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Socio-Economic Determinants of Gender-Based Violence [GBV]: SDG Analytics on the Global GBV Scenario With Special Reference to Technology Facilitated Gender-Based Violence and Adolescent Birth Rates

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SOCIO-ECONOMIC DETERMINANTS OF GENDER-BASED VIOLENCE [GBV]:

SDG ANALYTICS ON THE GLOBAL GBV SCENARIO WITH SPECIAL

REFERENCE TO TECHNOLOGY FACILITATED GENDER-BASED VIOLENCE

AND ADOLESCENT BIRTH RATES

By

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Dissertation

Submitted to the Graduate Faculty of the School of Health Science and Practices
in partial fulfillment of the
Requirements for the Degree of

DOCTOR OF PUBLIC HEALTH

New York Medical College
August 2023

NEW YORK MEDICAL COLLEGE
A MEMBER OF TOURO UNIVERSITY

School of Health Sciences and Practice

DEPARTMENT OF PUBLIC HEALTH

DrPH DISSERTATION APPROVAL FORM

Program: Health Policy and Management

Title: "Socio-economic Determinants of Gender Based Violence [GBV]: SDG Analytics on the Global GBV Scenario with special reference to Technology Facilitated Gender-Based Violence and Adolescent Birth Rates"

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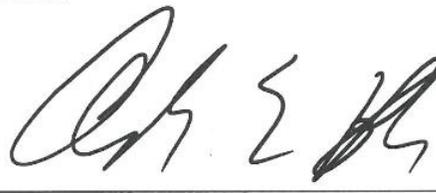
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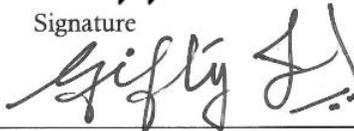
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Abstract

Gender-based violence is a multi-dimensional, centuries-old problem. The most rapidly increasing modern form of violence is the intertwined epidemic of technology facilitated gender-based violence and sexual violence, against women and girls. Understanding the socioeconomic determinants of gender-based violence is essential; the complexities of a higher dependence on technological devices increases exposures to digital violence. A disproportionate impact of violence was observed among women and girls, with an intense impact on the key populations and individuals living with disabilities, in low and middle-income countries. The COVID-19 pandemic has made it critical to investigate the myriad of combinations in modern forms of violence such as Technology Facilitated Gender-Based Violence. A higher reliance on technology has been reflected by the growth of the internet and mobile-phone usage, thereby increasing the bandwidth of exposure to digital violence and sexual violence. Very few studies have investigated the acceleration of the Sustainable Development Goals (SDG) of the United Nations, based on its interlinkage with gender-based violence.

This research presents a global analysis and a country-specific case study on Mexico. The study interlinks findings from: 1. The Public-Private Analytic Exchange Program of the U.S. Department of Homeland Security and 2. Collaborative research with the United Nations Population Fund. This research investigates the global implications of GBV, recommends holistic interagency and gender-inclusive approach, addressing both the victims and the perpetrators; and concludes with the need to integrate a "Technology Facilitated Gender-Based Violence disruptor model". Results from Phase-1 of the SDG analytics exposed the intermediary factors causing technology facilitated

