PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIAMINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

University of 8 Mai 1945- Guelma — **جامعة 08 ماي1945- قالمة**

Faculty of Letters and Language — **كلية الداب و اللغات**

Department of Letters and English Language — **قسم الاداب و اللغة الانجليزية**

Master Dissertation (Civilization)

The Treaty on the Prohibition of Nuclear Weapons and its Implications for Sustainable Development

A Dissertation Submitted to the Department of Letters and English Language in Partial Fulfillment of the Requirements of Master's Degree in Language and Culture

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June 2024

Acknowledgments

We would like to express our deepest gratitude and appreciation to all those who have contributed to the completion of our dissertation. First and foremost, we are immensely grateful to our supervisor, Dr Abdelkrim Dekhakhena, for his invaluable guidance throughout this journey. His expertise, patience, and constructive feedback have been instrumental in shaping our research. We would like to express our heartfelt gratitude to our family and friends for their love, encouragement, and understanding. Their continuous support, both emotionally and intellectually, has been a constant source of motivation for us. Last but not least, we would like to acknowledge the countless researchers, authors, and scholars whose works have served as valuable sources of knowledge and inspiration. In the end thank you all once again for your invaluable contributions and for being part of our academic journey.

Dedication 1

I humbly begin this dedication by acknowledging the blessings and guidance bestowed upon me by Allah. It is with utmost gratitude that I dedicate my research to my parents and siblings, who supported me in my academic pursuits.

To my parents, thank you for always being there for me. I hope I continue to make you proud in all my future endeavors.

To my little family, thank you for being a constant source of strength and care. I am grateful for your unwavering presence in my life.

Dafer Oussama

First and foremost, we would like to thank God Almighty for granting me with health and strength, and opportunity to arrive at this moment. We pray that his grace will always be upon us.

This dissertation is dedicated to each and every individual who have supported me and believed in me throughout this challenging endeavor.

Dear parents! Your unwavering encouragement and belief in my abilities have been the driving force behind my success. Thank you for standing by me and being a constant source of motivation.

Boufrida Nedjemeddine

Abstract

This dissertation analyzes the 2017 UN Treaty on the Prohibition of Nuclear Weapons (TPNW) and its potential impacts on global efforts to achieve Sustainable Development Goals (SDGs) related to poverty, health, inequality, environment, and peacebuilding. It argues that nuclear disarmament as called for in the TPNW can facilitate sustainable development, despite the lack of an explicit linkage in the treaty text itself. Through textual analysis and data on resource reallocation, climate impacts, and development indicators, the study demonstrates that nuclear weapons pose immense barriers to SDG targets across themes of economic growth, clean energy, gender equality, reduced hazards, and strong institutions. The study then explores the tensions between the TPNW and the United States' long-standing nuclear deterrence policy, considering the challenges and opportunities presented by the treaty. Through a detailed case study of US nuclear policy, the research investigates potential areas of conflict and possible paths for reconciliation between the TPNW's disarmament goals and the perceived security benefits of nuclear deterrence. The dissertation concludes by evaluating implementation challenges while affirming complementarity between the TPNW's prohibition framework and poverty reduction, good health/environmental wellbeing, and peaceful societies – amidst resistance from nuclear weapons states. It brings new evidence demonstrating that nuclear prohibition treaties can produce positive externalities helping realize the 2030 Agenda for Sustainable Development.

الملخص

هذه الرسالة العلمية تحلل اتفاقية الأمم المتحدة لعام 2017 بشأن حظر الأسلحة النووية وتأثيراتها المحتملة على الجهود العالمية لتحقيق الأهداف التنموية المستدامة المتعلقة بالفقر والصحة والتساوي والبيئة وبناء السلام. وتقول إن نزع السلاح النووي كما دعت إليه اتفاقية حظر الأسلحة النووية يمكن أن يسهم في التنمية المستدامة، على الرغم من عدم وجود ربط صريح في نص الاتفاقية نفسه. من خلال تحليل النصوص والبيانات حول إعادة توجيه الموارد وتأثيرات التغير المناخي ومؤشرات التنمية، تظهر الدراسة أن الأسلحة النووية تشكل عقبات هائلة أمام تحقيق أهداف الأجندة العالمية للتنمية المستدامة عبر مواضيع النمو الاقتصادي والطاقة النظيفة والمساواة بين الجنسين وتقليل المخاطر والمؤسسات القوية. ثم تستكشف الدراسة التوترات بين معاهدة حظر الأسلحة النووية وسياسة الردع النووي التي تنتهجها الولايات المتحدة منذ فترة طويلة، مع الأخذ في الاعتبار التحديات والفرص التي توفرها المعاهدة. ومن خلال دراسة حالة تفصيلية للسياسة النووية الأمريكية، يبحث البحث في مجالات الصراع المحتملة والمسارات الممكنة للتوفيق بين أهداف نزع السلاح في معاهدة حظر الأسلحة النووية والفوائد الأمنية المتصورة للردع النووي. . وتختتم الرسالة بتقييم التحديات التي تواجه التنفيذ مع تأكيد التكامل بين إطار حظر اتفاقية حظر الأسلحة النووية والحد من الفقر والصحة الجيدة / الرفاهية البيئية والمجتمعات السلمية - في وسط مقاومة من الدول النووية. وتأتي بأدلة جديدة تظهر أن اتفاقيات حظر الأسلحة النووية يمكن أن تنتج آثار إيجابية تساعد على تحقيق أجندة التنمية المستدامة لعام 2030.

Table of Content

Introduction.....1

Chapter One: The TPNW and Sustainable Development Goals.....4

1. The Treaty on the Prohibition of Nuclear Weapons (TPNW).....4

1.1 Relevance to Sustainable Development.....5

2. Sustainable Development Goals(SDGs).....6

2.1 The TPNW and Sustainable Development.....9

3. Sustainable Development and Interlinkages:.....12

Chapter Two: Public Spending Tradeoffs.....15

1. Historical Overview on Public Spending on Nuclear weapons.....16

1.1 Evolution of Public Spending on Nuclear Weapons.....16

1.2 The Impact of Public Spending on Nuclear Weapons on The National Budget.....20

2. Economic and Social Implications on Nuclear Weapons.....20

2.1 Opportunity Costs Weapons Vs UN and Related Programs.....21

2.2 Opportunity Cost.....22

Chapter Three: Assessing the Harm of Nuclear Weapons: Health, Environmental, and Social Impacts.....26

1. Health Impacts of Nuclear Weapons.....26

1.1Historical Nuclear Disasters and their Long-term Health Consequences:.....27

1.2 Long Term Effects Of the Nuclear Disaster.....27

2. Radiation Exposure and its Effects on Human Health.....28

2.1 Causalities.....28

2.2 Cancer.....28

2.3 Genetic Mutation 30

2.4 Blood Disorders 30

2.5 Psychological Effects.....31

3. Environmental Impacts of Nuclear Weapons 31

3.1Climate Change.....32

3.2 Contamination.....32

4. The Long-Term Effects of Nuclear Testing and Accidents on Ecosystems and Wildlife.....33

4.1 Atmospheric Effects.....33

4.2 Spread of Diseases 34

4.3 Effects on Wildlife.....34

5. Human Rights and Ethical Considerations 34

5.1 The TPNW and the Right to Life.....35

5.2The TPNW, Peace and Security.....35

6.The Ethical Implications of Nuclear Disarmament and the Protection of Future Generations ..36

Chapter Four: Implementing Prohibition in a Nuclear World Order and Pathways for Disarmament Dividends. 38

1. The Implementation of the TPNW 39

1.1 Approaches to Universalization with non-Nuclear-Armed States.....39

1.2 International Implementation.....45

2. Challenges.....52

2.1 Challenge 1: Lack of Standardization.....52

2.2 Challenge 2: Capacity and Resources.....53

2.3 Challenge 3: International Assistance.....53

3. Pathways or Disarmament Dividends.....53

3.1 Resource Reallocation 54

3.2 Long-term Sustainability 55

3.3 Peace and Security 56

3.4 Technological Innovation Driving Economic Growth and Global Development 58

3.5 Nuclear Disarmament Initiatives to Promote International Peace and Security.....58

3.6 Diplomatic Opportunities.....60

Conclusion 64

Appendix.....66

Work Cited 73

List of Abbreviations and Acronyms

ART	Antiretroviral therapy
BTWC	Biological and Toxin Weapons Convention
CCM	Convention on Cluster Munitions
CSA	Comprehensive Safeguards Agreement
CTBTO	The Comprehensive Nuclear-Test-Ban Treaty Organization
CWC	Chemical Weapons Convention
DNA	Deoxyribonucleic Acid
FAO	The Food and Agriculture Organisation
IAEA	International Atomic Energy Agency
ICAN	International Campaign to Abolish Nuclear Weapons
ICCPR	International Covenant on Civil and Political Rights
ICRC	International Committee of the Red Cross
IHL	International Humanitarian Law
ISU	Implementation Support Unit
LTBT	Limited Test Ban Treaty
MBT	Mine Ban Treaty
MDGs	Millennium Development Goals
NASEM	the National Academies of Sciences, Engineering, and Medicine.
NATO	North Atlantic Treaty Organization
NDRT	Nuclear Disarmament and Non-proliferation Treaty

NGO	Non-Governmental Organization
NNSA	The National Nuclear Security Administration
NNWS	Non-Nuclear Weapon States
NPT	Non-Proliferation Treaty
NWC	Nuclear Weapons Complex
NWFZ	Nuclear-Weapon-Free Zone
OECD	Organisation for Economic Co-operation and Development
PTSD	Post-Traumatic Stress Disorder
SDGs	Sustainable Development Goals
SIPRI	Stockholm International Peace Research Institute
START	Strategic Arms Reduction Treaty
TPNW	The Treaty on the Prohibition of Nuclear Weapons
UHC	Universal Health Coverage
UN	United Nation
UNICEF	United Nations Children's Fund
UNODA	United Nations Office for Disarmament Affairs
WHO	World Health Organization
WMD	Weapons of Mass Destruction

List of Tables and Figures

Fig.1. Nuclear weapons spending of the world's nuclear armed countries 2022 19

Fig.2. Annual nuclear weapons spending by country.....22

Table 1. Summary of findings* to date on Chernobyl fallout and cancer risk following the 1986 nuclear power plant accident 29

Introduction

The atomic age began with the end of World War II, when several states started the nuclear arms race. In the early years of the Cold War, nations such as the US, USSR, UK, France, China, and the US became nuclear powers due to the synergistic effects of geopolitics and the absence of effective international disarmament measures.The use of nuclear weapons enhances national security by enabling the country to confront particular dangers, accomplish particular policy objectives, show its strength, and maintain individual freedom of action.

One of the remarkable treaties is the Treaty on the Prohibition of Nuclear Weapons (TPNW), it entered into force on 22 January 2021, and its main objective is banning nuclear arming of all states of the world in the efforts to end full range of activities related to nuclear weapons, such as developing, testing, producing, manufacturing, acquiring, possessing or stockpiling nuclear weapons. Due to its strong connection to the Sustainable Development Goals (SDGs) and its foundation in humanitarian and environmental concerns around nuclear weapons, this treaty also helps to accomplish the SDGs.

Despite the lack of an explicit linkage in the treaty text itself, this research is significant because it shows how nuclear disarmament as called for in the TPNW can facilitate sustainable development and contribute to the achievement of Sustainable Development Goals (SDGs) related to poverty, health, inequality, environment, and peace building. The study also intends to supply academics with resources on a highly relevant field of study.

This study explores the TPNW, the SDGs, sustainable development, and the connections among them in great detail. It also seeks to provide data and tables for the analysis of various government expenditures on nuclear weapons. Along with ethical considerations surrounding their use, this research also presents the devastating effects of nuclear weapons on human health and the environment through a historical example of a nuclear explosion and its aftermath.

This study discusses the challenges faced in calling for disarmament to achieve global stability and security, as well as the challenges the treaty faced during its national implementation. The topic's investigative nature suggests that both qualitative and quantitative methods will be used in the research. First, the qualitative approach entails textual analysis of relevant official documents such as UN resolutions and reports, as well as the TPNW and SDG frameworks. Finding the points of convergence and divergence is the aim. Using analysis of economic, health, climate, and conflict datasets, the comparative method is employed within this methodological framework to statistically investigate potential development dividends from nuclear disarmament called for in the TPNW.

This research is divided into six major parts, a general introduction, four main chapters, and a general conclusion. The first chapter’s title is “The TPNW, SDGs and Sustainable development” it is about addressing a general overview of the treaty on prohibiting nuclear weapons, sustainable development, the sustainable development goals and the linkages between them. The second chapter, entitled “public spending tradeoffs” explores and examines the expenditure of public funds by governments at various levels focusing on nuclear weapons field. The third chapter “Assessing the Harm of Nuclear Weapons: Health, Environmental, and Social Impacts” discusses the

effects of utilizing nuclear weapons on people's health, the environment, and historical examples of nuclear explosions and their aftermath.

The forth chapter titled “Implementing Prohibition in a Nuclear World Order and Pathways for Disarmament Dividends “discusses the steps taken toward implementing the treaty and stats parties position toward ratifying it.

