10th the model-based estimate.

The second is an exogenous parametric control on conflict "magnitude," which is benchmarked to historical data from the Political Instability Task Force/Center for Systemic Peace (CSP) project on state failure (Marshall, 2017).[6] We made this determination by comparing the trend in magnitude acceleration and death patterns after conflict onset in Yemen to historical conflicts covered by the CSP database, where we found high similarity between Yemen, Sierra Leone and Iraq. These conflicts also shared a similar length, similar dynamics in magnitude during early years, and clustered in the same group as Yemen in the clustering exercise that can be found in Table 5 of Moyer et al. (2019).

The third control is an instrumental parameter that describes the likelihood of conflict for projection years. For the purposes of this study, we tune this parameter so that the associated variable has a value of 1 (conflict = true) for the duration of conflict. The conflict magnitude and probability assumptions are held constant throughout the horizon in the **Conflict** scenario but are phased out over a period of 10 years in **Fragmented Recovery**.

GROSS DOMESTIC PRODUCT (GDP)

GDP is calibrated in the model by adjusting two parametric controls which together allow the use of an exogenous GDP growth rate series to be imposed on the model. For the initial historical years (2015 – 2021) GDP growth rates reflect values from the IMF's World Economic Outlook (2021).

Previous reports drew on data from UN DESA (see Annex 1 of Moyer, Bohl, et al., 2019), but since then estimates from the two sources have become more aligned. The previous reports also enforced GDP growth rates estimated as function of the rate of change of assumed conflict deaths.

In this study we allow GDP growth rates to be estimated endogenously in both the **Fragmented Recovery** and **Conflict** scenarios beginning in 2022.

POVERTY AND INEQUALITY

In IFs, poverty is estimated using a standard method using average household consumption, a measure of inequality (the Gini index), and an assumption of lognormality. However, using this approach, estimates of poverty prior to and during the conflict do not reconcile with estimates of per capita consumption from IFs and the most recent data available on the Gini index.

Starting from the assumption that the greatest source of uncertainty in this calculation can be attributed to the Gini index, we elected to treat the Gini as a parameter and used it to calibrate the poverty rate to the best estimates identified during our review. After we achieved the desired level of poverty for the last year of data available, the Gini index is held constant for the duration of conflict. In **Fragmented Recovery**, Gini is relaxed over a period of 10 years to 1.2 times the base parameterization.

The significant deviation of calibrated Gini from most recent estimates instrumentally suggests that inequality has significantly worsened in Yemen over the past seven years. However, as no estimate of inequality has been reported for Yemen since pre-conflict years and reporting of such measures during periods of conflict is rare, we are unable to validate this finding.

AGRICULTURAL PRODUCTION AND TRADE

We calibrated agricultural production values in these scenarios with data from the FAO (2019). There is no exogenous model parameter on agricultural production within the IFs system. Rather, changes are introduced on the two proximate determinants of production: agricultural yield and crop land. Data from FAO showing

6 Internal to the IFs system, conflict magnitude is consolidated across the four conflict types to compute an average expanded index based upon inclusive weighting of the subcomponent measures available for each conflict designation from PITF. This consolidated conflict magnitude score is used to initialize the IFs projections for conflict magnitude and is also what was used historically for cross-country benchmarking and validation.

significant reductions in production despite relatively constant yields, suggest large reductions in crop land. Therefore, after attuning IFs yield variables to FAO estimates, we reduced the level of land under cultivation until production was brought in line with current estimates. Yields and land under cultivation are held constant for the duration of conflict. In the Fragmented Recovery scenario, the parameters applied to both variables are relaxed back to base levels over a period of 10 years.

We adjusted agricultural import flows to reach levels commensurate with values reported by FAO/GIEWS (2018) and the World Bank (2018), which suggest that import volume of essential commodities remained relatively stable across the conflict period. This parameter is thus used here in an instrumental way, to reconcile import volume with what was previously suggested in the IFs base case. Agricultural exports are assumed to follow a similar pattern during conflict. After the cessation of conflict in Fragmented Recovery, exogenous suppression of agricultural imports is immediately removed, whereas exports recover over a period of 10 years.

