

Research Article

Prohibition of Nuclear Weapons: Towards Sustainable Human Security

Intan Soeparna

Faculty of Law, Airlangga University, Surabaya, Indonesia

* Corresponding author: intan@fh.unair.ac.id

Submitted: 23 April 2022 | In revised form: 3 May 2023 | Accepted: 10 May 2023 |
Published: 1 October 2023

Abstract: Using descriptive and analytical legal research, this study analyses the relationship between the Treaty on the Prohibition of Nuclear Weapons (TPNW) and sustainable human security. It involves critically analysing the rules on the prohibition of nuclear weapons and what has been written and argued regarding human security and sustainable human security. The findings indicate that the TPNW consists of legal obligations for all state parties to abolish nuclear weapons as a prerequisite to permanent human security. It also comprises provisions for achieving sustainable human security. Therefore, the total ban on nuclear weapons is meant to protect human security and sustain it by eliminating the factors of insecurity of human beings due to the threat of using nuclear weapons.

Keywords: Nuclear weapon prohibition; nuclear law regimes; permanent human security

1. Introduction

In July 2017, the United Nations General Assembly (UNGA) convened to negotiate a legally binding instrument prohibiting nuclear weapons. The legal instrument points to a full range of activities related to nuclear weapons, such as developing, testing, producing, manufacturing, acquiring, possessing or stockpiling nuclear weapons or other nuclear explosive devices and the threat of using these weapons. Approximately 50 nations adopted the first international Treaty banning nuclear weapons or the Treaty on the Prohibition of Nuclear Weapons (TPNW), with only the Netherlands opposed 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 22 January 2021, with only 59 countries ratifying it out of 86 signatory countries. All

ratifying countries are non-nuclear weapon states, where the majority are developing countries [1].

All nuclear weapon states have refused to sign TPNW because they continue to consider nuclear weapons essential for deterrence reasons. Furthermore, nuclear weapon states (NWS) are also adamant about preserving nuclear weapons as a protection and defence against territorial and national security. The approximate number of nuclear weapons worldwide ranges from 12,705 to 13,080 [2].

In the academic discourse, there is a clash between those who support nuclear proliferation, known as the “proliferation optimists,” and those who oppose it, called “proliferation pessimists.” Kenneth Waltz and other scholars who support proliferation optimism argue that possessing nuclear weapons increases the cost of conflict, thus discouraging leaders from initiating war against nations with nuclear capabilities, and hence, “more may be better.” [3]. Nuclear weapons also assuage security concerns and enable those weaker inabilities to deter stronger adversaries

by reducing their vulnerabilities and the military imbalance [4]. On the other hand, those who opposed to nuclear proliferation optimism argue that if many states possess nuclear weapons, this will increase the chances of conflict and contribute to international instability [5]. Likewise, nuclear proliferation may increase the likelihood of a nuclear accident and unauthorised possession by terrorists of nuclear weapons [6]. It may lead to the endangerment of human security.

Nevertheless, the debate between the existence of nuclear weapons as a token of national security and its impact from the perspective of human security persists until today. NWS focus only on external security threats and consider nuclear weapons a bastion of traditional national security. Meanwhile, the concept of national security is broadening into human security, where the crucial instrument of national security is human security.

The campaign to abolish nuclear weapons from the human security perspective is prevalent. The prohibition of nuclear weapons is one of the measures to promote and protect human security, where the human security perspective underlines the humanitarian consequences and risks of nuclear weapons [7]. Today, the world community recognises sustainable human security, which integrates four pillars of freedom: freedom from fear, want, shame and vulnerability. These pillars of sustainable human security are embedded into political, economic, social and environmental responsibilities [8]. They are reflected in the parlance of sustainable development initiatives developed by the UN, from Millennium Development Goals (MDGs) to Sustainable Development Goals (SDGs).

This study elaborates on the relationship between the TPNW and sustainable human security, in which the TPNW is one of the measures for attaining sustainable human security. The provisions in TPNW are constructing a crucial instrument for human security. Moreover, the TPNW also provides rules for achieving sustainable human security. The link between the TPNW and sustainable human security is that the TPNW provides rules to reassure that state parties are obliged to restrain any activities related to nuclear weapons based on preserving sustainable human security.