Chapter One

The TPNW and Sustainable Development Goals

In 2017, the United Nations held conference to negotiate the issue of nuclear weapons, and later, they came to prohibit the use of these deadly weapons. The meeting took place in New York from March 27 to March 31 and from June 15 to July 7. This conference was about The Treaty on the Prohibition of Nuclear Weapons (TPNW), which includes a set of prohibitions on engaging in any nuclear activity, including the use, development, production, stockpiling, transfer, and threat of nuclear weapons under international law (United Nations, Nuclear Disarmament).

The Sustainable Development Goals (SDGs) are a pressing request for action in a global partnership from all nations, developed and developing. They understand that eradicating poverty and other forms of deprivation requires concerted efforts to combat climate change, protect seas and forests, enhance health and education, lower inequality, and promote economic growth (United Nations, Sustainable Development Goals).

This chapter briefly reviews the TPNW and the SDGs, along with their goals, successes, and difficulties. It also covers how the TPNW and SDGs are related and how implementing them would help make the world safer, more sustainable, and more fair for present and future generations.

1. The Treaty on the Prohibition of Nuclear Weapons (TPNW)

The Treaty on the Prohibition of Nuclear Weapons (TPNW) is an international agreement founded by non-nuclear weapon states(NNWS), with the aim of nuclear disarmament and

prohibiting the use of these deadly weapons by focusing on the devastating consequences on human life and also weakening sustainable development efforts worldwide (International Peace Institute).

Adopted by the United Nations in 2017, approximately 50 nations adopted it; only the Netherlands opposed it, and Singapore abstained. Nine countries with nuclear weapons, namely the United States, Russia, the United Kingdom, China, France, India, Pakistan, North Korea, and Israel, were notably absent during the negotiations. After a long debate and prolonged ratification, the TPNW entered into force on January 22, 2021, with only 59 countries ratifying it out of 86 signatory countries. All ratifying countries are non-nuclear weapon states(NNWS), where the majority are developing countries (Soeparna 32).

1.1 Relevance to Sustainable Development

A commitment to the SDGs is incompatible with the development, use, or possession of nuclear weapons or the reliance on nuclear deterrence. The Treaty has a close connection to the SDGs because it was based on humanitarian concerns regarding nuclear weapons. With its emphasis on human security, peace and safety, and indigenous rights (Hunt 2).

1.1.1 Peace and Security

Global peace and security would be achieved when states avoid escalating their conflict into a nuclear war, which is important for maintaining a developed and sustainable world. In order to prevent nuclear proliferation, state parties are credibly assured by Articles 2 and 3 of the TPNW that they should not convert nuclear materials into nuclear weapons. According to these publications, the benefit of nuclear openness will primarily provide a secure atmosphere. It also

plays a significant role in maintaining world peace. By putting Articles 2 and 3 of the TPNW into effect, state parties should be expected to fulfill their commitment to prevent the presence of nuclear weapons in a world that is sustainable and peaceful. States should avoid escalating conflicts into nuclear war, even when it may not be possible or desirable to have a world free of conflicts (Soeparna 38).

1.1.2 Humanitarian Concerns

Long-term harm to individuals, socioeconomic deterioration, health destruction, and food poverty is likely to be avoided if there are no nuclear weapons in the world. The preamble and Article 6 of the TPNW both reiterate this goal. The preamble states that the use of a catastrophic nuclear weapon would have a disproportionately negative effect on women and girls and would have serious ramifications for human survival, socioeconomic development, the global economy, food security, and future generations' health. States are therefore required to ensure that nuclear weapons are never deployed (Soeparna 37).

2. Sustainable Development Goals(SDGs)

In order to guarantee a brighter future for everybody, the Sustainable Development Goals (SDGs) seek to balance economic, social, and environmental factors. The United Nations approved these 17 interrelated goals in 2015 to replace the Millennium Development Goals. The SDGs are centered on eradicating poverty, safeguarding the environment, and advancing universal peace and prosperity (United Nations, Sustainable Development Goals). Accroding to the United Nations, these SDGs are:

1-No Poverty: Ensuring that everyone has access to basic resources and opportunities helps reduce conflicts arising from inequality and scarcity.

2-Zero Hunger: Ensuring food security for all not only prevents conflicts over resources but also fosters a more stable and healthy society.

3-Good Health and Well-being: Promoting health and well-being helps create a more resilient and peaceful society by reducing the burden of diseases and enabling people to live better lives.

4-Quality Education: Providing equal access to quality education empowers individuals, reduces ignorance, and fosters understanding among different communities, contributing to peaceful coexistence.

5-Gender Equality: Ensuring equal rights and opportunities for women and men helps create a more harmonious society where everyone's potential is utilized and conflicts due to gender disparities are minimized.

6-Clean Water and Sanitation: Ensuring access to clean water and sanitation reduces the risk of diseases and conflicts over scarce resources, contributing to a more peaceful environment.

7-Affordable and Clean Energy: Promoting sustainable energy sources helps protect the environment and reduces dependence on non-renewable resources, which can be sources of conflict.

8-Decent Work and Economic Growth: Creating job opportunities and promoting economic growth helps alleviate poverty and reduces the likelihood of conflicts arising from economic disparities.

9-Industry, Innovation, and Infrastructure: Encouraging sustainable industries and infrastructure fosters economic growth and reduces the risk of conflicts over resources.

10-Reduced Inequalities: Addressing inequalities within and among countries promotes social cohesion and helps prevent conflicts arising from social and economic disparities.

11-Sustainable Cities and Communities: Developing sustainable urban areas and promoting inclusive communities reduces the pressure on resources and minimizes conflicts over limited space and resources.

12-Responsible Consumption and Production: Encouraging sustainable consumption and production patterns helps preserve natural resources and reduces the risk of conflicts arising from resource scarcity.

13-Climate Action: Combating climate change and its impacts promotes global cooperation and helps prevent conflicts related to environmental degradation and extreme weather events.

14-Life Below Water and Life on Land: Protecting marine and terrestrial ecosystems ensures the well-being of humans and other species, reducing the likelihood of conflicts over resources and habitats.

15-Peace, Justice, and Strong Institutions: Strengthening democratic institutions, access to justice, and the rule of law contributes to a more peaceful and stable society where conflicts are resolved through dialogue and cooperation.

16-Partnerships for the Goals: Encouraging collaboration among governments, civil society, and the private sector fosters a spirit of unity and shared responsibility, which is essential for sustainable peace.

17-Revitalize Global Partnerships: Building strong and inclusive partnerships at the global level helps address common challenges, promotes mutual understanding, and reduces the risk of conflicts among nations (United Nations, Sustainable Development Goals).

2.1 The TPNW and Sustainable Development

The TPNW and the SDGs share common goals to achieve a better, safer, and prosperous world from which everyone will benefit. The two interconnected agreements address the same challenges facing the world and work on eliminating them to get the most out of the benefits they both provide.

Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture: Even a minor nuclear conflict might put over 2 billion people in danger of starvation. Enough soot from massive fires would be released into the atmosphere to obstruct the sun's light and warmth, chilling the planet and ruining agriculture. The areas currently experiencing a scarcity of food and water would be the most severely impacted. A nuclear famine would also cause widespread relocation and the establishment of camps for refugees across Africa (“The TPNW and the SDGs,” International Campaign to Abolish Nuclear Weapons).

Goal 3: Ensure healthy lives and promote well-being for all at all ages: Nuclear weapons detonation would result in immediate health impacts, including deafness and burns. Medical and municipal services would either cease to exist entirely or cease to operate. Africa would be overrun by outbreaks of radiation illnesses, cholera, typhus, malaria, plague, and other skin diseases, in addition to the expansion of Ebola ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 5: Achieve gender equality and empower all women and girls: women and girls would be disproportionately affected by ionizing radiation from a nuclear bomb assault. Fears of reproductive issues have also resulted in discrimination and stigma against female atomic bomb survivors ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 6: Ensure availability and sustainable management of water and sanitation for all: Leading climate scientists discovered in a 2019 study that a limited nuclear war may also result in a sharp drop in precipitation, one so severe that China and India would go without rain for nearly ten years. Furthermore, a nuclear weapon detonation would contaminate water resources, and radioactive waste pollution at nuclear weapons installations poses a hazard to adjacent water sources ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 10: Reduce inequality within and among countries: It is fundamentally unfair for a few states to possess nuclear weapons at the expense of global safety and security. Testing of nuclear weapons has disproportionately affected indigenous people and their territory ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 11: Make cities and human settlements inclusive, safe, resilient, and sustainable: In the early wake of a nuclear weapons explosion in a populated area, there is little capability for humanitarian relief. A nuclear bomb blow would completely destroy a metropolis, and nuclear fires would quickly combine to consume the city. Historically, towns and cities have been the targets of nuclear weapons ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 13: Take urgent action to combat climate change and its impacts. Significant global climatic impacts, including ozone depletion in the stratosphere, would result from a limited nuclear war. A more widespread nuclear conflict may cause the earth's temperature to drop by up to 10°C, triggering a catastrophic ice age that might wipe out all life ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 14: Conserve the oceans, seas and marine resources for sustainable development: A limited nuclear conflict might result in a 1-3 °C drop in global ocean temperatures as well as a 5–15% decrease in net primary productivity ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 15: Protect, restore, and promote sustainable use of terrestrial ecosystems; sustainably manage forests, combat desertification, and halt and reverse land degradation; and halt biodiversity loss: Apart from the enduring effects of radiation at Hiroshima and Nagasaki, other accounts exist of dangerous pollution at nuclear weapons manufacturing plants and testing grounds. A small-scale nuclear conflict may cause a 15–30% decrease in net primary production on land ("The TPNW and the SDGs," International Campaign to Abolish Nuclear Weapons).

Goal 16: Peace, Justice, and Strong Institutions: Peace is obviously threatened by the nuclear arsenals' prolonged presence, modernization, and growing likelihood of use. By mandating victim assistance and environmental restoration for individuals and locations impacted by the use and testing of nuclear weapons, the TPNW advances justice. By fortifying the international legal disarmament framework and mandating that all state parties follow the treaty domestically, the TPNW advances the rule of law (“The TPNW and the SDGs,” International Campaign to Abolish Nuclear Weapons).

3. Sustainable Development and Interlinkages:

The TPNW recognizes that nuclear weapons have a huge, devastating impact on the environment, socioeconomic development, and the global economy, which are important to the 2030 Agenda, also known as the SDGs. Thus, the TPNW contributions will help achieve these achievements by working toward solving these issues.

Article number 1 of the treaty, which is about the core prohibitions, including the prohibition of production, transfer, stockpiling, testing, and use, has a direct connection with several SDGs, such as SDG 3, "Ensure healthy lives and promote well-being for all at all ages," SDG 6 "Ensure availability and sustainable management of water and sanitation for all," SDG 14 "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" and SDG 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" (Hunt 2; United Nations, Sustainable Development Goals).

Furthermore, the prohibition on manufacturing nuclear weapons in Article 1(a) will limit the financial and scientific dedication to it, resulting in a reduction in the amount of money spent on nuclear weapons, which could free up funds and resources for the Sustainable Development Goals and its progress. Including SDG 1 "End poverty in all its forms everywhere", SDG 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" and SDG 10 "Reduce inequality within and among countries" in particular. Furthermore, shifting funds from producing and maintaining nuclear weapons could easily contribute to SDG 17 "Partnership for the Goals" (Hunt 3; United Nations, Sustainable Development Goals).

Moreover, the implementation of environmental remediation, which is mentioned in article 6(2), will most likely affect SDGs 14—Life Below Water—and 15—Life on Land—because efforts to remove pollution from land and the ocean could potentially repair harmed ecosystems (Hunt 3; United Nations, Sustainable Development Goals).

Finally, Article 7's provisions on international cooperation echo SDG 17 (Strengthen the means of implementation and revitalize the global partnership for sustainable development).

In the end, the TPNW and the Sustainable Development Goals (SDGs) overlap in many areas. Implementing the TPNW can assist in achieving the SDGs. The persistence of nuclear weapons threatens the world's progress toward the Sustainable Development Goals, as recent history has demonstrated the massive explosions in Hiroshima and Nagasaki that left hundreds of thousands of innocent people dead or injured. Although since 1945, no weapon has been used in battle, banning a weapon is the most effective way to get rid of it. Thus, working on eliminating them is the top priority of the whole world as it helps make progress towards the SDGs and promotes peace

among all nations. If the whole world is genuinely committed to the SDGs, then steps should be taken towards the elimination of nuclear weapons, starting with signing and ratifying the Treaty on the Prohibition of Nuclear Weapons and ensuring the sustainability of the world safe.

Chapter Two

Public Spending Tradeoffs

Public spending goes from the strategic spending of government money at all levels—federal, state, and local—to promoting activities viewed as indispensable to society. These are expenditures from education to provide access to quality learning and health to foster public health; via infrastructure to facilitate economic growth and provide connectivity; through defense to preserve national security; until welfare programs, where the aim is to hold up the weakest members of society. Besides, public funds are assigned to environmental protection, research and development, cultural institutions, and facilities for sports and recreation with the view of achieving sustainable development, improving quality of life, and efficiently responding to other human needs within society. In sum, public expenditure is a very important policy tool for the promotion of equity, stability, and growth of economies and societies through proper management of resources and public policy implementation (Rosen).