EDUCATION

The Global Partnership for Education project advises that Yemen had 6.5 million school-age children in 2018 (GPE, 2018), while the UN Office for the Coordination of Humanitarian Affairs (UNOCHA, 2018) reports a figure of 7.5 million. This appears to correspond to the number of students within the compulsory education system (6 – 14 years of age) per the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics categories, which IFs estimates to be around 7.24 million in 2018. The UN OCHA (2018) Humanitarian Response Plan for Yemen suggests that:

a. There was an extended period of non-payment to school officials in 2017/2018 in 13 of 22 governorates in Yemen, causing significant school delays/ disruptions.

b. Between 20 per cent and 33 per cent[7] of schools in Yemen have suffered damage or occupation to the extent of being unfit for use.

c. 4.1 million school children need assistance to continue schooling.

The above figures imply that, even if the broader cohort of children aged 6 – 14 are considered, an additional 57 per cent of children are at risk of losing education on top of the 28 per cent that are already out of school. This implies a worst-case scenario total for the immediate future of 85 per cent of children out-of-school, should the state of the education system continue to deteriorate. We interpret this 85 per cent figure to be an upper limit of a potential worst-case scenario for the medium term and use it to inform our scenario intervention into the education system.

The education system in IFs can be conceptualized as a "pipeline," where cohorts of school age students move through successive stages of education: primary, lower secondary, upper secondary and tertiary. There are exogenous parameters on intake, graduation, and transition rates at each level, which further affect the upstream flows of education.

For this study, we reduced survival, intake, and graduation by 50 per cent to model the combined impacts of: (a) infrastructure damage; (b) reduced schooling hours; (c) occupation of schools; (d) reduced ability to pay for child schooling; (e) reduced staff and classroom time associated with non-payment within

7 Top range of 33 per cent from Ferguson (2018).

the school system; (f) the size of the pool of out-of-school children; and, (g) children at risk for losing access to the education system. We hold this adjustment constant over the conflict horizon. Because of the propensity for the IFs model to prioritize education, perhaps beyond what is likely in a **Fragmented Recovery** context, we relax the parameterization over a period of 40 years. Despite this prolonged reduction, gross primary enrollment returns to **No Conflict** levels in around seven years.

FOREIGN TRADE AND INVESTMENT

Reflecting estimates from the World Bank (2017), we imposed a 50 per cent reduction in foreign trade. We further reduce energy imports by 75 per cent to reflect the negligible imports reported by MoPIC (2016). We also made adjustments to both internal and external stocks of FDI in the model in order to bring year-on-year FDI flows in line with time series data collected from the UN Conference on Trade and Development (UNCTAD, 2019). Here, the UNCTAD data is used as a target to calibrate year-on-year FDI flows into a more acceptable range with historical estimates under conflict years for Yemen.

In the **Conflict** scenario, these adjustments to the patterns of international flows are held constant throughout the horizon, whereas in **Fragmented Recovery** they are relaxed over a period of 10 years. An exception is made for the adjustment for exports, which is relaxed immediately in 2022 due to their sluggish recovery in the model.

WATER AND SANITATION

We used a point estimate from REACH (2017) for the year 2016 to compare to IFs piped water coverage numbers and find the difference to be negligible (0.8 per cent). For sanitation access values, we utilized a

point estimate for 2016 from UN OCHA of 11.6 million people in acute need of access to sanitation services,[8] which corresponds almost exactly with the sanitation estimates in the IFs system. Because of the proximity of these two point estimates under conflict, as well as the dearth of reliable time series estimation, we make no further calibration to the WASH sector for the duration of conflict. Owing to a very ambitious recovery, water and sanitation access improvements are slowed by 20 per cent over 5 years (starting in 2026) in the Fragmented Recovery scenario.

NUTRITION

We benchmarked model projections under conflict years on the prevalence of severe acute malnutrition (SAM) in the population, as well as child undernutrition, and use prevalence of undernutrition data from FAO for undernutrition in the wider population. SAM estimates from the model years match UNICEF (2019) estimates from the years 2016 – 2018.