The remainder of the paper is structured as follows. The first section introduces the TPNW and the refusal of the NWS to sign the TPNW, including the adamant argument of the NWS to preserve nuclear weapons as a token of national security. The second section outlines the argument on existing rules of nuclear weapons under international law. The third section highlights the existence of nuclear weapons under customary international law. The fourth section elucidates the TPNW to protect human security. The fifth section discusses the relationship between the obligations to prohibit nuclear weapons and sustainable human security. Section sixth concludes.

Descriptive and analytical legal research methods were used in the study. This involved critically analysing the rules on nuclear weapons and what has been written and argued

regarding human security and sustainable human security. The analysis continued by examining several provisions under the TPNW to find its relationship with sustainable human security. Using critical thinking, it was determined that the extensive purpose of the TPNW exceeds the positive obligations of state parties to eliminate nuclear weapons to protect human security. Therefore, the commitment to eliminate nuclear weapons is also a means for attaining and preserving sustainable human security.

2. The Rules on Nuclear Weapons under International Law

The precipice on nuclear weapons could be dated back to the event of the nuclear bombing of Hiroshima and Nagasaki at the end of World War II, where the casualty of the bombing emerged condemnation from civil society at the time. In 1990, the UNGA requested an advisory opinion regarding the legality of nuclear weapons from the International Court of Justice (ICJ). Most judges admitted that any threat or use of nuclear weapons is unconditionally illegal unless acceptable under the law of self-defence. The ICJ also explains that “there is in neither customary nor conventional international law any comprehensive and universal prohibition of the threat or use of nuclear weapons as such” [9]. However, this has changed since the TPNW entered into force. The TPNW is a new international treaty that comprehensively prohibits States Parties from participating in nuclear weapons activities.

Additionally, international law has been evolving towards the goal of nuclear disarmament globally. The 1963 Nuclear Test Ban Treaty recognised the uniquely lethal nature of nuclear radiation and prohibited nuclear testing. The subsequent 1968 Treaty on the Non-Proliferation of Nuclear Weapons, also called the Non-Proliferation Treaty (NPT), defines nuclear-weapon states (NWS)—such as China, France, Russia, the United Kingdom, and the United States—as those states that had manufactured and detonated a nuclear explosive device before January 1967. These states are obligated to prevent the spread of nuclear weapons in their possession. It imposes a specific obligation on NWS to take concrete steps toward total nuclear disarmament. On 3 January 2022, the leaders of the five NPT NWS issued a joint statement on “Preventing Nuclear War and Avoiding Arms Races [10].” Meanwhile, other states that possess nuclear weapons, such as India, Pakistan and North Korea, were not parties to the NPT—North Korea was formerly a party but withdrew in 2003. These countries have conducted nuclear weapons tests. The TPNW mentions its relations with the NPT. In the preamble, TPNW underlines the importance of full and effective NPT implementation, which is the cornerstone of the nuclear disarmament and non-proliferation regime. The core obligation of the NPT and the TPNW seems to be consistent with one another. The TPNW restricts the use of nuclear weapons for all countries—meanwhile, the NPT points to the need for nuclear disarmament by NWS.

Other international agreements address significant environmental and ecological issues regarding nuclear weapon risks. For example, the 1959 Antarctic Treaty prohibits stationing nuclear weapons on the frozen continent. Additionally, the 1967 Outer Space Treaty prohibits the deployment of nuclear weapons in the vastness of outer space and celestial bodies. Moreover, the 1970 Declaration of Principles Governing the Sea-bed and the Ocean Floor prohibits the stationing of nuclear weapons on the ocean floor. Last, the 1977 Environmental Modification Convention prohibits the explosion of nuclear weapons harmful to the environment. These international agreements demonstrate that the deployment, development, and use of nuclear weapons, including testing such weapons, are prohibited under international law [11]. Bleimaier argued that if nuclear weapons are prohibited because of their destructive nature and indiscriminate impact on the civilian population, then any planning related to the development, deployment, and possible use of nuclear weapons would constitute a crime against peace [12]. He referred to the Nuremberg principles that a crime against peace was defined as planning, preparing, and initiating warfare violating international law [13]. Moreover, the impact of nuclear weapons, that is, the mass extermination of civilians, constitutes a crime against humanity [14].