In the nuclear weapons field, public spending refers to the allocation of financial resources by the government towards the development, maintenance, and operation of nuclear weapon systems. These weapons are considered a crucial component of a nation's strategic defense systems, deterring potential countries from engaging in hostile actions. However, these weapons also affect global security through the catastrophic humanitarian consequences of their use. In terms of public spending on nuclear weapons, there are arguments both for and against investing in these weapons (ICAN).

The first side claims that the existence of nuclear arsenals can prevent wars and protect national interests. They also argue that nuclear weapons provide a sense of stability and security. On the other hand, critics argue that public spending on nuclear weapons comes at the expense of other economic and social needs. They suggest that resources could be allocated towards different areas such as education, health care, infrastructure, and environmental protection, benefiting citizens and promoting global welfare. Additionally, the existence of such weapons increases the risk of nuclear accidents and international use, which may have catastrophic consequences for humanity (United Nations)

1. Historical Overview on Public Spending on Nuclear weapons

Public spending on nuclear technology began with big military-oriented funding in the Second World War and the Cold War, peaking in the production of atomic bombs and installations. Military-oriented use gave way to civilian nuclear energy in the 1950s and 1960s, during which time public funding was required for the building of nuclear reactors as a supplement to electricity supply. The safety concerns following events such as Chernobyl led to tighter control and shifted investments into the fields of enhanced reactor safety and nuclear waste management. Today, as nuclear power becomes regarded as a low-carbon energy source, interest revives; with public funds, new investments in advanced reactor technologies have taken center stage. Internationally, the effort goes on with nuclear disarmament and non-proliferation (Walker).

1.1 Evolution of Public Spending on Nuclear Weapons

The evolution of public spending on nuclear weapons has seen a significant increase over the years, driven by security, economic factors, and political matters. During the Cold War, the

USSR and USA invested heavily in their nuclear arsenals, leading to a peak in spending on nuclear weapons. However, since the end of the Cold War, there has been a noticeable decrease in public spending on the production of these weapons (Gaddis).

1.1.1 Cold War Era 1945 1991

The nuclear arms race between the USA and the USSR led to a colossal run-up in public spending on nuclear activities. The research by Joseph A. Labovitz captures the colossal amount of financial investment the two nations made in beefing up their nuclear weapons arsenals. The rivalry between the two countries, which lasted for many decades, saw billions of dollars being put into developing and maintaining the nuclear capabilities in the United States and the Soviet Union.In that light, the research by Labovitz gives an idea of the colossus amount of money that the USA invested in nuclear weapons and associated programs. In fact, the United States appropriated a stunning sum of 5.7 trillion dollars toward its nuclear arsenal, evidencing the huge fiscal commitment toward strategic superiority (Labovitz).

Also, the ‘Stockholm International Peace Research Institute’ (SIPRI), published a report regarding the gigantic sums of money which the USSR committed to its military investments, especially in nuclear armament. The report from SIPRI indicates that between the years 1946 and 1991, the Soviet Union invested approximately 6.5 trillion dollars in military infrastructure, with a great share allocated to nuclear weapon development and sustenance (SIPRI).

1.1.2 Post-Cold War Period

After the break-up of the Soviet Union, there was a sea change in the world politics, mainly in terms of the cost of nuclear weapons and the policies on arms control. The two major

nuclear powers during the Cold War process, the United States and Russia, initiated a string of diplomatic efforts for reducing proliferation in nuclear weapons and reducing each other's stockpiles. Another important agreement of this period was the Strategic Arms Reduction Treaty, which imposed a limit on the number of strategic nuclear weapons possessed by the U.S. and Russia. Signed in the course of years into its different versions, START made possible huge cuts in deployed nuclear warheads and delivery systems, shaping a considerably safer international security environment. (Kimball)

The Nuclear Nonproliferation Treaty also played a very important role in preventing nuclear weapons from spreading to other countries. Through commitments to disarmament efforts and encouragement of peaceful uses of nuclear energy, signatories to the NPT sought to prevent further proliferation of nuclear weapons while encouraging international cooperation in nuclear technology (UNODA).

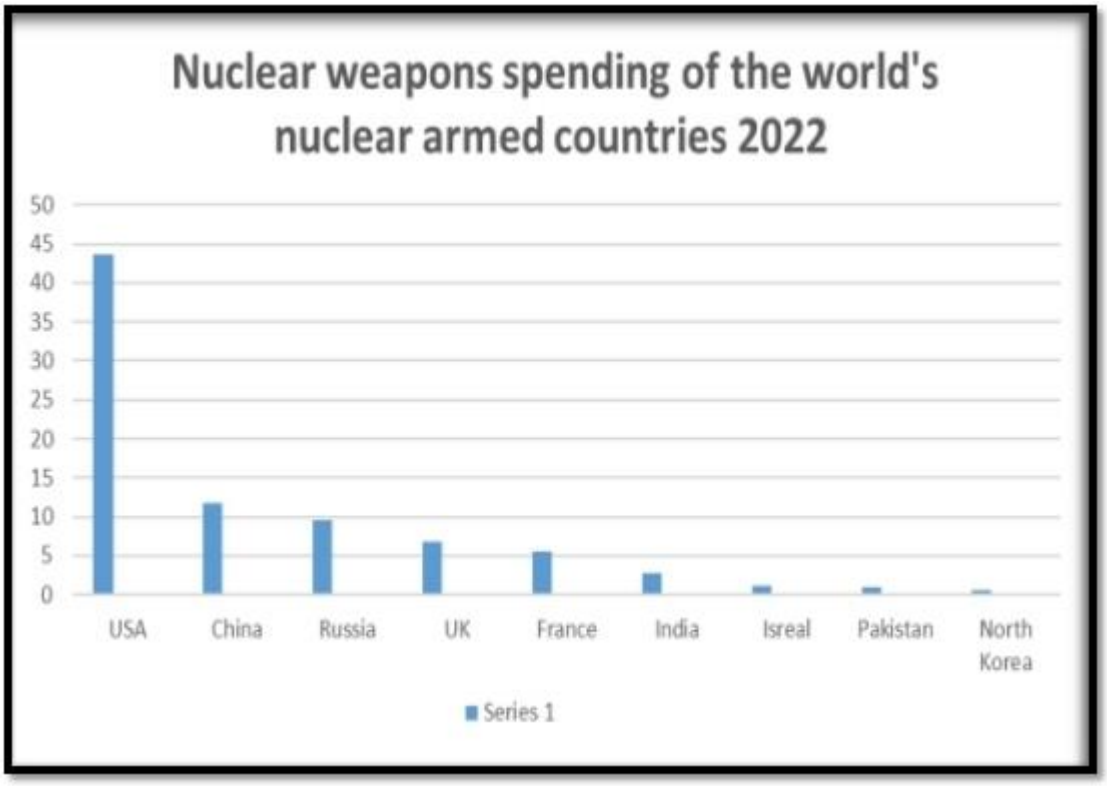
Despite such diplomatic efforts, public spending cuts generally on nuclear weapons meant that both Russia and the U.S. did not stop devoting large parts of their defense budgets to modernization and the maintenance of their nuclear arsenals. This commitment underscores the strategic importance of nuclear deterrence for their respective national security doctrines, even within the post-Cold War period (Neuneck).

1.1.3 Recent Development

Public spending on nuclear weapons has been stable in the last year for the United States and Russia, but there has been a growing ambition of other countries to develop their nuclear

arsenals, such as China, the United Kingdom, and France, leading to an increase in spending. As it is represented in Figure 1.

Fig.1. Nuclear weapons spending of the world's nuclear armed countries 2022



Source:H. Dyvik. Nuclear weapons spending of the world's nuclear armed countries 2022 December 2023. https://www.statista.com/statistics/752531/nuclear-weapons-spending-worldwide-by-country/

In 2022, the USA spent around 44 billion US dollars on nuclear weapons. As the highest country in the world, China spent the second highest amount at nearly 12 billion US dollars, while Russia spent 9.6 billion US dollars in third place. In the fourth and fifth places are the UK and France, with 6.8 billion dollars for the UK and 5.6 billion dollars for France, followed by India in

the sixth place with a spending of 2.7 billion US dollars, and Israel and Pakistan in the 7th and 8th places with a spending of 1.2 billion US dollars for Israel and 1 billion US dollars for Pakistan. North Korea spent the lowest amount of money on nuclear weapons, with a spending of around 0.59 billion US dollars.

1.2 The Impact of Public Spending on Nuclear Weapons on The National Budget

Public spending on nuclear programs has a significant impact on the national budget on the nuclear countries due to the high costs, associated with maintaining and modernizing nuclear weapons, the allowed of funds towards Nuclear weapon programs divert resources from other essential areas such as health care, infrastructure, education and social welfare programs. This can lead to an increase in national debt and reduce funding for other services that benefits the population, Furthermore, this huge funding can lead also to new arms race to begin and rise tensions between nations by this the defense expenditure of the other nuclear countries will rise creating a cycle of escalating military budgets (Snyder).

2. Economic and Social Implications on Nuclear Weapons

The economic and social implications of nuclear weapons are deep and many. Economically, huge resources are sunk into nuclear arsenals that siphon money away from much-needed social programs such as education and healthcare into the infrastructure. Far worse is that the ever-present specter of nuclear conflict keeps global stability at bay, and it acts as an infection to international trade and investment. Nuclear weapons instill fear and anxiety into people's minds; they turn the world's citizens into adversarial roles and breed a culture of mistrust. Nuclear war threatens communities because the prospect impacts mental health and stalls movement toward peaceful coexistence. Furthermore, the asymmetrical distribution of nuclear weapons enhances

geopolitical inequalities that deepen power imbalances around the world. This accumulation of economic and social costs associated with nuclear weapons is evidence of the need for disarmament and nonproliferation efforts that could make for a safer and more prosperous future (Smith 45-62).

2.1 Opportunity Costs Weapons Vs UN and Related Programs

Setting aside such a huge expense on arms that are hazardous to the environment, public health, and society even in the process of manufacturing is a big opportunity cost. According to the Sustainable Development Solutions Network, it is about US $1011 billion.(Sachs et al)
This translates to a requirement of an average per annum from 2019 to 2030 for the full funding of the realization of SDGs, which all governments agree to. This is over half of the annual military budget, which stood at US$1981 billion in 2020, 2.6% higher than in 2019 (Da Silva). That rise happened despite the COVID-19 pandemic and the ensuing severe economic slump, rise in poverty, and increase in food insecurity.in the combined annual budgets of UNICEF, the International Committee of the Red Cross, the World Health Organization, the UN High Commissioner for Refugees, and the UN itself, less than 30% of direct spending on nuclear weapons goes to the UN Office of Disarmament Affairs and the International Committee of the Red Cross (International Peace Bureau).

The money for one Virginia Class nuclear submarine would have been enough to equip 9,180 ambulances; the cost of one Trident II nuclear missile would suffice to buy 17 million facemasks; and an hour's operation of an F-35 nuclear-capable combat aircraft costs as much as an OECD average nurse makes in a year (International Peace Bureau). . By way of example, by September 2021, less than 3% of people in low-income countries had received at least one dose,

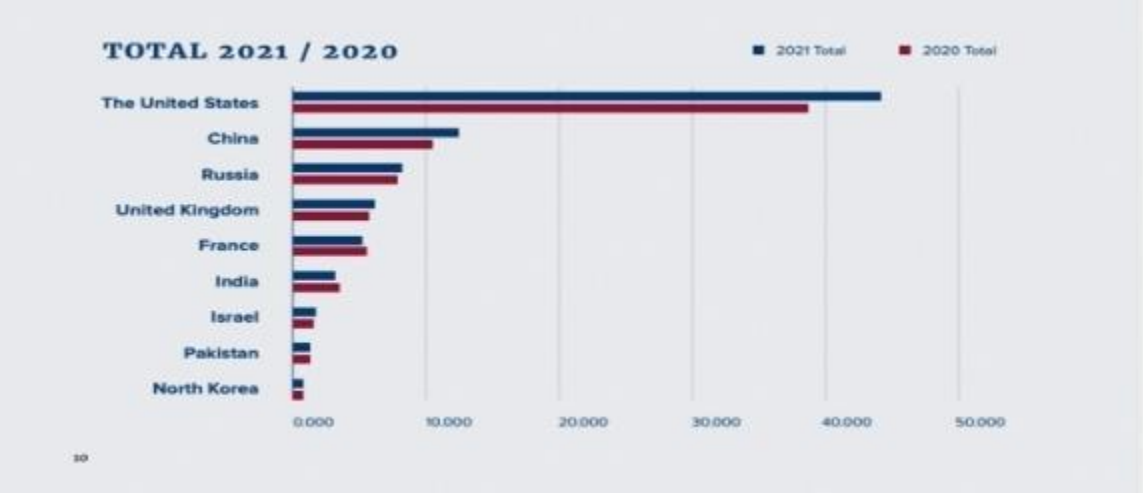
while the WHO faced a funding shortfall of the US $900 million required to see them through to March 2022 to play a leading role in ending the acute phase of the pandemic—1.2%. of the annual direct nuclear weapons spending (Ghebreyesus).