FAO (2019) estimates prevalence of undernutrition values to 2017, with a three-year moving average applied to the time series to smooth data. IFs projections of child undernutrition are slightly conservative compared to FAO data, but prior calibration rounds of the model result in less than a 10 per cent difference in 2017 between the point estimates of undernutrition headcount in Yemen. For child malnutrition estimates, IFs is slightly conservative as well – Eshaq et al. (2017) report that child malnutrition stood at 50 per cent of the child population, while IFs reports 48.5 per cent for the same year. This suggests that, while IFs is slightly conservative across both measures for initial years, internal dynamics for projection years are in line with data collected.

GOVERNMENT FINANCE

We made adjustments to year-on-year values of government revenues (central plus local) in order to more closely reflect estimates of government revenue streams (as per cent of GDP) from the World Bank (2017). Here, the World Bank estimates are used as target values in order to get year-on-year revenue flows into a more acceptable range with WDI estimates of revenues under conflict years for Yemen.

After the adjustment, revenue-constrained expenditures remained above 2017 estimates. This led us to impose an additional reduction in government expenditures, combined with a maintenance of 2014 levels of military spending, and a significant reduction in government welfare transfers due to the suspension of the Yemeni Social Welfare Fund. In the Conflict scenario, all adjustments are maintained throughout the horizon. In Fragmented Recovery, revenue and expenditure constraints are completely relaxed in 2022, allowing for revenue collection and government expenditures to recover in line with the recovery of economic production. Military and welfare transfers spending return to a fully endogenous state over a period of 10 years.

INTERNATIONAL MIGRATION

IFs initializes migration projections based on net migration rates on a country-by-country basis. Net migration rates from the UN Population Division (UNPD, 2017) World Population Prospects (WPP) are typically used within the IFs system as an exogenous series. Despite the severity of the conflict in Yemen today, most data sources continue to report net migration as negative in the country, meaning that the year-on-year inflow of immigrants exceeds the year-on-year outflow.

The numbers compiled by the World Bank's World Development Indicators for 2017 are not substantially different from the 2017 values from the UNPD WPPs 2017 revision – thus for this project we elected to default to the UNPD WPP migration rates.

8 This is distinct from people in need of basic access, which also is noted to capture those people who have access but are currently at risk of losing access.