In the most fundamental sense, nuclear proliferation is a moral and humanitarian issue which led to the formulation of the first UNGA resolution [15]. The destructive power of nuclear weapons cannot be contained in space or time. It can cause human suffering and destroy all civilisations of humanity, the generations to come and, eventually, the planet's entire ecosystem. The terrible and indiscriminate effects of nuclear weapons constitute an attack on the integrity of all humankind [16]. The UNGA declares that the use of nuclear weapons is a crime against humanity and a violation of the letter and spirit of the UN Charter [17]. Additionally, the principles of humanity under humanitarian law apply to nuclear weapons [18]. Judge Trindade of the ICJ *Nuclear Disarmament Obligations Case* affirms that the principle of humanity – *raison d'humanité* – *Vis a Vis jus necessarium* must prevail over *raison d'état* [19]. In the same vein, the ICJ declared in the *Jurisdictional Immunities of the State Case* that prohibiting crimes against humanity constitutes *jus cogens* due to violating inherent fundamental human rights [20]. Therefore, nuclear proliferation violates the prohibition of crime against humanity.

3. Nuclear Weapons Under Customary International Law

Customary international law is created by the convergence of two elements, namely, practised by a sufficient number of states and other subjects of international law and *opinio juris sive necessitates*, that is, evidence of a belief that practice is rendered obligatory by the existence of the rule of law [21,22]. The emergence, as *lex lata*, of customary international law on nuclear weapons, may be deduced from the following elements:

3.1. State Practices towards the Disarmament and Prohibition of Nuclear Weapons

State practices are fundamental in determining the emergence of customary international law. Prohibition and disarmament obligations related to nuclear weapons have garnered widespread acceptance. As such, numerous international treaties have been formulated to commit to nuclear-free zones or comprehensive measures to prohibit these weapons [23]. Today, modern state practices contribute to a trend toward regionalism for creating local nuclear weapons-free zones or a zone of peace of various types that have been successfully achieved [24]. This collaboration among smaller groups of states may provide more feasible opportunities for a comprehensive law on nuclear weapon prohibition in advance [25].

However, some states, especially NWS, consistently assert the practice of nuclear deterrence to defend against an attack on their security interests. For example, in *The Manual of the Law of Armed Conflict*, the United Kingdom declares the use of nuclear weapons only for self-defence under extreme circumstances. Likewise, The United States would consider deploying nuclear weapons under extreme circumstances to defend its vital interests and those of its allies and partners. Therefore, the practice of NWS of maintaining nuclear weapons diminishes the legal relevance of state practice toward the prohibition of nuclear weapons [26].

3.2. Nuclear Weapons Prohibition based on *opinio juris*

Two different arguments indicate the establishment of *opinio juris* on the prohibition of nuclear weapons. The proponents of the illegality of nuclear weapons argued that the absence of nuclear detonation since 1945 is evidence of *opinio juris*. Thus, the use of weapons is unlawful. On the contrary, the states that adhere to the nuclear deterrence policy argued that the service of nuclear deterrence is evidence of *opinio juris*, where, in a particular circumstance, the use of nuclear weapons is not unlawful. According to the ICJ, although most countries have refrained from using nuclear weapons since 1945, the non-recourse to nuclear weapons is not considered *opinio juris* [9]. However, a series of UNGA and UNSC resolutions have prohibited the deployment of weapons since 1945. It is rendered *de facto* that the use of nuclear weapons is a violation of international law. The UNGA and UNSC have continuously paid particular attention to nuclear disarmament issues and have reiterated the opposing views and condemnation of all possession of and recourse to nuclear weapons under all circumstances [27]. For example, numerous UNSC resolutions have sanctioned North Korea for non-compliance with the obligation to disarm its nuclear ballistics [28]. The UNGA continually declares nuclear weapons are prohibited through a series of resolutions since Resolution 1653 (XVI) of 24 November 1961. Unfortunately, these resolutions fall short of establishing the existence of an *opinio juris* that may contribute to the

creation of customary international law over the prohibition of nuclear weapons ([9], para. 64).