2.2 Opportunity Cost

All nine nuclear armed states are investing in huge numbers in modernizing their nuclear arsenals. Global spending on production and development of nuclear weapons in 2020 reached 72.6 billion dollars, and it has increased in 2021. The total cost of nuclear weapons programs, including environmental clean-up and legacy costs, are much greater (Kuzemko et al).

The figure below shows how much the nine nuclear countries spent on nuclear projects during 2020 and 2021.

Fig.2. Annual nuclear weapons spending by country



Source: (International Campaign to Abolish Nuclear Weapons)

There is an increase in spending for the first four countries at varying rates, but France, and India have spent less money on their nuclear arsenals than in 2020. and we notice that Israel has increased its spending rate slightly compared to the previous year, while Pakistan and North Korea have maintained the same level of spending.

The global nuclear spending grew by 3% from 2021 to a record $157,664 per minute. and most of the investments in this regard were made by the United States, whose expenses reached $43.7 billion less than they were in 2021. followed by China, with over 6% growth and expenses reaching $11.7 billion. Russia spent $9.6 billion in third place, representing a rise of 5.74% from the last year. While the United Kingdom increased its spending on nuclear by just over 11 percent (Zakre).

These resources allocated to nuclear weapons could have been directed towards improving education, healthcare and overall living standards for the people worldwide ,this would have led to healthier and better educated population contributing to a more prosperous and peaceful global security, and also those resources could have been directed to develop and promote clean renewable energy sources such as solar, wind , and hydroelectric power .This would have reduced greenhouse gas emissions and ending the negative impact of climate change, and also, the funds allocated to the nuclear programs could have been spent on reducing income inequality,also investing that money in developing different areas such as medicine and space exploration (Schwartz).

The opportunity cost of maintaining nuclear weapons has a significant impact on social welfare. The huge amount of money spent on nuclear arsenals by countries diverts resources from

crucial social welfare programs, which affect the well-being and development of societies. This resources that have been allocated to fund nuclear programs could be diverted towards social welfare programs such as health care and infrastructure development (Schwartz).

According to “Move the Nuclear Weapons Money International Campaign” the next 10 years, $1 trillion USD will be invested globally into the development of nuclear programs. This allocation could instead cover all the following instead:

- Feeding all 780 million undernourished people in the world for 10 years
- constructing 2–100 million houses
- Build 400–400,000 hospitals
• 2–10 million Yearly salaries for teachers
Ensuring proactive healthcare for every African, leading to an 80% decrease in infant and maternal mortality rates.
• UN budget for a decade
3 million residential solar panel systems
• 1 million wind turbines
•1 million electric vehicles
•Education for 200,000 students for 5 years each at top U.S. universities
• 10 years of ART drugs for 28 million HIV infected people in Africa
• Rconstructing Haiti after the earthquake
67 million environmentally-friendly biomass stoves
• Planting 20 billion trees in Africa
- Eradicating malaria within a decade, saving half a million lives annually
One million new water wells

Source (Dodge) : https://nuclearweaponsmoney.org/opportunity-costs/

This huge investment in nuclear arsenals instead of social welfare programs hinders progress toward achieving the SDG and improving the quality of life for people.In conclusion, public spending on nuclear weapons is a complex issue that requires careful consideration of various factors. While these weapons have historically been seen as a means to ensure national security and deter potential adversaries, their development, maintenance, and potential use come with significant costs, both financial and societal, and these weapons have played a role in maintaining a balance of power and preventing large-scale conflicts during the Cold War era. However, the escalating costs associated with their development and upkeep can divert resources from other essential areas such as education, healthcare, infrastructure, and environmental protection.

Chapter Three

Assessing the Harm of Nuclear Weapons: Health, Environmental, and Social Impacts

The environmental damage caused by nuclear weapons also impacts sustainable development. Radioactive and hazardous to humans, animals, and the environment are nuclear bombs. Prior to the weapon being used, the environment is harmed by uranium mining, weapon testing, and waste disposal. Long-lasting contamination results from nuclear weapons testing sites, Hiroshima and Nagasaki. That's unclean water for decades, unusable soil for farming, cancer that won't go away, and unfathomable damage long after the original explosion.

This chapter aims to present the impact of using nuclear weapons on health, well-being, and the environment, including a real-life historical example of a nuclear explosion and its consequences. Additionally, it delves into ethical considerations, human rights, and their relation to the TPNW.

1. Health Impacts of Nuclear Weapons

The creation, manufacturing, application, and testing of nuclear weapons have had global, disastrous effects on human health and sustainable development. Many of these effects are still being felt today. Since their inception, nuclear weapons have had an impact on international relations and posed a threat to humanitarianism. People from Hiroshima and Nagasaki, two of the now-18 UN member states, were killed in the atomic bombings. More than 2,000 nuclear test explosions were conducted at sites inside what are now 15 states between 1945 and 2017 (Bolton and Minor 389).

1.1Historical Nuclear Disasters and their Long-term Health Consequences:

According to the International Nuclear Incident Scale, the Chernobyl Nuclear Power Plant was a devastating tragedy and is rated as a category seven incident. The disaster occurred because of a series of explosions. The main cause was a sequence of activities by the operator, such as turning off automatic shutdown devices. In addition to quick steam production and pressure rise, fuel fragmentation resulted from the very hot fuel interacting with the cooling water. Because of the reactor's design features, significant damage to even three or four fuel assemblies may and did cause the reactor to explode. The reactor's 1000 t cover plate partially detached due to the overpressure, rupturing the fuel channels and blocking all of the control rods, which were only halfway down at the time (Chernobyl Accident 1986 - World Nuclear Association).

After the emergency cooling circuit burst, intense steam generation spread throughout the entire core, feeding fission products into the atmosphere and resulting in a steam explosion. Between two and three seconds later, a second explosion threw out fragments from the fuel channels and hot graphite. Causing the main release of radioactivity into the environment. A total of about 14 exabecquerel (EBq) (14 x 1018 Bq) of radioactivity was released, over half of it being from biologically inert noble gases, which was considered the largest uncontrolled radioactive release into the environment ever recorded for any civilian operation (Chernobyl Accident 1986 - World Nuclear Association).

1.2 Long Term Effects of the Nuclear Disaster

When it comes to the long-term health consequences of Chernobyl,20 years after the event, children and adolescents who were exposed to radioactive fallout

showed an increased prevalence of cancer (Cardis et al. 135). These radioactive fallouts contain harmful nuclei, including Iodine (I-131), which leads to thyroid cancer, and Cesium (Cs-134 and Cs-137). It is estimated that more than 6000 cases of thyroid cancer of all ages were caused by the Chernobyl disaster (Ricarte-Filho et al. 4935)

2. Radiation Exposure and its Effects on Human Health

Human health can be significantly impacted by radiation exposure, which is radiation receiving energy from ionized radiation waves or particles from outside radioactive sources, which is referred to as "exposure." (Christensen et al. 245). Acute radiation syndrome could develop if the dose is high, given quickly, and reaches the entire body Like what happened in the Chernobyl incident, as mentioned earlier.

2.1 Causalities

Research has indicated that the detonation of a nuclear weapon would result in extensive casualties, destruction, and loss of life, mainly if it happened in or close to a populated area. Due to blast effects and the release of thermal radiation, there would be numerous casualties from severe burns and blunt force injuries in the instant following the detonation. These effects also increase the likelihood of fires and firestorms, which result in a significant number of additional casualties as fuel and flammable materials burn or explode (Maclay 159).

2.2 Cancer

It is proven that there is an increased risk of cancer due to ionizing radiation exposure. A study has been conducted on the Japanese atomic bomb survivors and the Chernobyl incident; it argues that Survivors who were exposed as children had a higher risk of cancer than those who were exposed later in life; at higher doses, there is an

increased risk of cardiovascular diseases and certain other non-cancer diseases. Survivors have a dose-response relation that is linear for solid cancer, though that is still unclear at low doses (Sera et al. 47).

Furthermore, the development of the central nervous system and stature were affected in children exposed to large doses of atomic bomb radiation in the womb, and the risk of cancer rose with the mother's dose (Ôtake and Schull 161). Additionally, children who received high thyroid doses due to internal exposure to radioactive iodine were shown to have an increased incidence of thyroid cancer several years after Chernobyl (as listed in the figure below); the results of Chernobyl research also indicate a significant psychological impact (Drozdovitch et al. 597).

Table 1. Summary of findings* to date on Chernobyl fallout and cancer risk following the 1986 nuclear power plant accident

Exposed population	Thyroid cancer (degree of association)	Leukemia (degree/presence of association)	Other cancers
Clean-up workers	Equivocal	Positive	Data lacking
Residents – children	Strongly positive	No association	Data lacking
Residents – *in utero*	Data lacking	Positive	No association
Residents – adults	No association	No association	No association

MODIFIED FROM HATCH, *ET AL.* THE CHERNOBYL DISASTER: CANCER FOLLOWING THE ACCIDENT AT THE CHERNOBYL NUCLEAR POWER PLANT. EPIDEMIOL REV 2005;27:56-66.

Source: Hatch, M., et al. “The Chernobyl Disaster: Cancer Following the Accident at the Chernobyl Nuclear Power Plant.” Epidemiologic Reviews, vol. 27, no. 1, July 2005, pp. 56–66, doi:10.1093/epirev/mxi012.

From the table, it is notable that children were strongly positive, as their thyroids were still developing. It's estimated that around 4,000 to 6,000 additional cases of thyroid cancer will eventually result from the Chernobyl disaster.

2.3 Genetic Mutation

Another health problem that can arise from ionizing radiation exposure in humans is Genetic mutations, which is DNA damage of the cells. Even at low doses, ionizing radiation exposure can damage a cell's genetic material, which may lead to developmental effects under certain circumstances, heritable diseases in the exposed person's offspring, or radiation-induced cancer years later. We refer to these effects as stochastic effects. The possibility of the effect occurring—but not its severity—depends on the dose for both radiation-induced cancer and heritable diseases (Müller 280).

In the years after their direct exposure to the blasts, the health of the offspring born to survivors is also being observed. Hereditary transmission of radiation effects will be a long-term problem, and there may be another generation of sufferers requiring long-term therapy if it is discovered that radiation exposure alters the parents' genes, as has been done in animal experiments.

2.4 Blood Disorders

High fever was identified as a sign of bone-marrow failure brought on by radiation-induced damage to the bone marrow. This manifested as a sharp drop in white blood cell counts, which paved the way for bacterial invasion through open wounds. White blood cells are the main line of defense against bacterial invasions. The cells are known medically as "neutrophils." The blood's lack of neutrophils caused bacterial infections to worsen and eventually cause death. An enormous number of deaths were

attributed to infections. White blood cell counts in these patients with high fevers occasionally dropped below 1,000/mm3, or 20% or less of normal values (Tomonaga 511).

2.5 Psychological Effects

A tendency toward apparent emotional numbness, commonly interpreted as a lack of motivation to work, was frequently noted among working-age survivors of the atomic bombings in both cities during the five years following the bombings. In the social disarray that followed Japan's surrender, even the young survivors who were lucky enough to have jobs could not perform well every day; some of them were fired or laid off. Nagasaki Medical College psychiatrists examined this mental illness. They dubbed this particular phenomenon "atomic-bomb numbness syndrome," or "genbaku bura-bura byo." Physicians thought that the numbness was caused by psychological harm, akin to the condition that is currently known as post-traumatic stress disorder (PTSD) (Tomonaga 493).

There are also more behavioral and psychological issues noted. Feelings of guilt seem to surface following an initial tendency toward profound apathy and disorientation. Furthermore, survivors expect anomalies in their progeny and h arbor a persistent fear of cancer and the late effects of radiation (Cassell et al. 83).

3. Environmental Impacts of Nuclear Weapons

Radiation from a nuclear explosion could harm the ecosystem, having an adverse effect on agriculture, natural resources, and demography over a very wide area. However, ionizing radiation poses a risk of damaging the future environment, food, and marine ecosystem, as well as causing illnesses and genetic defects in future generations.

3.1Climate Change

Climate change is happening slowly and could be mitigated, as using these weapons can cause global warming ("What Happens if Nuclear Weapons Are Used?"). According to the International Campaign Against Nuclear Weapons ("ICAN") The explosion's dust, smoke, and firestorm can block sunlight, resulting in a sudden drop in temperature and amount of rain. It may result in a decline in fish and agricultural productivity, which might greatly decrease calorie production and cause famines. The sudden shift has some severe side effects, such as "ocean acidification and damage to the ozone layer."

3.2 Contamination

Another dangerous way that nuclear weapons can impact the environment is through contamination; the radioactive waste from nuclear testing contaminates soil, water, and vegetation, causing loss of agricultural yield and harm to marine life, like the case of the US dropping 43 nuclear bombs in Enewetak Atoll.

Furthermore, cleaning up the bodies of farm animals or large herds that have been contaminated can lead to hygienic problems. Although plants vary in their susceptibility to radiation, nuclear radiation can cause deforestation, which would result in the extinction of all plants in more susceptible plants. One instance is the Chernobyl disaster. Radiation destroyed the pine forest that surrounded Chernobyl because it was made of a highly sensitive species of trees (Council, “Effects of Nuclear Earth-Penetrator and Other Weapons”).