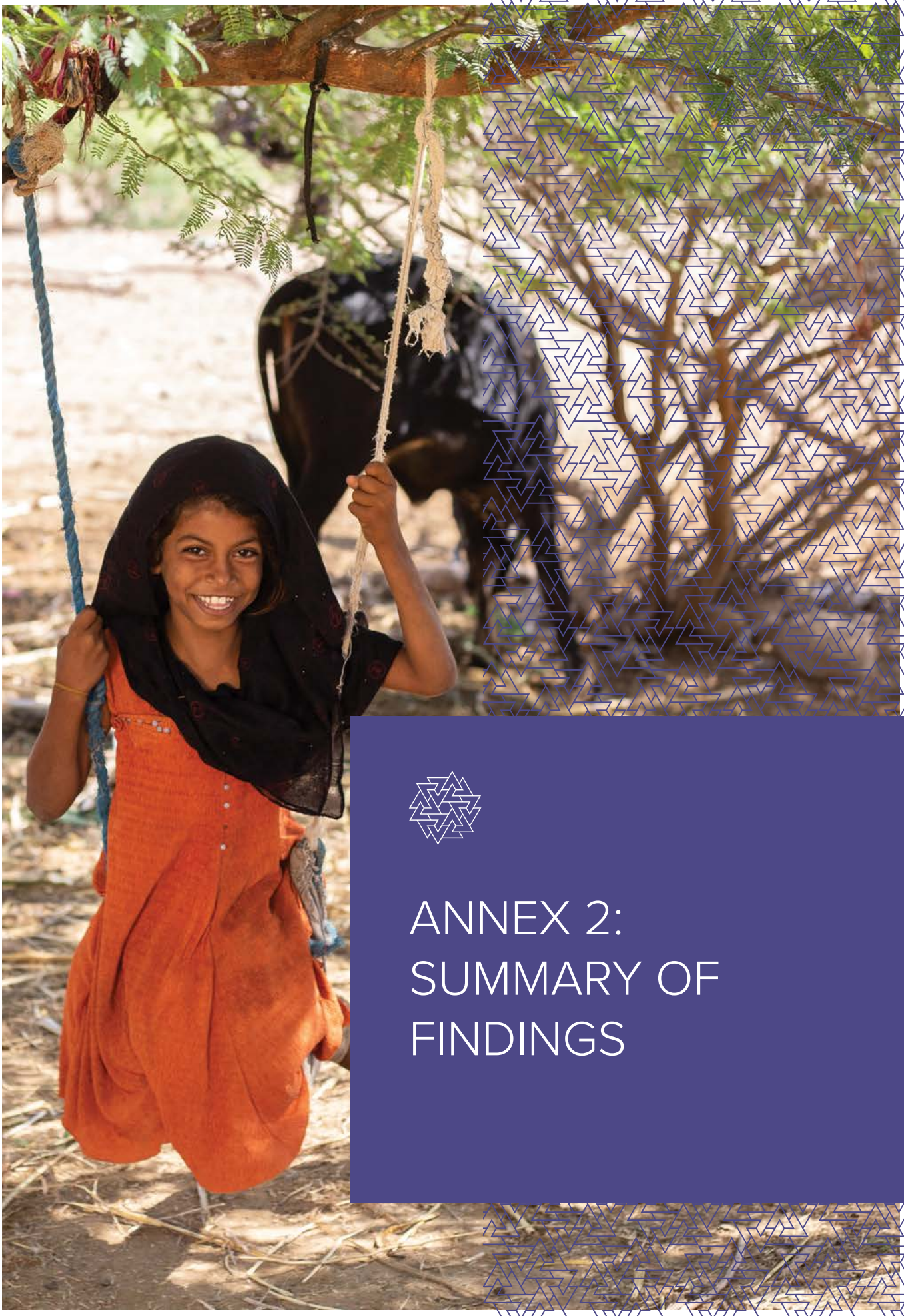
TABLE 6 | Table of interventions and their magnitudes by recovery pathway scenario.

Scenario	Intervention variable	2014	2021	2026	2030
Agriculture Investments	Calories per capita	2,136	1,727	2,305	2,482
	Agricultural imports, billion USD	3.5	2.3	5.0	6.7
	Agricultural exports, billion USD	0.34	0.17	0.40	0.55
	Agricultural yields, metric tons per hectare	2.1	2.1	2.9	3.1
	Land used for crops, million hectares	1.45	1.45	1.54	1.60
Economic Development	Total investment, billion USD	2.8	1.4	0.5	3.7
	Net foreign direct investment, per cent of GDP	0.0	0.3	3.3	3.7
	Informal labor, share of total labor	68	79	63	57
	Remittances received, per cent of GDP	9.5	15	19	22
	Household transfers, per cent of GDP	7.8	0.8	8.6	9.8
	Foreign aid, billion USD	3.1	2.3	5.5	5.6
Empowered Women	Total fertility rate	4.2	4.2	3.4	3.2
	Female labor participation rate	6.1	10	23	26
	Gross primary enrollment rate, girls	89	67	106	113
	Gross secondary enrollment rate, girls	40	23	36	61
	Ratio of female to male wages	0.74	0.74	1	1
	Gender Empowerment Measure (GEM)	0.135	0.145	0.253	0.26
Governance Quality	IFs index, probability of internal war	0.55	1.0	0.0	0.0
	Effectiveness, index	1.1	0.8	1.3	1.6
	Private spending on infrastructure, billion USD	$0.5	$0.4	$1.2	$1.6
Human Capabilities	Safe water access, per cent of population	89	71	75	87
	Improved sanitation access, per cent of population	63	49	50	58
	Electricity access, per cent of population	66	51	54	65
	Gross primary enrollment rate, total	98	77	117	116
	Gross secondary enrollment rate, total	50	28	42	69

Assumptions in the Building Block and Integrated Recovery Scenarios

Five recovery building block scenarios were constructed, reflecting different focuses of recovery efforts. Each scenario started with the assumptions in the Fragmented Recovery scenario (see above). Additional interventions were added, simulating additional advancement in key indicators. Individual interventions and their magnitudes are listed by scenario in Table 6.