Despite the efforts to eliminate the use of nuclear weapons under some international agreements, the language of these agreements suggests that state parties recognise the absence of customary norms proscribing nuclear weapons [29]. According to Sheldon, numerous international laws merely regulate particular aspects of nuclear weapons, such as nuclear weapons testing, deployment, and non-proliferation of nuclear weapons. The prohibition of using nuclear weapons has not ascended to customary international law since the international community has not expressly or implicitly consented to a ban on nuclear weapons, as evidenced by state practices. Likewise, the UNGA did not establish a rule forbidding the use of nuclear weapons in all states [30]. Meanwhile, Koplou argued that although the creation of customary international law may not solve all problems related to the proliferation of nuclear weapons, it can play a more significant role if the international society would note the muse of jurisprudence to recognise the extent to which it promotes the values of stability and peace [25].

Although there is insufficient evidence to suggest the prohibition of nuclear weapons under customary international law, the TPNW is a significant occasion for states that support the goal of eradicating nuclear weapons. The TPNW is undoubtedly a triumph for a humanitarian effort to ban nuclear weapons [31]. It precludes state parties from disregarding humanitarian and human rights laws. State parties are barred from developing, testing, producing, manufacturing, acquiring, possessing or stockpiling nuclear weapons. The provisions could be considered special TPNW clauses that strengthen humanitarian law. The TPNW reinforces human rights globally because human rights law aims to protect people from destructive situations such as the impact of nuclear weapons. Moreover, the obligation to protect human rights denotes the protection of the right to life, human treatment, a healthy environment, and the highest standard of health [32]. Furthermore, the right to life encompasses minimising the recourse to lethal force in state law enforcement and, at the same time, planning operations and appropriate medical assistance during the execution of a weapon [33]. The UN Secretary-General Antonio Guterres said, "The TPNW is the product of increasing concerns over the risk posed by the continued existence of nuclear weapons, including the catastrophic humanitarian and environmental consequences of their use" [34].

The TPNW restricts the use of nuclear weapons worldwide (Article 4: Total elimination of nuclear weapons) and demands national implementation (Article 5), where each state party shall adopt the measures necessary to implement its obligations under the TPNW. It also provides victim assistance and environmental remediation. Article 6 underlines the following:

"Each State Party should, with respect to individuals under its jurisdiction who are affected by the use or testing of nuclear weapons, under applicable international humani-

tarian 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."

4. Banning Nuclear Weapons for the Protection of Human Security

The equivocal perceptions on the prohibition of nuclear weapons create the dichotomy of the existence of nuclear weapons in the international community today. Certain countries maintain the classical concept of national security that restricts the scope of security to military threats. Such as NWS preserve the possession of nuclear ballistics for national security reasons. Therefore, NWS demonstrate that possessing nuclear weapons is legitimate for tackling threats against the territorial integrity and domestic political order. Another reason for maintaining nuclear weapons is the global security demand based on superior military resources. This notion is not associated with the current security concept, which includes individual security.

Nowadays, the concept of security has broadened from territorial security to the security of people or individuals[35]. Several authors have developed the idea of security into human security. For example, Krieger argued that security features two critical dimensions. First, security denotes protection from physical harm. Second, it refers to the freedom to access all resources to meet basic needs. His argument underlines the inherent concept of security as protecting human security [36]. Like Krieger, Bajpai also argued that the core of security is human security, which pertains to protection from direct and indirect threats to individual safety and freedom [37]. Additionally, Hampson et al. defined security as the absence of threat to the core of human values, including physical safety, which incorporated physical safety and the protection of fundamental freedom [38]. Later, Tavanti and Stanusch underline that personal security is an integral part of human security, which is frequently interlinked with freedom from fear and includes protecting people from physical harm due to community, political, national and public threats [8]. Additionally, Leaning and Arie identified human security as an underlying condition for sustainable human development. The authors focused on human development's psychological and non-material aspects, where human security is a precondition [39].