violence and unraveled the socio-economic determinants of gender-based violence. The top-four socioeconomic determinants of GBV, for the year 2021, were: [1] Gender Development Index (GDI: β= 185.03, $p \leq 0.001$, 95% CI: 160.07, 209.99), [2] Economic status - Gross National Income per capita: (GNI: Male: β= 713.28, $p \leq 0.001$, 95% CI: 520.62, 905.95; Female: β= 575.27, $p \leq 0.001$, 95% CI: 458.06, 692.47), [3] Human Development Index (HDI: β= 66.56, $p \leq 0.001$, 95% CI: 53.66, 79.46) and [4] Gender Inequality Index (GII: β= - 56.17, $p \leq 0.001$, 95% CI: -65.6, -46.74). The worst impacted among the female population were the Key Populations (at risk population) and the women and girls living with disabilities. Socio-cultural norms, biases and religious beliefs, impeded the achievement of SDG 5.2 (elimination of violence against women and girls). Results from a multivariate regression analysis on the study-population with SDG 5.2 (Phase-II), indicated a statistically significant unethical use of technology prevalent among the urban male population (β= - 1.25, $p \leq 0.05$, 95% CI: -2.13, -0.36), compared to a positive impact on SDG 5.2 among the urban female internet users (β= 1.18, $p \leq 0.05$, 95% CI: 0.39, 1.97). Misuse of the high-speed internet, mobile subscriptions, 5G integrations (interconnectedness of multiple devices) and innovations, were identified to increase technology facilitated violence. Human trafficking exposed a substantial reliance on technology, for each stage of its criminal activity. The unethical use of technology was found to amplify vulnerability, sustain victimization beyond physical boundaries, and impact global productivity and security. Consequentially, it was essential to understand and integrate the mitigation measures presented by the Public-Private Analytic Exchange Program (U.S. Department of Homeland Security) to disrupt and end digital violence. Phase-III of the study revealed the impact of a set of country-

specific interventions which involved youth participation and interagency-approach, leading to a drop in Adolescent Birth Rates by 2%, significant reduction in digital violence which was supported by a strict punitive law, in Mexico. The predictive analytics of Phase-IV on SDG 5 provided the foresight and paved the way to prepare for emerging threats against women and girls. A business model and TF GBV disruptor strategy was developed based on the findings. TF GBV is a public-health and public-safety concern; however, it has not yet been considered a crisis that could adversely impact the career, health and life of a victim. The results of this study point to the importance of focusing on gender development and the ethical use of the technology. This study concludes that digital connectivity has been used as a tool for repression and coercion, particularly against women and girls in the low and middle-income settings. There is an immediate need to empower women and girls, enhance economic autonomy, integrate holistic interagency interventions (engaging public-private sectors), harness technological advances, mitigate cybersecurity threats with a sustained monitoring effort to eliminate violence against women and girls, by 2030.

Keywords: gender-based Violence [GBV], technology facilitated gender-based violence [TF GBV]; adolescent birth rates [ABR]; key populations [KP comprises the population of sex workers, men who have sex with men (MSM), people who inject drugs, transgender people, prisoners, people living with HIV/AIDS)]; sustainable development goals [SDGs]; United Nations Population Fund [UNFPA], Public-Private Analytic Exchange Program of the U.S. Department of Homeland Security [AEP-DHS]; information and communications technology [ICT]; gender development index [GDI]; gross national income [GNI], gender inequality index [GII].

with the United Nations Association-New York Chapter. A special note of thanks to the respected deans of my institution, Dr. Robert Amler, Dr. Benjamin Johnson, and Dr. Mark Kittleson (Head of the Department of Public Health), Mr. Anthony Sozzo (Dean of Student Affairs) of New York Medical College. Special thanks to Ms. Erica Levy (Director of Academic Support, NYMC) for the excellent working opportunity at New York Medical College as a Peer Learning Partner (PLP), in providing academic support and developing a repository of resources (national and international) for the DrPH and MPH candidates, during my DrPH research program at the New York Medical College.

Sincere thanks to Special Agent Anthony Jennings (Drug Enforcement Administration) and First-Class Lieutenant Dr. Stacey Lloyd (New Jersey State Police), for the practical applications and research insights provided from a law-enforcement perspective. Special thanks to Regulatory Officer Ms. Samuel Stewart (New Jersey Department of Health, Office of the Commissioner), for sharing valuable insights on health regulations, from a national and international perspective.

Special thanks to Subin Pradeep (Informational Science, Urbana Champaign, Illinois), Sherwin Dinakar (American High School, San Francisco) and Shruti Krishnakumar (Stuyvesant High School, New York), who participated in my study by creating youth-engagement resource-materials on cybersecurity. The resource-materials are included in the GBV toolkit.