The Integrated Recovery scenario combines all the interventions from the five building block scenarios into one.



ANNEX 2: SUMMARY OF FINDINGS

TABLE 7 | Calories per capita across all scenarios, 2014-2050. Source: IFs 7.67

Calories per capita									
Year	No Conflict	Conflict	Frg. Recovery	Ag. Invst.	Econ. Dev.	Emp. Women	Gov. Quality	Human Capabl.	Int. Recovery
2014	2,136	2,136	2,136	2,136	2,136	2,136	2,136	2,136	2,136
2015	2,153	2,054	2,054	2,054	2,054	2,054	2,054	2,054	2,054
2016	2,180	1,684	1,684	1,684	1,684	1,684	1,684	1,684	1,684
2017	2,194	1,692	1,692	1,692	1,692	1,692	1,692	1,692	1,692
2018	2,206	1,711	1,711	1,711	1,711	1,711	1,711	1,711	1,711
2019	2,219	1,715	1,715	1,715	1,715	1,715	1,715	1,715	1,715
2020	2,219	1,721	1,721	1,721	1,721	1,721	1,721	1,721	1,721
2021	2,231	1,727	1,727	1,727	1,727	1,727	1,727	1,727	1,727
2022	2,250	1,755	1,728	1,809	1,742	1,729	1,728	1,728	1,825
2023	2,261	1,767	1,749	1,923	1,778	1,753	1,750	1,749	1,958
2024	2,274	1,783	1,778	2,047	1,822	1,784	1,783	1,778	2,103
2025	2,289	1,799	1,807	2,173	1,867	1,816	1,815	1,807	2,256
2026	2,305	1,816	1,837	2,305	1,920	1,850	1,847	1,837	2,425
2027	2,321	1,832	1,868	2,350	1,954	1,884	1,880	1,868	2,477
2028	2,337	1,850	1,900	2,395	1,985	1,918	1,915	1,901	2,508
2029	2,354	1,868	1,934	2,439	2,016	1,952	1,950	1,935	2,537
2030	2,372	1,886	1,967	2,482	2,043	1,984	1,983	1,969	2,581
2031	2,391		1,999	2,520	2,071	2,013	2,013	2,001	2,627
2032	2,409		2,026	2,559	2,100	2,040	2,040	2,029	2,674
2033	2,426		2,052	2,601	2,132	2,068	2,068	2,056	2,723
2034	2,443		2,080	2,644	2,158	2,096	2,096	2,086	2,773
2035	2,461		2,103	2,684	2,184	2,120	2,120	2,110	2,822
2036	2,478		2,126	2,724	2,208	2,145	2,144	2,134	2,871
2037	2,496		2,149	2,760	2,233	2,171	2,167	2,159	2,916
2038	2,513		2,170	2,796	2,257	2,194	2,190	2,180	2,962
2039	2,531		2,192	2,832	2,281	2,220	2,215	2,205	3,005
2040	2,548		2,213	2,869	2,304	2,244	2,239	2,229	3,048
2041	2,566		2,235	2,903	2,326	2,268	2,263	2,254	3,086
2042	2,583		2,258	2,929	2,350	2,293	2,286	2,278	3,112
2043	2,601		2,281	2,950	2,373	2,317	2,311	2,303	3,139
2044	2,618		2,303	2,971	2,397	2,343	2,335	2,328	3,163
2045	2,635		2,326	2,993	2,420	2,368	2,359	2,353	3,188
2046	2,651		2,347	3,014	2,440	2,394	2,383	2,376	3,213
2047	2,668		2,368	3,035	2,458	2,419	2,405	2,400	3,238
2048	2,684		2,389	3,056	2,478	2,443	2,428	2,424	3,261
2049	2,700		2,411	3,076	2,498	2,466	2,450	2,447	3,286
2050	2,715		2,432	3,097	2,521	2,490	2,473	2,471	3,313

TABLE 8 | GDP per capita at purchasing power parity in 2011 US Dollars across all scenarios, 2014-2050. Source: IFs 7.67