In 1994, the UN Development Programme (UNDP) developed the concept of security that focuses on individual security. The UNDP classified human security into two main aspects: safety from chronic threats (e.g., hunger, disease and repression) and protection from sudden and harmful disruptions in daily life [40]. Later, in 2003, the Commission on Human Security defined the new concept of security, which intends to ensure the protection of people instead of states. The concept began with the condition where states frequently failed to fulfil their security obligations, which often even became a source of threat to people. Therefore, the Commission on Human Security urged the shift in

attention from state security to the security of the people and more to human security [41]. Furthermore, in 2012, UNGA resolution 66/290 adopted a common definition of human security that stressed the role of UN Member States in identifying and addressing widespread and cross-cutting challenges to people's survival, livelihood and dignity [42].

Nuclear weapons create a two-dimensional threat to human security. First, the existence and possession of nuclear weapons, even without a nuclear war, entails human insecurity physiologically. Moreover, producing nuclear weapons and their waste could harm humans physically. Müller observed that producing nuclear weapons, even under the deterrence policy, can never be completely fail-safe where malfunctions, technical failures, and human error in nuclear reactors can occur [43]. Nevertheless, the nuclear deterrence proponents argued that eliminating nuclear weapons would decrease the protection of human security since the absence of nuclear weapons would create a condition where countries no longer fear the horror associated with the use of nuclear weapons. In this situation, using other weapons, such as chemical or biological weapons, would become plausible. Therefore, nuclear deterrence has been more effective in preventing wars than any other instrument [44]. Nuclear weapons are primarily valuable for persuasion and deterrence rather than destruction [45]. However, nuclear weapons, even under the realm of deterrence, are still considered a threat to human security.

Second, detonation in the case of nuclear war pertains to anthropogenic risk, which accounts for the spectrum of small events that can escalate to the level of a global catastrophe [46] because the catastrophic effect of nuclear weapons on the world and humanity is immense. The fire effects of nuclear explosions will likely damage humans, the climate and ecosystems. The damage can also lead to a boomerang effect on economic and migration patterns. Incidences of near-misses, false alarms, accidents in and around nuclear weapons, unauthorised or intentional nuclear weapon detonation and nuclear terrorism are the main risks of nuclear weapons [47]. Likewise, producing nuclear weapons will incite the illicit trafficking and malicious use of nuclear and radioactive materials. It will be tremendous for people and the environment if these materials are possessed by terrorists or criminals and eventually become an issue of nuclear security [48]. Therefore, the impact of nuclear weapons will preclude individuals from the freedom to live and create human insecurity. Additionally, it will disrupt the pattern of daily life.

The TPNW came under scrutiny after it entered into force in 2021. It has become a crucial and new instrument for human security. Significantly, protecting human security under the TPNW represents the development of new international laws and policies for human safety. The preamble says:

“The risks posed by the continued existence of nuclear weapons, including any nuclear-weapon detonation by accident, miscalculation or design, emphasises that these risks concern the security of all humanity and that all States share

the responsibility to prevent any use of nuclear weapons.”

Thus, the TPNW is a milestone for preserving freedom from fear of the impact of nuclear weapons and protecting human security. This protection includes medical care, rehabilitation and psychological support for any individuals affected by testing nuclear weapons (Article 6 Paragraph 1 of the TPNW). The obligation to protect human security under the TPNW is significantly associated with eliminating the fear of physical harm. Learning from the deployment of the nuclear arsenal of North Korea and the fear of the impact of possible nuclear detonation has spread worldwide, especially in neighbouring countries of North Korea, such as Japan and South Korea. The ability of North Korea to send a nuclear warhead across the Pacific raised fear among Japanese citizens [49]. Thus, the expectation from implementing the TPNW is eliminating the fear of possible physical harm due to the detonation of nuclear weapons.

Nevertheless, the purpose of the TPNW of promoting human security faces resistance. The TPNW sceptics argue that the Treaty neglects other critical human security dimensions of the harmful impact of nuclear weapons, including the effects on human rights, the environment, and sustainable development. According to them, the preamble of the TPNW only addresses the suffering of victims without recognising the abrogation of their rights [50]. Therefore, to challenge the TPNW sceptics, the following section explains the relationship between the obligations prohibiting nuclear weapons and the other human security dimensions, including sustainable development.