My special acknowledgment and heartfelt gratitude to my family, especially my parents, Mr. Dinakar Paul and Mrs. Pamela Dinakar, for their sincere prayers and support. My parents have been a strong pillar of encouragement and support, cheering me as I completed my Ph.D. in Nutrition and Infectious Diseases (in 2009). Their continued strong

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Chapter 1: Introduction

Gender-based violence (GBV) is a public health crisis. Amidst the rapid technological progress, there exists the subtle problem of perpetration where technology and connectivity could also be used as a weapon for domestic destruction with global repercussions. "People and technology are increasingly interlinked, further enabling the very best, as well as the worst, of humanity". (The White House, 2023).

Dr. Natalia Kanem, the Executive Director of the United Nations Population Fund has prioritized the need to end digital violence which adversely impacts women and girls.

Figure 1 Digital Violence: "The virtual is real."
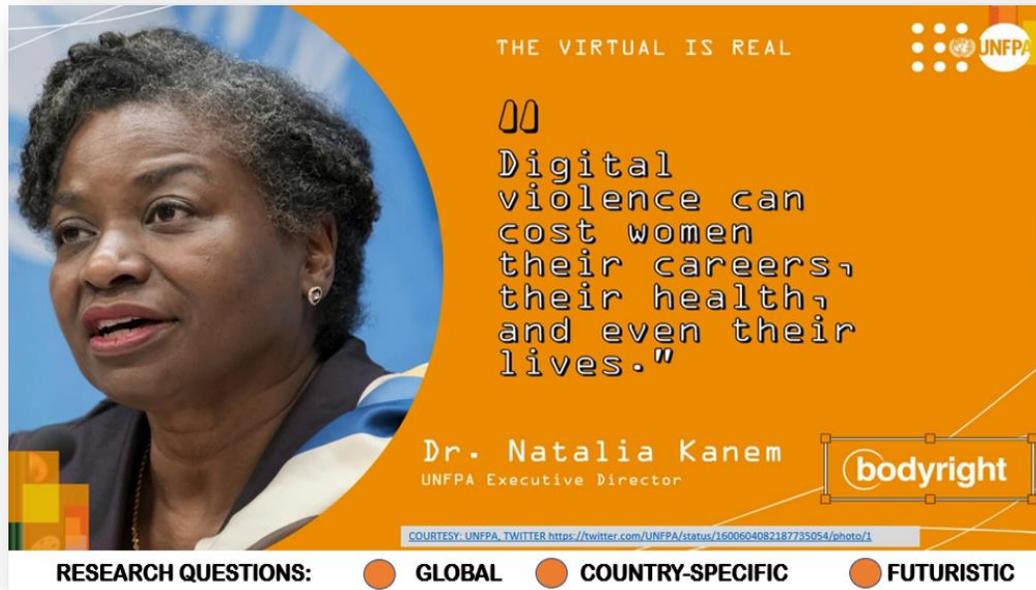
Note: Adapted from "Digital Violence", UNFPA 2021.

This research unfolds the research questions, global findings, a country-specific case study, and predictive analytics, to provide the most recent quantitative metrics to justify the statement of Dr. Kanem, "The virtual is real."

Technological innovation and digitalization are opening a window of opportunities for sustainable development, during a timeline when many aspects of human life are being radically

transformed. The emergence of and the increasing reliance on digital technology and spaces, is a global megatrend, a universal phenomenon that is shaping our current world. Technology has the potential to foster socio-economic growth in several dimensions of health, education, and finances; however, digitalization also serves as a space or a conduit through which harm may be perpetrated. (United Nations Population Fund, 2021). President Joe Biden of the United States of America recently stated that digital connectivity should only be used as a tool to uplift and empower people everywhere, not one used for repression and coercion. (National Cybersecurity Strategy, The White House, 2023).

Very few research studies have quantitative metrics to expose the concrete socioeconomic determinants of the modern forms of violence and harmful practices against women and girls. In the context of understanding the contributing factors that enable GBV, the prevalence of technology facilitated GBV and sexual violence, have been interlinked. This study presents the glaring evidence that digital violence is real by first exposing the socio-economic determinants of GBV.