GDP per capita at PPP, thousand USD									
Year	No Conflict	Conflict	Frg. Recovery	Ag. Invst.	Econ. Dev.	Emp. Women	Gov. Quality	Human Capabl.	Int. Recovery
2014	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
2015	3.9	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
2016	3.9	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
2017	3.9	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2018	3.9	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2019	4.0	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2020	3.7	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
2021	3.7	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
2022	3.7	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
2023	3.8	2.0	2.1	2.2	2.2	2.2	2.1	2.1	2.3
2024	3.9	2.0	2.2	2.3	2.3	2.2	2.2	2.2	2.4
2025	3.9	2.0	2.2	2.3	2.4	2.3	2.3	2.2	2.6
2026	4.0	2.0	2.3	2.4	2.5	2.4	2.4	2.3	2.8
2027	4.1	2.0	2.3	2.5	2.6	2.5	2.5	2.4	3.0
2028	4.2	2.0	2.4	2.6	2.8	2.7	2.6	2.5	3.1
2029	4.3	2.0	2.5	2.7	2.9	2.8	2.7	2.6	3.2
2030	4.5	2.0	2.7	2.8	3.0	2.9	2.8	2.7	3.4
2031	4.6		2.7	2.8	3.1	3.0	2.9	2.8	3.5
2032	4.8		2.8	2.9	3.2	3.1	3.0	2.9	3.7
2033	4.9		2.9	3.0	3.3	3.2	3.1	3.0	3.9
2034	5.1		3.0	3.1	3.5	3.3	3.2	3.1	4.1
2035	5.2		3.1	3.2	3.6	3.5	3.3	3.2	4.4
2036	5.4		3.2	3.3	3.7	3.6	3.4	3.3	4.6
2037	5.6		3.3	3.4	3.9	3.7	3.5	3.4	4.9
2038	5.8		3.4	3.5	4.0	3.9	3.7	3.5	5.1
2039	5.9		3.5	3.6	4.2	4.1	3.8	3.7	5.4
2040	6.1		3.6	3.7	4.3	4.2	3.9	3.8	5.6
2041	6.3		3.7	3.9	4.5	4.4	4.1	4.0	5.9
2042	6.5		3.8	4.0	4.6	4.5	4.2	4.1	6.2
2043	6.8		3.9	4.1	4.8	4.7	4.4	4.3	6.5
2044	7.0		4.1	4.3	5.0	4.9	4.5	4.5	6.8
2045	7.2		4.2	4.4	5.2	5.1	4.7	4.7	7.1
2046	7.4		4.3	4.6	5.3	5.4	4.9	4.8	7.5
2047	7.6		4.4	4.7	5.4	5.6	5.0	5.0	7.8
2048	7.9		4.5	4.9	5.6	5.8	5.2	5.2	8.2
2049	8.1		4.7	5.0	5.7	6.0	5.4	5.4	8.5
2050	8.3		4.8	5.2	5.9	6.2	5.6	5.6	8.9

TABLE 9 | Human Development Index (HDI) across all scenarios, 2014-2050. Source: IFs 7.6