5. Prohibition of Nuclear Weapons to Attain Sustainable Human Security

In general, the freedom from fear of physical harm (e.g. from a violation or, in a broader situation, the impact of the detonation of nuclear weapons) is the core of attaining human security. People can achieve other forms of freedom, such as political freedom, economic facilities and social opportunity when they achieve protective security. However, individuals are unable to exercise their life if these instruments of freedom are removed [51]. Thus, the foremost form of freedom for attaining human security is freedom from fear of physical harm, which is recognised in the parlance of the instruments for international human rights [52].

According to Kofi Annan, human security exceeds personal protection from violent conflict, where the nature of threats includes nuclear weapons. Human security also encompasses the opportunity and freedom to fulfil individual potentials, such as freedom from want and fear and the freedom of future generations to inherit a healthy natural environment [53]. Similarly, the UNDP also profoundly remarked on the transition of cognition from national security to human security. A new dimension of human security is an integrative concept that includes protection for economic, food, health, environmental, personal, community and political [40]. Therefore, personal security protection is integrated into protection from other insecurities such as

hunger, unemployment, disease, conflict and natural or artificial disaster. The concept of the UNDP regarding human security is without the hierarchical background in which all freedoms are interlinked. Based on this concept, human security emphasises responses to threats from multi-sectoral insecurities; thus, it cannot be tackled in isolation through fragmented stand-alone responses. Instead, human security involves comprehensive approaches that require multi-sectoral responses, such as responses to downturns. In turn, the result of downturns, such as conflicts, economic crises or man-made disasters, can lead to human insecurities that should be tackled by years of human development [54]. Human development focuses on opportunities for every individual to participate in the process of shaping and improving their lives [55]. Accordingly, a component of human security is the accommodation of human development. Kofi Annan emphasised that “there will be no development without security and no security without development” [56]. Hence, the relationship between human security and development is inextricably intertwined.

The interdependence between human security and development occurs when human security requires long-term solutions from the perspective of human development. Thus, human security focuses on the sustainability of human development [8].

These aspects refer to the definition of the UNDP on human security that embraces economic, social, individual and environmental elements. Accordingly, the concept of sustainable human security identifies the interplay amongst human security, development and sustainability.

Referring to the aforementioned concept of sustainable human security, prohibiting nuclear weapons can protect human security. Thus, the global prohibition of nuclear weapons (prohibition from production to utilisation) will continue to preserve human security. The global absence of nuclear weapons will likely prevent individual harm, environmental damage, socio-economic degradation, health destruction and food insecurity in the long run. This purpose reverberates throughout the preamble and Article 6 of the TPNW. According to the preamble, a catastrophic nuclear weapon poses grave implications for human survival, the environment, socio-economic development, the global economy, food security and the health of current and future generations and has a disproportionate impact on women and girls. In other words, states must guarantee that nuclear weapons are never used. In this manner, protection is provided to individuals, the environment, socio-economic and health. The guarantee to protect human security should be sustainable and continuous. Based on this notion, prohibiting nuclear weapons is robustly correlated with sustainable human security.

The TPNW is constructing a crucial instrument for human security. Moreover, the TPNW also provides rules for achieving sustainable human security. The rule is a reassurance that state parties are obliged to restrain any activities related to nuclear weapons based on preserving sustainable human security (Article 1 of the TPNW). This obliga-

tion will enable symbiosis with sustainable development [50]. Furthermore, the concept of sustainable development has been incorporated into global targets since 2000, when the UN established global goals in the MDGs. The goals provide a broad and accepted definition of development, including poverty eradication, health, education, environment and gender equality. In 2012, SDGs for 2030 were announced at the UN Conference on Sustainable Development in Rio de Janeiro. The objective of SDGs would cover the entire agenda for sustainability under a set of 17 universal goals. Therefore, the following arguments may be used to analyse the obligation to preserve sustainable human security under the TPNW.

5.1. Individual Safety and Health

Article 1 establishes the obligation to restrain any activities, including developing, testing, producing and manufacturing, acquiring, possessing, transferring, stockpiling, assisting, stationing and deploying nuclear weapons. The rule is relevant to the duty of state parties to avoid the production and manufacture of nuclear weapons based on individual safety and health. High levels of radiation can expose workers at nuclear weapon facilities during the production of nuclear weapons. Moreover, the impact of ionising radiation and the biological effects of radiation on workers led to acute health effects, from burns to cancer, during the production of weapons [36].