Background: Addressing the global GBV scenario

"Gender based violence [GBV] is exacerbated in conflict, disaster contexts, among population segments with high risk-behaviors and most importantly GBV has infiltrated and invaded the much overlooked digital-space where different forms of GBV are perpetuated and sustained. This multifaceted public health crisis is pushed to the side burner as a social problem while ignoring its global impact."

- Research Investigator [Chandra P. Daniel]

The digital space has been predominantly used for different forms of communication; how much of this space has been utilized for perpetration, requires a two-edged pointed attention. "Good communication leads to great relationships (devoid of violence); deceitful communications lead to problems in relationships". GBV is further compounded by misaligned practices, social norms, and lack or deficiency in access to health and educational services when compared to the high standards reflected in a nation's policy framework. The best strategy to understand the implications of GBV is to link the impact of GBV at a grass-root level, on the global output and productivity of a country. This research was based on correlating the local GBV prevalence (estimates and actual exposures) with the global indicators to expose the socio-economic determinants of digital violence (Technology Facilitated Gender-Based Violence [TF GBV] which impacts sexual violence, such as Adolescent Birth Rates [ABR].

Introduction to the different types of Gender-Based Violence:

Gender-based violence is a grave violation of human rights and has been deeply rooted in gender inequality, discrimination, and harmful social norms. Gender based violence refers to any form of violence that is predominantly directed against individuals because of their gender or that disproportionately affects individuals of a particular gender. It encompasses various acts of harm, coercion, or control that are rooted in unequal power relationships between genders. GBV primarily affects women and girls, but it can also affect men and people of diverse gender identities. It is to be noted that in today's era, the digital platform can be utilized to trigger different types of violence from a domestic level to a national level, as in the case of human trafficking. This study throws a spotlight on technology facilitated violence which is measured by SDG 5.2 and SDG 9.c. (Ending all harmful practices against women and girls, ICT progress

represented by universal access to technology-internet usage and mobile phone usage) and sexual violence (measured by SDG 3.7.2- Adolescent Birth rates).

Examples of Gender Based Violence (GBV) include:

1. Domestic violence: This includes physical, sexual, or psychological abuse within intimate relationships or family settings.

2. Sexual violence: This refers to any sexual act or behavior that is performed against someone's will or without their consent, including rape, sexual assault, harassment, and trafficking.

3. Intimate partner violence: It involves violence or abuse perpetrated by a current or former spouse or partner which may include physical, sexual, or emotional abuse.

4. Female genital mutilation (FGM): It involves the partial or total removal of the female external genitalia for non-medical reasons, often carried out on young girls.

5. Forced marriage: This is when someone is coerced or compelled into a marriage without their free and full consent.

6. Honor killings: These are killings carried out against individuals, typically women, who are perceived to have brought dishonor or shame to their family or community.

7. Harassment: It includes unwanted and unwelcomed behaviors such as sexual advances, stalking, online harassment, and verbal or physical intimidation.

Gender based violence has severe physical, psychological, and emotional consequences for the survivors and can perpetuate cycles of violence and oppression. Efforts are being made

to globally address and prevent GBV through legislation, awareness campaigns, support services, and education on gender equality. It is essential to understand the socioeconomic determinants of GBV which is reflected in the Sustainable Development Goals (SDG) of the United Nations. The age structure (median age of male and female populations) is a critical component to be studied in the context of maximum exposures to GBV.

During COVID-19, with an increase in death rates, isolation protocols, mental health problems, and amplified reliance on technology, there was an urgent need to investigate domestic disturbances and power-control dynamics among the study-population. Considering the types of family structures (blended families versus other family structures), the blended families reported a higher level of domestic disturbances, litigations, gender stereotyping, and socio-cultural norms which were found to reflect a higher and acute exposure to GBV when compared to other types of family structures. Considering the type of personalities which are more prone to exhibit the nature of perpetration, narcissistic traits top the list as the most common trait, that drives power-control and abuse.