4. The Long-Term Effects of Nuclear Testing and Accidents on Ecosystems and Wildlife

The long-term environmental effects of nuclear accidents—which include radioactive fallout, biological contamination, and even modifications to species morphology, behavior, and physiology—are frequently ignored in policy discussions. There are two main problems with ignoring the effects of nuclear accidents on the environment. First, there is cause for concern regarding the effects that possible nuclear accidents could have on a variety of organisms. Second, harm to ecosystems frequently results in harm to ecosystem services, which has a significant indirect impact on the well-being of people both now and in the future (Von Wehrden et al. 81-82).

4.1 Atmospheric Effects

In the long term, the extensive use of nuclear weapons in atmospheric testing has had detrimental long-term effects. Physicians estimate that atmospheric nuclear tests carried out between 1945 and 1980 will ultimately cause the deaths of 2.4 million people worldwide from cancer. Also, the Isotopes released from these atmospheric nuclear tests come to the surface as a result of deposition and natural events. Due to the half-life of the particles involved in nuclear events, isotopes that settle in the topsoil layer can stay there for many years. Long after the actual incident, there is still a chance that it will have an impact on people's health and safety because of the long-term negative effects on agriculture, farming, and livestock (Amiard; Asad).

In fact, one percent of the world's nuclear weapons has the potential to permanently alter the climate and endanger the lives of up to two billion people through nuclear famine. Our delicate ecosystem would be destroyed by a nuclear winter, which

could be caused by the detonation of thousands of nuclear weapons ("What Happens if Nuclear Weapons Are Used?").

4.2 Spread of Diseases

A nuclear detonation will result in a An easy breeding environment for flies and other insects would be created by an abundance of decomposing human and animal corpses, untreated trash, and sewage. Illnesses such as respiratory diseases, amoebic dysentery, malaria, typhus, infectious hepatitis, shigellosis, salmonellosis, typhus, and tuberculosis would spread epidemic-like over large regions (Verghese 708).

4.3 Effects on Wildlife

On the other hand, when it comes to wildlife, the consequences include reduced life spans, non-specific aging, and/or mutation effects in the affected animals' genes. They also cause various cancers to develop in the affected animals. The latter may persist for several generations after the initial ionizing radiation exposure (D'Arrigo).

Furthermore, the plants and animals that are exposed to radiation and then perish end up as fertilizer in the soil. Food poisoning results from the radiation contamination of the soil, which then affects the crops grown on contaminated soil. This happened in Kazakhstan when vegetation became contaminated due to radioactive waste exposure. Aside from that, the use of nuclear weapons or underground testing might cause earthquakes that can harm natural features (Asad).

5. Human Rights and Ethical Considerations

The goal of human rights law is to shield people from dangerous circumstances like the effects of nuclear weapons, the TPNW upholds human rights on a global scale.

Furthermore, upholding human rights means defending the freedom to exist, to be treated as a human being, to live in a healthy environment, and to maintain the highest possible level of health, peace, and security (Nystuen et al.).

5.1 The TPNW and the Right to Life

Nuclear weapons pose a significant threat to humanity, which violates human rights. In Article 6 of the International Covenant on Civil and Political Rights (ICCPR), the United Nations Human Rights Committee stated: The threat or use of weapons of mass destruction, in particular nuclear weapons, which are indiscriminate in effect and are of a nature to cause destruction of human life on a catastrophic scale, is incompatible with respect for the right to life and may amount to a crime under international law. Since the goal of human rights law is to shield individuals from dangerous circumstances like the effects of nuclear weapons, the TPNW upholds human rights everywhere. Furthermore, upholding human rights means defending the right to live, to be treated as a human being, to live in a healthy environment, and to maintain the best possible standard of health (Nystuen et al.).

5.2The TPNW, Peace and Security

As long as nuclear weapons are in existence, there can be no global peace and security, for example in early 2023, North Korea threatened the launch of nuclear weapons if the United States and South Korea continue to display open hostility through joint military drills. Therefore, as stated in Article 1 of the TPNW, the only way to completely remove the possibility of a nuclear weapon being deployed is to stop producing nuclear weapons.

6.The Ethical Implications of Nuclear Disarmament and the Protection of Future Generations

the majority of studies concurs that it is immoral to explode an atomic weapon, Considering the immediate and long-term devastating consequences, also Many treaties on prohibiting nuclear weapons call for disarmament like the TPNW which Whyte 353-354 described it as the product of a combination of factors, including a strong political resolve, the ethical and moral imperative of nuclear disarmament, has lot of positive outcomes if applied.

Preventing human extinction is one of these positive outcomes that can be achieved if nuclear disarmament is applied, especially in case a war is waged between two nuclear states. The expected outcome of war without nuclear weapons is at least less catastrophic (Carnegie Council for Ethics in International Affairs). Another benefit is the absence of any potential health issues for those directly exposed to radioactive fallout from nuclear testing or bombing. And the absence of air pollution and environmental damage (Carnegie Council for Ethics in International Affairs).

According to IDN-InDepthNews, the threat that nuclear weapons pose would destroy our history, our present, and our future, as their use would place all life in jeopardy. Eradicating them is inherently an altruistic act not just for current generations but for the past and especially for the future. The presence of nuclear weapons on our planet is a crime against future generations. They demand our attention and action.”

Future generations shouldn't have to bear the expense and risk of nuclear weapons anymore—they already have to deal with the existential threat posed by climate change. The only way to completely eliminate nuclear risk is through complete

disarmament. The most efficient approach to accomplish this goal is to ratify the Treaty on the Prohibition of Nuclear Weapons (TPNW), which is why an increasing number of young people believe that their nation must do so right away—before nuclear weapons are ever used again, whether through mistake, insanity, or accident (Diaz-Maurin).

In conclusion, nuclear weapons testing and usage have had devastating international effects on the environment and human welfare. There are still aftereffects from more than 2,000 nuclear explosions that occurred in the areas of 15 states, which has major ramifications for sustainable development and human rights. Indicators for tracking development issues and tracking targets' progress are listed in the 2030 Agenda. In numerous international conventions, nuclear disarmament is a prominent concern. It alludes to the process of minimizing or doing away with the deployment of nuclear weapons.

In contrast, the Treaty on Prohibition of Nuclear Weapons, or TPNW, is an international pact that aims to foster cooperation in the peaceful uses of nuclear energy while preventing the spread of nuclear weapons and weapons technology. Billions of millions are spent annually by numerous nations on the development, upkeep, and security of their nuclear arsenals. Governments should be encouraged to report pertinent information to Meetings of States Parties regarding the effects of nuclear weapons on populations and environments under their control once the TPNW comes into effect.

Chapter Four

Implementing Prohibition in a Nuclear World Order and Pathways for Disarmament Dividends.

The current nuclear condition of the globe is defined by a complex terrain formed by historical rivalries, security concerns, and international agreements. As of now, nine countries have nuclear weapons: The United States, China, France, India, Israel, North Korea, Pakistan, Russia, and the United Kingdom. The global nuclear order had been challenged in recent years by individual proliferators, the dormant US-Russian arms control mechanism, and frustration with stalled disarmament progress have all posed challenges to the global nuclear order in recent years. Then Russia started a full-scale invasion of Ukraine under the cover of nuclear threats against NATO. This has neither shown the international nuclear-governance framework as useless nor brought it to the brink of collapse (Bollfrass and Herzog).

The global nuclear order's history demonstrates its resilience against rogue acts by great nations. It will continue to support the security and energy interests of important nuclear-capable states in the non-proliferation sector. Arms control between Washington and Moscow has always been sensitive to their strategic interests and can be restored. While conflict involving established nuclear powers like the U.S., China, France, Russia, and the U.K. is deemed unlikely but possible, attention is also focused on newer nuclear states such as Israel, India and Pakistan, and North Korea. The actions and policies of these nations contribute to ongoing concerns about global stability and security (Bollfrass and Herzog).

1. The Implementation of the TPNW

Implementation the TPNW in national level can be complicated by vaguely worded provisions of the actual Treaty text, which some have described and sometimes criticized as vague or ambiguous. There are various plausible and interrelated reasons as to why this is so. First, in general, multilateral treaty drafting is an imperfect science further complicated by translation processes. This is true also of the TPNW, while 130 States (and the UN Office of Legal Affairs) were parties to this enormous and messy collective draft exercise, all played out in front of an audience in the span of a few weeks. Maybe vagueness in the text had been intentional with a view to keeping the Treaty simple and short for its easy passage. It might be also linked to the absence of the nuclear-armed States in the negotiations while an apparent lack of detailed provisions - in particular in Article 4 on elimination of nuclear weapons. Furthermore, drafters postponed decisions related to some provisions either to the first Meeting of States Parties discussed elsewhere in this special issue or to the "competent international authority or authorities". It all contributes to a measure of flexibility in national implementation (UN).

1.1 Approaches to Universalization with non-Nuclear-Armed States

Maximizing the authority of the treaty through more ratifications will require different approaches for different states. We distinguish four communities of states: nuclear-armed states; nuclear client states; non-nuclear armed states that can be supportive of or ambivalent about nuclear disarmament; and non-nuclear armed states who are champions of nuclear disarmament—what Marianne Hanson termed the "advocacy states" (Hanson 71–93). In light of the negotiation setting of the TPNW and opposition by nuclear-armed and client states, the advocacy states, other non-nuclear-armed states, and perhaps a small number of nuclear clients will be the target of

universalization efforts soon after entry into force. Over the long term, the TPNW does have provisions for wider universalization by providing pathways for the renunciation of nuclear weapons set out in Article 4, but clearly, its adoption is not an aim on the part of the nuclear-armed.

This means different roles will have to be fulfilled by TPNW supporters and TPNW stakeholders. The role of CSOs in promoting the universalization of the TPNW remains central to the advancement of arguments by the Treaty in national and international discourse. Success in universalization efforts by TPNW member states demands complementary—sometimes even closely coordinated—civil society campaign activities and strategies. This is supported by an example from Oberdorster in 2008 on how normative arguments, working together with civil society, but more basically stipulation-embedding, bear out the case of the TPNW. within broader UN, NPT, and IHL institutional architecture in securing further ratifications (Oberdorster 681).

The obligation of Article 12 of the TPNW, however, concerns the states parties, and it will be up to them to find ways to engage at the governmental level with those states that are yet to join. But here again, there will be an important role for states active in disarmament advocacy. All such strategies rest on some set of narratives and concrete activities drawing from universalization experiences with similar treaties (UNODA).

1.1.1 Non-Nuclear Armed States: Promoting a Positive Discourse

Increasing support for the TPNW through further ratifications by non-nuclear-weapon states is needed. For them, they are already prohibited from pursuing nuclear weapons under the NPT—ratifying the TPNW resoundingly reaffirms present legal commitments. Most of them—over 150 of the 193 UN member states—do not have nuclear weapons, nor are they allied with nuclear states, and each of them has a Comprehensive Safeguard Agreement with the International Atomic Energy Agency. Moreover, among such, 115 are already part of Nuclear Weapon Free

Zones and therefore have already legally prohibited nuclear weapons on their territories (Potter and Mukhatzhanova). Most of these states have a track record of calling for nuclear disarmament, and several of them are recent signatories to the "Humanitarian Pledge" to eliminate nuclear weapons.

Many of the non-nuclear-armed countries might not be able to bear political pressure from the major states opposing TPNW. Nuclear disarmament cannot emerge as the prime issue for most of these countries, especially small or developing ones, against various other pressing matters. Nuclear-armed states are against the TPNW because it goes against the core interests of such states. Thus, some of the non-nuclear-armed countries would be very reluctant to become part of the TPNW Process due to the apprehension of possible adverse repercussions in terms of foreign aid, trade, or any such parameter that may affect them (Ritchie and Kmentt1-24).

1.1.2 Engaging with Nuclear Client States

Up to now, we have focused on building the membership of nonnuclear-armed states. But the states parties must also reach out to nuclear client states and, when possible, nuclear-armed states—the two groups still wedded to nuclear weapons and nuclear deterrence. The five NPT NWS, NATO, and NATO members all have formally stated their opposition to the TPNW. At least for some time to come, little can be expected in terms of engaging the nuclear-armed states on the TPNW. Yet when turning to this point on the nuclear client states, there are far greater opportunities to engage and to encourage accession to treaty. This will, in part, necessitate some of the same forms of outreach outlined above, but discursive engagement will differ along two paths we begin to outline here: first, through a rebuke of a set of negative arguments concerning

the TPNW; second, by way of engendering debate in nuclear client states over the humanitarian, risk, and ethical rationales underpinning the TPNW (Ritchie 44–50).

1.1.3 Countering the Negative Discourse

Critics' picks on several of the most common arguments against the TPNW. Countering claims that the TPNW distracts from practical nuclear disarmament steps by pointing to a lack of progress that nuclear-armed states have made in their commitments, it does not single out any feasible alternative plan for progress toward elimination. It sweeps aside concerns about sowing divisions by laying them directly at the feet of the failure of nuclear-armed states to fulfill NPT commitments, and highlights instead the value in democratic debate fostered through the TPNW (Ritchie and Egeland 121–141).