Human Development Index (HDI)									
Year	No Conflict	Conflict	Frg. Recovery	Ag. Invst.	Econ. Dev.	Emp. Women	Gov. Quality	Human Capabl.	Int. Recovery
2014	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
2015	0.55	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
2016	0.55	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
2017	0.56	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
2018	0.56	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
2019	0.56	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
2020	0.56	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
2021	0.56	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
2022	0.57	0.47	0.48	0.48	0.48	0.48	0.49	0.48	0.49
2023	0.57	0.47	0.49	0.49	0.49	0.50	0.50	0.50	0.51
2024	0.58	0.47	0.50	0.50	0.50	0.51	0.51	0.51	0.52
2025	0.58	0.47	0.50	0.51	0.51	0.52	0.51	0.52	0.54
2026	0.58	0.47	0.51	0.52	0.52	0.54	0.52	0.54	0.55
2027	0.59	0.47	0.52	0.52	0.53	0.55	0.53	0.55	0.57
2028	0.59	0.48	0.53	0.53	0.54	0.56	0.54	0.56	0.58
2029	0.60	0.48	0.53	0.54	0.55	0.57	0.54	0.57	0.59
2030	0.60	0.48	0.54	0.54	0.56	0.57	0.55	0.58	0.60
2031	0.60		0.55	0.55	0.56	0.58	0.56	0.58	0.60
2032	0.61		0.55	0.56	0.57	0.59	0.56	0.59	0.61
2033	0.61		0.56	0.56	0.57	0.60	0.57	0.60	0.62
2034	0.62		0.56	0.57	0.58	0.60	0.57	0.60	0.63
2035	0.62		0.57	0.57	0.59	0.61	0.58	0.61	0.64
2036	0.63		0.57	0.58	0.59	0.62	0.58	0.61	0.64
2037	0.63		0.58	0.58	0.60	0.62	0.59	0.62	0.65
2038	0.63		0.58	0.59	0.60	0.63	0.59	0.63	0.66
2039	0.64		0.59	0.59	0.61	0.64	0.60	0.63	0.66
2040	0.64		0.59	0.60	0.61	0.64	0.61	0.64	0.67
2041	0.65		0.60	0.60	0.62	0.65	0.61	0.64	0.68
2042	0.65		0.60	0.61	0.62	0.66	0.62	0.65	0.69
2043	0.66		0.61	0.61	0.63	0.66	0.62	0.66	0.69
2044	0.66		0.62	0.62	0.64	0.67	0.63	0.66	0.70
2045	0.66		0.62	0.62	0.64	0.67	0.63	0.67	0.71
2046	0.67		0.63	0.63	0.65	0.68	0.64	0.68	0.71
2047	0.67		0.63	0.63	0.65	0.69	0.65	0.68	0.72
2048	0.68		0.64	0.64	0.66	0.69	0.65	0.69	0.73
2049	0.68		0.64	0.65	0.66	0.70	0.66	0.69	0.73
2050	0.68		0.65	0.65	0.67	0.71	0.66	0.70	0.74

TABLE 10 | Population experiencing malnutrition in millions across all scenarios, 2014-2050. Source: IFs 7.67

Malnourished population in millions									
Year	No Conflict	Conflict	Frg. Recovery	Ag. Invst.	Econ. Dev.	Emp. Women	Gov. Quality	Human Capabl.	Int. Recovery
2014	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
2015	8.2	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
2016	8.1	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
2017	8.2	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
2018	8.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
2019	8.4	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
2020	8.7	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
2021	8.8	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4
2022	8.8	17.3	17.8	16.2	17.6	17.8	17.8	17.8	15.9
2023	8.9	17.5	17.9	14.4	17.3	17.8	17.9	17.9	13.8
2024	9.0	17.7	17.8	12.5	16.9	17.7	17.7	17.8	11.6
2025	9.0	17.9	17.7	10.8	16.4	17.5	17.6	17.7	9.5
2026	9.1	18.0	17.6	9.1	15.8	17.2	17.4	17.6	7.5
2027	9.1	18.1	17.4	8.7	15.5	16.9	17.1	17.4	7.1
2028	9.1	18.2	17.2	8.3	15.3	16.6	16.8	17.1	6.9
2029	9.2	18.3	16.9	8.0	15.1	16.3	16.5	16.9	6.8
2030	9.2	18.4	16.6	7.7	15.0	16.0	16.3	16.5	6.5
2031	9.1		16.3	7.4	14.8	15.8	16.0	16.3	6.2
2032	9.1		16.2	7.2	14.6	15.6	15.9	16.1	5.9
2033	9.1		16.0	6.9	14.3	15.3	15.7	15.9	5.6
2034	9.1		15.8	6.6	14.1	15.1	15.5	15.7	5.3
2035	9.1		15.7	6.3	14.0	15.0	15.3	15.5	5.0
2036	9.1		15.6	6.1	13.8	14.8	15.2	15.4	4.7
2037	9.1		15.5	5.9	13.7	14.6	15.1	15.2	4.5
2038	9.0		15.4	5.7	13.5	14.5	14.9	15.1	4.3
2039	9.0		15.3	5.5	13.4	14.3	14.8	15.0	4.1
2040	9.0		15.2	5.3	13.2	14.1	14.6	14.8	3.9
2041	9.0		15.1	5.1	13.1	13.9	14.4	14.6	3.8
2042	8.9		14.9	5.0	13.0	13.7	14.3	14.4	3.7
2043	8.9		14.8	5.0	12.8	13.5	14.1	14.2	3.6
2044	8.9		14.6	4.9	12.6	13.3	13.9	14.0	3.5
2045	8.8		14.5	4.9	12.5	13.1	13.7	13.8	3.5
2046	8.8		14.4	4.8	12.4	12.8	13.6	13.6	3.4
2047	8.8		14.2	4.8	12.3	12.6	13.4	13.5	3.3
2048	8.7		14.1	4.7	12.3	12.4	13.3	13.3	3.3
2049	8.7		14.0	4.7	12.2	12.2	13.1	13.1	3.2
2050	8.7		13.9	4.7	12.0	12.0	13.0	12.9	3.2