Furthermore, a significant health decline occurs because of the testing of nuclear weapons. Test site workers, personnel of armed forces participating in atmospheric weapon testing and people living near nuclear weapon test sites are directly exposed to nuclear fallout. The impact of nuclear fallout has been examined using 16,000 nuclear test workers in Australia since 1982. The result showed that among the nuclear test workers, 23% had cancer due to radioactive exposure. The risk of death due to cancer is 18% higher than the general population in Australia [57]. Similar examination is also conducted on French Polynesia's population from 1966 to 1996. The explosion from nuclear testing in French Polynesia had increased the incidence of thyroid cancer in the local population. This health issue resulted from the radioactive contamination of the local food and water supply [58]. Therefore, the expectation from implementing the obligation under Article 1 is to protect the safety and health of particular groups of people, such as workers, armed forces personnel, and people in general, from the hazardous impact of nuclear weapon testing and production.

5.2. Environment

The negative impact of fallout from nuclear testing is inevitable on the environment. For example, the radionuclide of carbon – 14 exerts a long-lasting effect on the atmosphere (approximately 5730 years) and is extremely difficult to remove. Another example is caesium-137. The impact of

caesium-137 on the environment in terms of radioactivity remains up to 30 years after the nuclear weapon explosion. The concentration of caesium-137 has been found in numerous marine regions worldwide. For instance, nuclear testing in the Novaya Zemlya test site in 1979 provided a significant radioactivity contribution of large concentrations of caesium-137 in the Barents Sea. However, research has detected a decrease in its concentration in 2000 [59]. The change can only be attributed to the absence of nuclear weapons from the testing site in Novaya Zemlya, Russia. Accordingly, if no countries undertake the testing of nuclear weapons today, the global environment will eventually be free from radionuclide contamination. The zero air, water and soil contamination will reduce the health risk for people, plants and animals and save the next generation from the threat of hazardous radiation if testing is permanently ceased.

5.3. Economic Development

In October 2018, the UN convened a meeting regarding Disarmament and International Security. The discussion focused on increasing global military expenditure, acquisition of nuclear weapons, and modernisation. In the debate, a delegation from Thailand emphasised that nuclear weapon funds would be better spent on poverty reduction, universal health or socio-economic development [60]. The worldwide total spending on nuclear weapons is approximately USD 82.4 billion in 2021 (the total calculation of nuclear weapon expenditure of China, France, India, Israel, North Korea, Pakistan, Russia, the United Kingdom and the United States) [61]. Each NWS spent more than USD 1 billion on nuclear weapons. For example, Pakistan spent USD 1.1 billion in developing and stockpiling of approximately 160 nuclear weapons (an estimated 10% of USD 10.256 billion of military spending in 2019) [62]. Meanwhile, in 2018 and 2019, Pakistan underwent a macroeconomic crisis, where the poverty rate increased to 4.4% [63]. Although the robust reason for possessing nuclear weapons is national security, diverting national budgets from maintaining the operational status of nuclear weapons to economic development would be valuable and beneficial. Hence, the obligation of Article 1 of the TPNW intends to eliminate the cost of activities related to nuclear weapons and divert these costs into essential objectives such as economic development.

5.4. Global Peace and Security

Nowadays, the risk of a nuclear weapon being used is higher than at any time since the cold war. During the cold war, the United States maintained nuclear weapons to deter the Soviet Union and its allies from attacking the United States. Unfortunately, the current situation is more precarious. The threat of nuclear weapons has been deteriorating global peace and security. For example, in 2022, the President of Russia is leveraging the threat of nuclear

weapons in war with Ukraine. In the same year, India accidentally fired a missile into Pakistan due to a technical malfunction during routine maintenance. The current issue is the threat from North Korea to launch nuclear weapons if the United States and the Republic of South Korea continue to open hostility through joint military drills in early 2023. These recent events have pushed nuclear weapons back to the forefront of mainstream discourse that global peace and security are unachievable if nuclear weapons still exist [64]. Thus, the only means to eliminate the risk of a nuclear weapon being used is to terminate nuclear weapons production.