Second, it answers the criticism about efficacy on the ground that, even though opposition from states armed with nuclear weapons already exists, the TPNW constitutes an important legal framework and takes precedents from other disarmament treaties. It shields humanitarian foundations of the TPNW against appeals to narrow security perspectives and stipulates its relevance for finding real security concerns it dismisses claims about incompatibility with the NPT and insists that the TPNW is not only consistent with existing regimes but powerful to further the disarmament agenda. **(**Ritchie 44–50**)**.

Finally, in sum, it depicts criticisms as an attempt to preserve the nuclear status quo and urges supporters of the TPNW to be prepared and ready to effectively respond to these narratives (Soares 65–68).

1.1.4 Opening up the Humanitarian Discourse in Nuclear Client States

The discussions in the TPNW on the humanitarian impact, risks, and associated ethical conundrums of nuclear weapons open up a venue for a client state to respond to criticism related to the usage of nuclear weapons. Scholars are more and more contributing to lay bare questions of responsibility, legitimacy, and collective security in nuclear deterrence by sustained scholarship on nuclear explosions and risks, putting it under scrutiny. It is in this respect that the TPNW calls for an examination of assumptions about nuclear deterrence. It requires, among other things, that the risks involved and the consequences of the actual use of nuclear weapons be balanced against perceived security gains—for example, what the chances of prevention are worth against the risk of failure of deterrence with catastrophic consequences (Borrie et al.).

At the same time, reception and engagement with the TPNW in countries around the world vary, highlighting the role of global civil society in promoting debate. Combining these inferences, it is suggested that democratic societies might be more responsive to criticisms against nuclear weapons regarding their humanitarian impacts and risks. The tension between advocacy for a nuclear-free world and security maintenance through nuclear deterrence is remarked upon, especially among states that are members of NATO and strongly opposed to the TPNW. For instance, looking at the view of NATO, the central concerns of this treaty, as related to the legitimacy of nuclear weapons and practices of nuclear deterrence, are underlined. That makes it politically difficult, in terms of cohesion, for member states to break away from alliance positions on the TPNW (Egeland,143–167).

TPNW supporters will have to strongly underline in the domestic debate within NATO allies that membership in NATO is not, per se, contingent on agreement with or participation in

nuclear deterrence policies. Nuclear deterrence is neither mentioned nor employed by the North Atlantic Treaty, and participating in NATO nuclear activities is not required as a matter of law. It was, in fact, only in 2010 that NATO described itself for the very first time as a "nuclear alliance " (Nystuen et al).

Opposing the TPNW is hence a political decision, but "(…) NATO member states bear no legal obligation to support extended nuclear deterrence or the retention of nuclear weapons. From a legal perspective, accession to the TPNW is compatible with NATO membership". It would, therefore, equally be a political decision on the part of NATO allies to "(…) pursue diplomatic action within NATO to modify nuclear policy to be compatible with the TPNW, or, failing to secure such change, to disavow nuclear deterrence on a national basis" (Meyer).

On equal terms, NATO allies might decide at country and collective levels to announce their interest in deviation from security architecture based on nuclear deterrence. A wider discourse on the TPNW within nuclear client states may hence realize that, indeed, they too consider nuclear deterrence unsustainable in the long term, in view of the humanitarian consequences and risks of the use of nuclear weapons for the undiminished security of humankind as a whole (Kmentt 681–709).

Accordingly, such states could distance themselves from the nuclear dimension of NATO and begin concrete efforts to replace deterrence through nuclear weapons with alternative deterrent and conflict-resolution mechanisms. This engagement may be at the heart of, and a plausible political deliverable for, the efforts related to universalization in nuclear client states**.**

1.2 International Implementation

How closely States Parties will translate their TPNW obligations into practice at the national level is overtly the subject of Article 5. However, the terms of obligations elsewhere in the Treaty beg further questions as to what form their implementation might take as well. All questions of national implementation are addressed in this chapter, the starting being Article 5, then subsequently moving on to those of relevance under other articles. The following analysis focuses on issues most pertinent to the group of nonnuclear armed States who will need to implement the TPNW in the short and medium term. It also, to a lesser extent, covers issue relevant to States that are/were part of nuclear-sharing arrangements (UNODA).

1.2.1 Article 5

Under Article 5 of the Treaty on the Prohibition of Nuclear Weapons, each State Party shall adopt measures, including legislative and administrative measures to prevent and suppress in its territory, activities prohibited under this Treaty for the fulfillment of its obligations. Though penal sanctions are mentioned, no exact measure is stated as "necessary"—a phrase commonly used in WMD treaties to grant latitude and flexibility to the corresponding sovereign states for contexts that may arise. But this ambiguity creates implementation problems, just as was encountered with the preceding WMD treaties where states' divergent interpretations led to inconsistent and sometimes less-than-adequate national measures. The underestimation of the effort required by some states in order for them to make a full contribution toward compliance with the state party's treaty obligations also flows through to potential weaknesses in the global WMD prohibition (Unated Nation General Assembly).

The first paragraph of what is required obliges States Parties to put in place national measures to address all obligations under the treaty. In particular, paragraph two identifies attention areas and explicitly binds States Parties to take legal measures to prevent activities prohibited under the Treaty. Consequently, a number of activities contained in various articles under this Treaty shall be criminalized by States Parties, including the development, testing, production, manufacture, use, or transfer of nuclear weapons or other nuclear explosive devices, and the necessary measures related to victim assistance (Unated Nation General Assembly).

In the course of the negotiations, some States mentioned other additional activities, such as transit and financing, but did not succeed in getting those activities included in the prohibitions of the Treaty. Nevertheless, when it comes to the process of national implementation, some States may wish, beyond the text of the Treaty itself, to explicitly prohibit those additional actions. Where examination of additional measures is concerned, however, it shall be of paramount importance that efforts are not made at the cost of attention or diverting resources from explicit obligations under TPNW (Ritchie and Egeland 121–141).

Legal measures for proscribing activities prohibited under the TPNW have evolved during the past two decades through both the application of the NPT and other measures, including non-legally binding IAEA legal instruments, such as the 1980 Convention on the Physical Protection of Nuclear Material and broader CPPNM legal measures, and UNSC Resolution 1540. Any kind of explicit type of obligation with respect to national implementation is not included in the NPT. However, Article 3 of the Treaty states that non-nuclear weapon states "shall accept safeguards, negotiated with the IAEA, which has promulgated non-binding guidelines for national measures to protect nuclear materials and equipment from security breaches" (IAEA).

Measures to fulfill the implementation requirements under the TPNW are the subject of this article. The States Parties to the Treaty are under obligation to take legal measures by way of legislation, inter alia, with a view to forbidding activities prohibited under the said Treaty by criminalizing them. Comparatively, these requirements have increased under UN Security Council Resolution 1540 by states in the adoption of legal frameworks for the same. It further underlines that states have to take measures beyond the laws in order to put the TPNW into practice (UNSCR). This can be done through capacity-building and engagement with stakeholders. The section goes ahead to mention the requirement of the establishment of national bodies on implementation coordination for complaint implementation as stipulated by the treaty, drawing comparisons from other WMD treaties, the Biological Weapons Convention, and the Chemical Weapons Convention (NASEM).

1.2.2 Article 2: Declarations

Article 2 of the TPNW Each Party shall submit to the United Nations Secretary-General an initial declaration no later than 30 days from the date of entry into force of this Treaty for that Party. This declaration shall confirm whether the State previously owned, possessed, or controlled nuclear weapons or nuclear explosive devices, and also whether it had eliminated its nuclear weapons program through processes of elimination, including the conversion of related facilities. It requires one to reveal nuclear weapons located in its territory owned by other states. It is in that category of declarations which are very relevant to the purposes of Article 4, not least because the identification is bound to involve states being treated as falling within certain categories for purposes of the Treaty and thus establishes related obligations. On grounds of practicality, the format, content, and procedures for submitting such initial declarations are reflective of flexibility

in respect to a variety of national circumstances and sensitivities, particularly those involving states that have had nuclear-sharing arrangements (United Nation General Assembly).

1.2.3 Article 3: Safeguards

Article 3 of the TPNW lays out obligations regarding non-nuclear-weapon States Parties. It requires every State that is not covered under Article 4 to maintain its current international atomic agency safeguards; to this end, each state shall conclude a comprehensive safeguards agreement within 180 days from the date of entry into force of this Treaty with the said State Party, which shall enter into force no later than 18 months thereafter. These obligations thus entail similar requirements of the NPT and on treaties for regional nuclear-weapon-free zones. For the states concerned, implementation would therefore be little more than assuring compliance with safeguard agreements that are already in force, including any voluntary Additional Protocol to which a state is a party, as discussed at length by Mukhatzanova and Rockwood, respectively, in the relevant recent articles (Rockwood and Mukhatzhanova).

1.2.4 Article 6: Victim Assistance and Environmental Remediation

Article 6 of the TPNW contains obligations with respect to individuals affected in various manners by nuclear-weapon use or testing and environmental contamination, and States Parties shall provide assistance that is nondiscriminatory, age-sensitive, and gender-sensitive. Also, it will be incumbent on the States to provide assistance, including medical and rehabilitation assistance, psychological support, and social and economic inclusion. Moreover, States are under obligation to remediate contaminated areas. These obligations shall not prejudice the fulfillment of other international or bilateral obligations. It borrows from the humanitarian approaches of the 1997 Anti-Personnel Mine Ban Convention and the 2008 Convention on Cluster Munitions. It favors

the need for national or international programs to deal with the nuclear-related humanitarian and environmental consequences, citing the establishing obligation of the 2009 Treaty of Semipalatinsk with similar provisions on environmental obligations. Altogether, Article 6 marks a step forward in nuclear disarmament by anchoring human rights and environmental concerns in legal terms. Building from earlier histories of nuclear arms control and survivor and civil society activism, the TPNW seeks to redress past impacts of nuclear activities and prevent those that may take place or are taking place currently (Docherty 253–264).

The whole process of including humanitarian provisions into the traditional legal regime of arms control and disarmament is not an easy one. First, whereas Convention on Cluster Munitions does, TPNW does not define the term "victim" and fails to establish a procedure regarding implementing victim assistance and environmental remediation. This was stipulated differently in the CCM, where there are particular initial administrative and institutional arrangements measured. This lack of detail in the TPNW results from several characteristics of its negotiation process—most notably, a strong preference by negotiators to see the Treaty adopted in a timely manner—at least in the face of firm opposition, if not reconciled to the less complete and succinct version (Bolton and Minor 59–101).

States Parties should conduct, as a first step toward the implementation of Article 6 of the TPNW, a needs assessment that would Elucidate understandings of nuclear harm to individuals and the environment within their jurisdictions. This is a relevant country assessment for four different country categories: those that have become victims of nuclear-weapon attacks, like Japan; those that have nuclear weapons programs in the past or present; countries that have been used as nuclear test sites, including Kazakhstan and Pacific island nations like Fiji, Kiribati, and Marshall Islands; and lastly, countries which suffer nuclear weapon accidents because of third-party

activities—instances are Spain and Greenland. Understanding these needs will enable effective responses to nuclear harm (Sagan).

First of all, existing capacities inside governments, international organizations, NGOs, and community organizations have to be identified through an initial needs assessment in affected countries. There should also be a basic overview of these needs available for the TPNW's First Meeting of States Parties. After States Parties follow common processes in arms control and disarmament, they may use an action plan that articulates principles and common actions to support the Treaty's universalization and priorities in its implementation. This would then entail the deletion of programs on nuclear weapons, victim assistance, environmental remediation, international cooperation and assistance, and transparency measures (Docherty 253–264).

International cooperation and assistance can aid in countless ways when applying disarmament agreements. Conferences of States Parties provide for a discussion on assistance, while the Accordingly, affected countries must create national strategies, policies, and programs of assistance to victims to match international measures. The political regime, legal tradition, and general resources of each country will dictate how implementation is approached. Establishment of national working groups or task forces and new legislation would be important steps toward determining entitlement. commitment appropriate funds should be committed by the countries to provide medical care, rehabilitation, and psychosocial support and ensure social and economic integration of the affected persons. Best practices from the APMBC and the CCM disarmament treaties underline the requirement for participation of survivors and communities at all levels of assessment, planning, and implementation, with provisions for gender-and age-sensitive non-discriminatory assistance (Dalaqua et al). Mechanisms to secure age-specific and gender-specific

data should be developed to ensure age and gender considerations are taken into account in victim assistance programming. Periodic meetings of implementing partners at country and local levels.

1.2.5 Article 7: International Cooperation and Assistance

Article 7 of the TPNW foresees assistance and cooperation, together with the obligation to create greater collaboration among States Parties in providing their views on the facilitation of this Treaty. Technical, material, and financial assistance should be provided by the States in a position to do so to the affected States or other affected parties, including assistance to the victims and remediation of environmental damages, caused by nuclear weapons use or testing. Help from organizations like the United Nations, the Red Cross, NGOs, and others can provide assistance from Pope Franziskus down to the affected States as long as needed. The States that used nuclear weapons or tested them shall provide appropriate assistance to affected States. In this regard, States Parties shall assess their potential for assistance and establish focal points at the national level in order to coordinate activities in the framework of Article 7. It shall call on all relevant stakeholders if not involving civil society, in light of prominent roles lately played by non-state actors in such programs of assistance (Debiel and Sticht).

It would probably not be a coincidence that the TPNW foresaw a role for NGOs and institutes in respect of international cooperation and assistance.