TABLE 11 | Population experiencing extreme poverty (living on less than US$ 1.90 per day in 2011 USD) in millions across all scenarios, 2014-2050. Source: IFs 7.67

Population in extreme poverty, millions									
Year	No Conflict	Conflict	Frg. Recovery	Ag. Invst.	Econ. Dev.	Emp. Women	Gov. Quality	Human Capabl.	Int. Recovery
2014	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
2015	3.7	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
2016	3.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
2017	3.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
2018	3.7	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
2019	3.8	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
2020	4.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
2021	4.4	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
2022	4.2	20.5	20.4	20.3	20.1	20.4	20.4	20.4	19.8
2023	4.0	21.1	20.5	20.1	19.7	20.3	20.4	20.5	19.1
2024	3.8	21.5	19.9	19.3	18.7	19.5	19.6	19.9	17.6
2025	3.6	22.1	19.6	18.7	17.9	18.9	19.2	19.6	16.1
2026	3.5	22.6	19.0	17.7	16.4	17.9	18.5	18.9	13.8
2027	3.3	23.1	18.3	17.1	15.5	16.8	17.6	18.2	12.7
2028	3.1	23.7	17.3	16.2	14.5	15.5	16.5	17.2	11.4
2029	2.8	24.3	16.2	15.1	13.4	14.2	15.2	16.0	10.2
2030	2.6	24.8	15.0	13.8	12.4	12.7	13.9	14.6	9.1
2031	2.5		13.5	12.4	11.4	11.0	12.4	13.0	8.1
2032	2.5		13.1	11.8	11.3	10.6	11.9	12.5	7.7
2033	2.5		12.7	11.3	11.1	10.4	11.8	12.0	7.1
2034	2.5		12.4	10.8	10.6	10.1	11.6	11.7	6.4
2035	2.4		12.2	10.4	9.9	9.8	11.3	11.3	5.7
2036	2.3		11.9	10.1	9.4	9.3	11.0	10.9	5.1
2037	2.2		11.6	9.8	8.9	8.7	10.6	10.5	4.5
2038	2.1		11.2	9.5	8.4	8.2	10.2	10.0	4.0
2039	2.0		10.9	9.3	8.0	7.7	9.7	9.5	3.6
2040	1.9		10.6	9.0	7.6	7.2	9.3	9.0	3.2
2041	1.8		10.3	8.7	7.2	6.8	9.0	8.6	2.9
2042	1.7		10.1	8.5	6.8	6.5	8.7	8.3	2.6
2043	1.7		9.9	8.4	6.3	6.2	8.5	8.0	2.2
2044	1.6		9.7	8.3	5.9	6.0	8.3	7.7	1.9
2045	1.5		9.6	8.2	5.4	5.8	8.1	7.4	1.7
2046	1.4		9.4	8.0	4.9	5.6	7.8	7.1	1.5
2047	1.4		9.3	7.8	4.4	5.4	7.6	6.8	1.3
2048	1.3		9.2	7.6	4.0	5.1	7.4	6.5	1.1
2049	1.2		9.0	7.4	3.6	4.8	7.1	6.2	1.0
2050	1.1		8.8	7.1	3.4	4.6	6.8	5.9	0.9

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