The TPNW provides an obligation to terminate nuclear weapons production. Article 2 underlines the commitment of state parties to declare their possession of nuclear weapons and eliminate nuclear weapons production. The declaration under Article 3 of the TPNW is followed by the duty to comply with the International Atomic Energy Agency (IAEA) Comprehensive Safeguard Agreement (CSA). The CSA provides the IAEA with rights and duties to ensure that state parties apply safeguards on all nuclear materials and not divert them into nuclear weapons or explosive devices (Article 2 of the CSA). The safeguard aims to detect the diversion of significant quantities of nuclear materials from peaceful nuclear activities to manufacture nuclear weapons or other nuclear explosives as early as possible. The technical measures for implementing safeguards include observation, review of records and reports, accounting of nuclear materials, destructive and non-destructive measurements, containment and surveillance, and unattended monitoring [65]. The most important factor underpinning the safeguard regime is international political pressure to deter state parties from developing nuclear weapon programmes and preventing them from acquiring nuclear weapons.

Articles 2 and 3 of the TPNW provide credible assurance to the international community that state parties should not divert nuclear materials into nuclear weapons to prevent nuclear proliferation. The advantage of nuclear transparency under these articles will predominantly create a secure environment. It also constitutes a substantial contribution to the preservation of global peace. The expectation of implementing Articles 2 and 3 of the TPNW is that state parties are bound by the obligations to avoid any possibility of the existence of nuclear weapons in a peaceful and sustainable world. Although a world without conflicts may be neither achievable nor desirable, states should avoid escalating conflicts into a nuclear war. Global peace would be achieved when states avoid escalating their conflict into a nuclear war. There are two components of peace, negative and positive peace. The negative peace approach focuses on the prevention of nuclear war [66].

Meanwhile, positive peace is the attitudes, institutions, and structures that create and sustain peaceful societies. Thus, the TPNW provides positive peace when the global community takes action to eliminate nuclear weapons in building sustainable peace and security.

6. Conclusion

Prohibiting nuclear weapons may not be the only means of attaining sustainable human security. The overarching aims of sustainable human security offer essential guidelines for tackling multiple levels of human insecurity. Furthermore, it requires strategies that comprise all efforts to protect human beings, society and the environment from all risks of insecurities. Nuclear weapons are one of the causes of world insecurities by threatening humanity in many aspects. Hence, the total ban on nuclear weapons is one of the measures for accommodating a sustainable strategy for human security.

The effort to ban nuclear weapons was initiated since the nuclear calamity occurred in Hiroshima and Nagasaki. Notably, after the last blast in 1945, the UN has exerted many efforts towards nuclear disarmament, including advocating the elimination of nuclear weapons through resolutions and international agreements. The efforts of the UN have played important roles in providing frameworks for the disarmament and prohibition of nuclear weapons. The TPNW is a current attempt towards the total elimination of nuclear weapons. It consists of legal obligations for all state parties to abolish nuclear weapons as a prerequisite to human security. The TPNW also creates rules to attain sustainable human security. Moreover, several provisions for achieving sustainable human security are an extensive purpose of the TPNW. The positive responsibility of state parties is refraining from disregarding the

catastrophic impact of nuclear weapons on human survival, the environment, socio-economic development, the global economy, food security and health.

Although many studies have been published in the context of the impact of nuclear weapons on human security, this study finds that the absence of nuclear weapons will contribute to the attainment of sustainable human security. The foremost reason is the absence of nuclear weapons will eliminate the worldwide fear of nuclear retaliation by NWS or the possibility of theft by terrorists and the danger of nuclear terrorism activities. Moreover, eliminating nuclear weapons contributes to human health, a clean environment and economic development. In the long run, the absence of nuclear weapons will eliminate possible health problems due to radioactive hazards to individuals directly exposed to the fallout of nuclear testing or the population exposed to air and water contamination. Prohibiting nuclear weapons also contributes to economic development when more NWS divert the expenditure for nuclear weapons into poverty reduction programmes. The last aspect is the protection of the environment. One of the global insecurities is environmental destruction due to man-made disasters. The absence of the production and testing of nuclear weapons will avoid ecological contamination and atmospheric pollutants. Therefore, the relationship between the TPNW and sustainable human security is that rules and obligations under the TPNW are not only to protect human security but also to attain sustainable human security.

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