Further, the first meeting of States Parties can provide an opportunity for bringing together all the relevant parties—donor countries, affected States, NGOs, and IOs—to find ways to implement Article 7 on a global scale. (Docherty163–186). An important element of the latter should be the elaboration of a plan regarding the mobilization of resources on international cooperation and assistance, and States Parties may even wish to establish international funding mechanisms through which development aid could be canalized in support of survivors and

environmental decontamination. One of these ways is through the voluntary trust funds set up under other agreements on arms control, such as the BWC, CWC, and ATT. Such a funding mechanism could not only be contributed by States Parties but also by the private sector enterprises and the non-States Parties who are in a position to give support for the atomic victim and cleaning of the environment (United Nation General Assembly).

2. Challenges

The examination of individual articles of the TPNW brings to the fore some of the main issues that are likely to be faced as states parties move to implement their treaty obligations at the national level. 1) the lack of standardization at the national implementation level ;2) the requisite level of national capacity needed for its effective implementation; and 3) mobilization of international assistance complementary to the national efforts (Revil et al 1–21).

2.1 Challenge 1: Lack of Standardization

An effective implementation of the Treaty on the Prohibition of Nuclear Weapons provides for shared understandings among States Parties on how to work at the level of each country. Flexibilities arising under TPNW Articles may be relied on by each State or Meetings of States Parties to adapt their implementation to suit their specific contexts. In doing so, this would help attract and thus sustain cooperative engagement and eventually achieve more countries joining in. However, detailed guidance may be lacking to promote robust implementation and adherence to Treaty principles. A first Meeting of States Parties provides essential space for discussing such issues, refining expectations, and developing shared interpretations of the meanings of Treaty text. It might also be useful to have "model" States demonstrate good practice soon after entry into force, which could then crystallize into common approaches, for example,

national implementation matrices or templates for the definition of nuclear victims (Revil et al 1–21).

2.2 Challenge 2: Capacity and Resources

The effectiveness of the TPNW clearly requires adequate resources and capacity development at the national level with regard to the identification of legislative gaps, data collection for declarations, assistance needs assessment, drafting of relevant legislation, and effective enforcement within the framework of the TPNW domestically. It would be particularly helpful to designate a focal point or responsible entity for national implementation in order to bring about coordination among the great variety of domestic entities and facilitate international-local engagement (Revil et al 1–21).

2.3 Challenge 3: International Assistance

Secretariat Organization or normally an ISU coordinates assistance programs, technical cooperation exchanges, and voluntary funding. States Parties to the TPNW may wish to establish an ISU that coordinates international assistance programs and trust funds toward national implementation. This ISU could also develop information sharing among States Parties, train national agencies, and build capacity in all areas of TPNW implementation, such as victim assistance and environmental remediation—in this connection, partnering with relevant organizations like the International Atomic Energy Agency and the United Nations to utilize fully the available resources (Revil et al 1–21).

3. Pathways or Disarmament Dividends

Disarmament dividends refer to the benefits that arise from reductions in military spending and the reallocation of those resources to other societal needs. Redirecting funds from military

budgets to other areas can contribute to social and economic development, promote peace-building efforts, and enhance global security and here are some potential outcomes that could result from successful disarmament efforts.

3.1 Resource Reallocation

Resources currently allocated to maintaining and modernizing nuclear arsenals could be redirected towards addressing pressing global challenges, such as poverty alleviation, healthcare, education, and climate change mitigation.

3.1.1 Poverty Alleviation:

Poverty alleviation includes a variety of strategies aimed at reducing and eliminating poverty by addressing its root causes and improving the well-being of affected individuals and communities. Microfinance programs, job creation schemes, and social safety nets are examples of initiatives that redirect resources toward poverty alleviation. These interventions are intended to empower communities, raise living standards, and reduce inequalities. Microfinance programs provide financial services to enable entrepreneurship and income generation, job creation schemes provide employment opportunities for vulnerable and minority groups, and social safety nets help those in need. These approaches work together to promote long-term poverty reduction and inclusive development (UNDP)

3.1.2 Healthcare and Education

Healthcare investments translate into better access, higher quality, and greater efficiency of services, manifested in the form of increased facilities, better equipment, and vaccination programs that result in fewer infectious diseases. Eradicating sicknesses, unhealthy behaviors, and settings are pointed out, while access to essential medicines will mean timely treatment. Reduced

morbidity rates, lower mortality, improved health outcomes, and strengthened health resilience are all combined accomplishments of developing underdeveloped countries. These efforts would support countries achieving their UHC targets and thereby the SDGs, both of which contribute to better health for society and stimulate growth (WHO).

In a related context, investing in education entails the construction of schools, teacher education, scholarship programs, and the elimination of discrimination against quality education. Education furthers economic progress by empowering people, making them innovative, and freeing them from poverty. Focusing on education means the pursuit of uniform developments through which countries will be enabled to train their key workers and empower all members to do their best toward broad social progress and development objectives (UNESCO).

3.2 Long-term Sustainability

The 2017 TPNW is for complete elimination so that long-term sustainability and humanitarian gains are assured. It prohibits the development, testing, production, acquisition, possession, stockpiling, use or threat of use, and transfer of nuclear weapons. Under the TPNW, there is supposed to be peace and security and protection of the set up; this shall help in averting the big disparity resulting from nuclear war and improve the wellbeing of humans. That, for the next generation, it is going to be the safest world created from the one in which they belong (Ghiassee 238).

3.2.1 Climate Change Mitigation

To fight climate change, we must redirect funds towards various projects, such as solar, wind, and hydroelectric power generation; energy-saving; restoring forests; and alternative travel that is friendly to the environment, in order to fight climate change. The targeted activities reduce

the level of carbon dioxide, thereby controlling climate change and meeting the needs of the green economy. Massive funding for such activities can minimize the risk of increased ocean water levels and ensure an adequate water supply for future generations. Together with this, these measures also provide for clean electricity generation—considerably safer on the environment compared to fossil-fuel power plants—and support global efforts against the climate crisis (IPCC).

3.2.2 Sustainable Development

Sustainable development policies redirect funds to promote sustainable agricultural practices, enhance water management, preserve biodiversity, protect the environment, and integrate them with urban planning and infrastructure. These are projects that are not only indispensable from a purely economic point of view in terms of growth but also in terms of long-term social equity and environmental stewardship. Investment in sustainable development is crucial for combating such world problems as poverty, inequality, and environmental degradation and promoting resilient, inclusive, and environmentally friendly pathways to prosperity. The UN has the deep conviction that these actions are very relevant to achieving Sustainable Development Goals and to eradicating poverty, as well as to good health and well-being for both present and future generations (UN).

3.3 Peace and Security

The United Nations eradicates war and seeks to obtain peace through various resolutions and programs. Global cooperation is required to establish diplomacy and an intergovernmental collaborative effort. Cooperation gives way to trust that allows countries to work together on common problems concerning the environment, public health, and humanitarian issues. The World Bank underlines that global peace, security, and prosperity must be based on diplomacy. It is only

through resource, expert, and political will-sharing that countries can respond to global challenges more effectively, provide greater stability, and be better prepared for future tensions or violence (World Bank).

3.3.1 Conflict Prevention and Diplomacy: Enhancing Cooperation for Global Stability

The conflict prevention effort raises awareness about addressing the root causes of conflicts by dealing with problems such as poverty, inequality, and environmental degradation. Resources could then be allocated to programs for financial amelioration, social inclusion, and good governance, with much greater effect on risk reduction concerning conflicts driven by a lack of resources, competition, or grievances. Investments in both sectors therefore help countries create stability, promote social integration, and increase their ability to withstand the pending tension and violence. In this perspective, the United Nations reiterates that there needs to be an exertion of positive efforts in fighting any war for the achievement of peace and security, quoting significant resolutions and programs for the prevention of such crises that result from the escalation of small-scale conflicts (United Nations).

At the same time, global cooperation is introducing space for new dimensions of diplomatic involvement and collaboration between governments. Together, in addressing assorted problems—be they environmental difficulties, public health emergencies, or crises of a humanitarian nature—coordinated action serves to reinforce the confidence in and invigorate the strength of international cooperation. It is through resource, knowledge, and political will pooling that countries can better and, in a more sustainable way, jointly tackle difficult global challenges. An example of the same is the World Bank, which primarily exists to promote diplomatic

cooperation in seeking to achieve common goals such as global peace, security, and economic well-being (World Bank).

3.4 Technological Innovation Driving Economic Growth and Global Development

Eventually, technological innovation could replace the security mechanisms with substitute ones, verification tools, and supervision systems supporting compliance with obligations under the disarmament treaties. Another thing is that energy technologies, especially renewable ones, can replace nuclear power and thus make a contribution to the enhancement of nuclear disarmament. It would also imply shifting money into areas of pivotal technology such as renewable energy, health technology, education technology, and sustainable infrastructure. With a view to creating pathways for economic growth through responses to global challenges, R&D investments serve as a way toward creating cutting-edge technologies, products, and services that would lead the world toward economic growth. Such investments in R&D increase human knowledge and result in applicative solutions that help move societies onto a pathway toward a sustainable and prosperous future. In its report, the World Economic Forum underscores that investment in R&D is considered one of the leading predicates of the setting of development trajectories at a global scale (WEF).

3.5 Nuclear Disarmament Initiatives to Promote International Peace and Security

Nuclear disarmament efforts are aimed at primarily reducing the number of weapons available with states and reducing threats connected with their proliferation. These may include arms control agreements like START, confidence-building measures, transparency, and verification. Confidence is inbuilt through disarmament, and at the same time, conflicts are reduced and regional cooperation enhanced. The reinforcement of non-proliferation norms by such an approach strengthens global security, reducing the risks of nuclear terrorism. Secondly, beating

swords into ploughshares through shifting from deterrence to dialogue by disarmament opens up new opportunities for cooperation in diplomacy to resolve conflicts, hence promoting international peace and security in the modern-day geopolitical environment (WEF The Global Risks Report 2020).

3.5.1 Confidence-Building Measures

CBMs are diplomatic instruments whose purpose is to enhance transparency and build trust among countries involved in disarmament treaties or military relations. Their efforts target the minimization of conflict risks through the promotion of communication channels, increasing predictability with respect to military actions, and minimizing misunderstandings. Key CBMs include information exchange, in which countries share military data so as to build mutual understanding and, consequently, trust. Verification mechanisms, such as inspections, facilitate transparency and compliance in disarmament agreements. Military exercises are carried out jointly in some places, which demonstrate good will, enhance cooperation, and create interoperability. Besides, crisis hotlines have facilitated communication between nations to rapidly respond and cool down impending critical situations (Kroenig).

3.5.2 Conflict Resolution

In particular, the disarmament of nuclear arms changes the strategic calculus of resorting to warfare for nations. It is through the hepatization of the credibility and perceived utility of nuclear arms as a coercive or aggressive tool that the processes of disarmament reduce the incentives that may lead states to use military force. In their place, disarmament fosters diplomacy through negotiations and the peaceful resolution of disputes. Besides reducing incentives for the escalation of force and the risks of war, disarmament provides an enabling environment in which

dialogue, cooperation, and confidence-building measures can be fostered between neighboring countries. Thus, the danger of nuclear escalation decreases, and the will for regional cooperation and joint defenses—a sort of preventive measure against outbreaks of conflict—is enhanced, thereby lessening tension and the chances of conflict. Strengthened regional security frameworks run in parallel to the processes connected with disarmament agreements, resulting in more stability, trust, and mutual security among neighboring states. Disarmament provided for an increase in transparency, communication, and cooperation—all elements that go on to create a durable framework for conflict resolution and regional peace (Thakur and Schnabel).

3.5.3 Norms of Non-Proliferation

Disarmament leads to the reduction of nuclear weapons and reinforces compliance with nonproliferation norms, such as the NPT, through obligations under a treaty in the long term. In doing so, leading-by-disarmament builds confidence among states, reinforces the world's regime on nonproliferation, and furthers cooperation on safeguards agreements and export controls. By reducing the weapons, disarmament reduces access to weapons by any non-state actors and diminishes the risk of nuclear terrorism. By these means, disarmament reinforces the security of nations and contributes to global peace and security (Joyner).

3.6 Diplomatic Opportunities

Disarmament leads to the reduction of nuclear weapons and reinforces compliance with nonproliferation norms, such as the NPT, through obligations under a treaty in the long term. In doing so, leading-by-disarmament builds confidence among states, reinforces the world's regime on nonproliferation, and furthers cooperation on safeguards agreements and export controls. By reducing the weapons, disarmament reduces access to weapons by any non-state actors and

diminishes the risk of nuclear terrorism. By these means, disarmament reinforces the security of nations and contributes to global peace and security.

3.6.1Diplomatic Opportunities: Building Trust through Disarmament Initiatives

Disarmament campaigns prove a nation's commitment to the reduction of nuclear reliance and a peaceful resolution of conflicts through dialogue rather than by nuclear threats. It develops confidence and sets foundations of trust amongst nations through an open and predictable military approach. As the disarmament process goes on, the more willing a country becomes to participate in cooperative dialogues related to controlling arms and non-proliferation issues (Waltz730–45).

Bilateral and multilateral negotiations, diplomatic talks, and institutionalized venues are the channels through which diplomatic efforts at disarmament progress. These are the channels where countries pursue their set objectives in disarmament, exchange technical expertise, and coordinate verification and enforcement efforts. Such channels provide all the confidence-building processes of transparency, joint inspection, and information exchange that are so important in enhancing world peace, security, and success in reaching set disarmament goals (Bunn and Flavin).

3.6.2 Conflict Prevention and Resolution

Disarmament has emerged as a decisive tool for conflict prevention and resolution because it recalibrates the dynamics of security and reduces incentives for belligerence among states. This course of action minimizes its appeal to nuclear weapons and makes states seek resolution through their differences using diplomacy rather than military deployments. Such a shift in strategy heralds a much less nuclear-conflict-prone world and furthers discourse, cooperation, and trust-building among nations. Besides, disarmament furthers the establishment of regional security architectures based on stability, cooperation, and the means to prevent and resolve

conflicts—what is normally referred to as transparency and confidence-building measures. On the whole, advocacy for disarmament tends to create an enabling global environment that can assist in the resolution of international disputes where coercive means are lacking, as propounded by Jervis in 1984 (Jervis).

3.6.3 Regional Security Cooperation

Disarmament processes can contribute immensely to regional cooperation and security by pointing out structural reasons for insecurity and creating a means for the initiation of diplomatic solutions among neighboring states. By reducing military capability and demonstrating political will for peaceful resolution, disarmament has the effect of reducing security threats while at the same time enhancing mutual trust in the region. This trust puts forward conversation on many issues to do with security, especially the control of arms and confidence-building, and enables joint security arrangements. Even more significantly, de-escalation and stability are achieved by arms limitation measures and/or the establishment of demilitarized zones. The confidence-building measures, entailing military exchange and crisis communication mechanisms that are transparent, enable both sides to clarify misconceptions and avoid accidental conflicts. Joint peacekeeping operations or cooperative military exercises undertaken by both parties reaffirm the stability of the cooperation existing in the region. They provide closer ties among the neighboring states in tackling joint security threats. Indeed, these disarmament initiatives play a very instrumental role in improving regional safety collaboration and fostering lasting security relationships (Mearsheimer5–49).

3.6.4 Multilateral Diplomacy

In most cases, disarmament generally involves more than one nation; therefore, multilateral diplomacy becomes almost a prerequisite for arriving at comprehensive disarmament treaties. It guarantees the presence of the parties concerned; it gives more credibility and universality to the agreements or accords by providing a clear channel for communication, sharing information, and negotiations through bodies such as the United Nations. Multilateral mechanisms institutionalize monitoring and verification mechanisms and structures of compliance assessment through which the fulfillment by states of commitments regarding disarmament may be realized. (UN)

Further, such cooperation among countries strengthens the norms and institutions of arms control and non-proliferation, placing global security on stable and predictable ground. The disarmament processes generally served international diplomacy by providing a base for cooperation based on mutual security interests and a possible basis for assuming a more inclusive approach to tackle global security issues. This enhances effectiveness and offers a broader scope for sustainable international governance measures pertaining to security (UN).

In this regard, the prohibition agreement in a world order of nuclear weapons and the ways to achieve disarmament benefits will be prerequisites for global peace and security. The prohibition of such weapons prevents the spread of nuclear weapons and aims to minimize the chances of disastrous wars. Pathways to disarmament dividends would reallocate military expenditures to socio-economic development, leading to universal stability and prosperity. Both are international cooperative processes in which politics requires innovative approaches to deal with the new geopolitical realities of the future.

Conclusion

The current research highly discusses and investigates the role of the 2017 UN treaty on the prohibition of nuclear weapons (TPNW) and its potential impacts on global efforts to achieve sustainable development goals (SDGs) related to poverty, health, inequalities, environment, and peacebuilding, as well as its role in the political field. This dissertation also attempted to explore the growth of the treaty implementation and the challenges that faced it. In addition, it examines the development of the treaty and its progress at the political and geopolitical levels furthermore. The study seeks to analyze the benefits of implementing the treaty on the prohibition of nuclear weapons (TPNW) in different fields and its future impacts to shape a new reality for nuclear use.

The Treaty on the Prohibition of Nuclear Weapons is a step toward the possibility of global disarmament and sustainable development. Prohibition of the development, testing, production, acquisition, possession, and stockpiling of and the threat of use of nuclear weapons reduces the probability of nuclear war, which in turn helps set up conditions for sustainable development. Nuclear weapons are tragic for the world: they eradicate the lives of millions of people; they cause environmental damage from their explosive forces; and they contaminate the planet with radioactivity for a long time to come. Prohibition of such weapons helps in saving human lives, protecting ecosystems, and ensuring the planet for the future. These resources, used to preserve and upgrade nuclear armaments, could be used otherwise for other, more constructive purposes, like healthcare, education, poverty relief, and the mitigation of climate change. Thus, such reallocation of resources will help reach the Sustainable Development Goals set by the UN. The essence of the Treaty on the Prohibition of Nuclear Weapons is the combination of

principles of global security and sustainable development, namely peace, security, and the well-being of present and future generations.

Appendix

Treaty on the Prohibition of Nuclear Weapons

Article 1 Prohibitions

1. Each State Party undertakes never under any circumstances to:

(a) Develop, test, produce, manufacture, otherwise acquire, possess or stockpile nuclear weapons or other nuclear explosive devices;

(b) Transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly or indirectly;

(c) Receive the transfer of or control over nuclear weapons or other nuclear explosive devices directly or indirectly;

(d) Use or threaten to use nuclear weapons or other nuclear explosive devices;

(e) Assist, encourage or induce, in any way, anyone to engage in any activity prohibited to a State Party under this Treaty;

(f) Seek or receive any assistance, in any way, from anyone to engage in any activity prohibited to a State Party under this Treaty;

(g) Allow any stationing, installation or deployment of any nuclear weapons or other nuclear explosive devices in its territory or at any place under its jurisdiction or control.

Article 2 Declarations

1. Each State Party shall submit to the Secretary-General of the United Nations, not later than 30 days after this Treaty enters into force for that State Party, a declaration in which it shall: (a) Declare whether it owned, possessed or controlled nuclear weapons or nuclear explosive devices and eliminated its nuclear-weapon program, including the elimination or irreversible conversion of all nuclear-weapons-related facilities, prior to the entry into force of this Treaty for that State Party; (b) Notwithstanding Article 1 (a), declare whether it owns, possesses or controls any nuclear weapons or other nuclear explosive devices; (c) Notwithstanding Article 1 (g), declare whether there are any nuclear weapons or other nuclear explosive devices in its territory or in any place under its jurisdiction or control that are owned, possessed or controlled by another State.

2. The Secretary-General of the United Nations shall transmit all such declarations received to the States Parties.

Article 3 Safeguards

1. Each State Party to which Article 4, paragraph 1 or 2, does not apply shall, at a minimum, maintain its International Atomic Energy Agency safeguards obligations in force at the time of entry into force of this Treaty, without prejudice to any additional relevant instruments that it may adopt in the future.

2. Each State Party to which Article 4, paragraph 1 or 2, does not apply that has not yet done so shall conclude with the International Atomic Energy Agency and bring into force a comprehensive safeguards agreement (INFCIRC/153 (Corrected)). Negotiation of such agreement shall commence within 180 days from the entry into force of this Treaty for that State Party. The

agreement shall enter into force no later than 18 months from the entry into force of this Treaty for that State Party. Each State Party shall thereafter maintain such obligations, without prejudice to any additional relevant instruments that it may adopt in the future.

Article 4 Towards the total elimination of nuclear weapons

1. Each State Party that after 7 July 2017 owned, possessed or controlled nuclear weapons or other nuclear explosive devices and eliminated its nuclear-weapon program, including the elimination or irreversible conversion of all nuclear- weapons-related facilities, prior to the entry into force of this Treaty for it, shall cooperate with the competent international authority designated pursuant to paragraph 6 of this Article for the purpose of verifying the irreversible elimination of its nuclear-weapon program. The competent international authority shall report to the States Parties. Such a State Party shall conclude a safeguards agreement with the International Atomic Energy Agency sufficient to provide credible assurance of the non-diversion of declared nuclear material from peaceful nuclear activities and of the absence of undeclared nuclear material or activities in that State Party as a whole. Negotiation of such agreement shall commence within 180 days from the entry into force of this Treaty for that State Party. The agreement shall enter into force no later than 18 months from the entry into force of this Treaty for that State Party. That State Party shall thereafter, at a minimum, maintain these safeguards obligations, without prejudice to any additional relevant instruments that it may adopt in the future.

2. Notwithstanding Article 1 (a), each State Party that owns, possesses or controls nuclear weapons or other nuclear explosive devices shall immediately remove them from operational status, and destroy them as soon as possible but not later than a deadline to be determined by the first meeting of States Parties, in accordance with a legally binding, time-bound plan for the

verified and irreversible elimination of that State Party's nuclear-weapon program, including the elimination or irreversible conversion of all nuclear-weapons-related facilities. The State Party, no later than 60 days after the entry into force of this Treaty for that State Party, shall submit this plan to the States Parties or to a competent international authority designated by the States Parties. The plan shall then be negotiated with the competent international authority, which shall submit it to the subsequent meeting of States Parties or review conference, whichever comes first, for approval in accordance with its rules of procedure.

3. A State Party to which paragraph 2 above applies shall conclude a safeguards agreement with the International Atomic Energy Agency sufficient to provide credible assurance of the non-diversion of declared nuclear material from peaceful nuclear activities and of the absence of undeclared nuclear material or activities in the State as a whole. Negotiation of such agreement shall commence no later than the date upon which implementation of the plan referred to in paragraph 2 is completed. The agreement shall enter into force no later than 18 months after the date of initiation of negotiations. That State Party shall thereafter, at a minimum, maintain these safeguards obligations, without prejudice to any additional relevant instruments that it may adopt in the future. Following the entry into force of the agreement referred to in this paragraph, the State Party shall submit to the Secretary-General of the United Nations a final declaration that it has fulfilled its obligations under this Article.

4. Notwithstanding Article 1 (b) and (g), each State Party that has any nuclear weapons or other nuclear explosive devices in its territory or in any place under its jurisdiction or control that are owned, possessed or controlled by another State shall ensure the prompt removal of such weapons, as soon as possible but not later than a deadline to be determined by the first meeting of

States Parties. Upon the removal of such weapons or other explosive devices, that State Party shall submit to the Secretary-General of the United Nations a declaration that it has fulfilled its obligations under this Article.

5. Each State Party to which this Article applies shall submit a report to each meeting of States Parties and each review conference on the progress made towards the implementation of its obligations under this Article, until such time as they are fulfilled.

6. The States Parties shall designate a competent international authority or authorities to negotiate and verify the irreversible elimination of nuclear-weapons programs, including the elimination or irreversible conversion of all nuclear- weapons-related facilities in accordance with paragraphs 1, 2 and 3 of this Article. In the event that such a designation has not been made prior to the entry into force of this Treaty for a State Party to which paragraph 1 or 2 of this Article applies, the Secretary-General of the United Nations shall convene an extraordinary meeting of States Parties to take any decisions that may be required.

Article 5 National implementation

1.Each State Party shall adopt the necessary measures to implement its obligations under this Treaty.

2. Each State Party shall take all appropriate legal, administrative and other measures, including the imposition of penal sanctions, to prevent and suppress any activity prohibited to a State Party under this Treaty undertaken by persons or on territory under its jurisdiction or control.

Article 6 Victim assistance and environmental remediation

1-Each State Party shall, with respect to individuals under its jurisdiction who are affected by the use or testing of nuclear weapons, in accordance with applicable international humanitarian and human rights law, adequately provide age- and gender-sensitive assistance, without discrimination, including medical care, rehabilitation and psychological support, as well as provide for their social and economic inclusion.

2. Each State Party, with respect to areas under its jurisdiction or control contaminated as a result of activities related to the testing or use of nuclear weapons or other nuclear explosive devices, shall take necessary and appropriate measures towards the environmental remediation of areas so contaminated.

3. The obligations under paragraphs 1 and 2 above shall be without prejudice to the duties and obligations of any other States under international law or bilateral agreements.

Article 7 International cooperation and assistance

1. Each State Party shall cooperate with other States Parties to facilitate the implementation of this Treaty.

2. In fulfilling its obligations under this Treaty, each State Party shall have the right to seek and receive assistance, where feasible, from other States Parties. 3. Each State Party in a position to do so shall provide technical, material and financial assistance to States Parties affected by nuclear-weapons use or testing, to further the implementation of this Treaty.

4. Each State Party in a position to do so shall provide assistance for the victims of the use or testing of nuclear weapons or other nuclear explosive devices.

5. Assistance under this Article may be provided, inter alia, through the United Nations system, international, regional or national organizations or institutions, non-governmental organizations or institutions, the International Committee of the Red Cross, the International Federation of Red Cross and Red Crescent Societies, or national Red Cross and Red Crescent Societies, or on a bilateral basis.

6. Without prejudice to any other duty or obligation that it may have under international law, a State Party that has used or tested nuclear weapons or any other nuclear explosive devices shall have a responsibility to provide adequate assistance to affected States Parties, for the purpose of victim assistance and environmental remediation

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