Digital violence or Technology Facilitated Gender Based Violence [TF GBV]

According to the United Nations Population Fund [UNFPA], technology facilitated gender-based violence (TF GBV) is defined as follows:

"An act of violence perpetrated by one or more individuals that is committed, assisted, aggravated and amplified in part or fully by the use of information and communication technologies or digital media, against a person on the basis of their gender." United Nations Population Fund (2021)

Forty-one types of TF GBV are listed and defined by UNFPA's technical document titled 'Making All Spaces Safe'. UNFPA (2021) and UNESCO (n.d.). Since the pandemic, there has

been an increased appetite for tech-solutions designed to enhance access to information and services for survivors of gender-based violence (GBV) and harmful practices. Yet, this proliferation of technology is largely unregulated from a "do no harm" perspective. Therefore, despite its creators' good intentions, technology can create additional spaces where women are at risk of harm. (UNFPA, 2023)

Digital violence which has been overlooked as a threat to the life and the career of women, is emphasized with quantitative metrics in this study. Technology facilitated violence has been reported to have had its share of adverse repercussions in real-life evidenced by a rise in technology facilitated gender-based violence, sexual violence reflected by harmful online communications, threats, sustained victimization, and teenage pregnancy rates. It is important to understand the ramifications of the GBV-landscape, with the intertwined impact of the progress in technology coupled with an increased dependence on technological devices, was a result of the COVID-19 pandemic. Internet usage and mobile usage have increased tremendously; futuristic goals of the tech-giants indicate a steep upward trend in the usage and interlinking of technological devices to promote health, safety, and well-being. The ethical and wise usage of technological devices is analyzed from an SDG standpoint and an anthropological perspective, in this study, to understand and tackle the social and global GBV problem with a country-specific case study and predictive analytics. Two components of gender-based violence are prioritized in this research: the correlation of GBV with digital violence (Technology Facilitated Gender-Based Violence-TF GBV) and sexual violence (Adolescent Birth Rates-ABR).

The UN's Report of the Special Rapporteur on Violence Against Women defines *online violence against women* as "any act of gender-based violence that is committed, assisted or aggravated in part or fully by the use of ICT, such as mobile phones and smartphones, the internet,

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social media platforms or email, against a woman because she is a woman, or that affects women disproportionately." (United Nations, 2018).

The Role of the United Nations and the 17 Sustainable Development Goals:

The United Nations' sixty-second session on the Commission on the Status of Women (CSW 62) reaffirmed the Beijing Declaration and Platform for Action. The reaffirmation emphasized the urgency of eradicating poverty, fulfilling the rights of women and girls to an adequate standard of living, to a life free of violence and harmful practices, to land and productive assets, food security and nutrition, decent work, education, and health, inclusive of sexual and reproductive health and rights. (Based on E/CN.6/2018/3, paras 3 and 43).

Sustainable Development Goals [SDGs]

The Sustainable Development Goals (also known as the 'Global Goals') of the United Nations exposes the quantifiable socioeconomic determinants that fuel different forms of GBV (which includes TF GBV) and its repercussion on other forms of violence against women and girls. In today's digital world where education, business transactions, social interactions, banking, transportation, shopping, data analysis, and data-storage has moved from the physical realm into the "cloud" or digital realm, this study provides a prevention model with mitigation measures to make 'all spaces safe", for women and girls.

The 2030 Agenda for Sustainable Development, adopted by all the 193 United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. (United Nations Department of Economic and Social Affairs (UNDESA, 2021).

Sustainable Development Goals 5.2 and 3.7*:*

The SDG 5 targets "Achieving gender equality and empowering all women and girls.

Figure 2 *Components of Sustainable Development Goal #5*

Source: United Nations (2022). Sustainable Development Goals Report 2022
Goal 5 infographic, source: https://unstats.un.org/sdgs/report/2022/

The Sustainable Developmental Goal of a country reflects the overall wellbeing of a country and

functions as one of the measurable global metrics that highlight the intricate socioeconomic

determinants of a country and hence the SDG metrics were chosen for this study. SDG 5

includes a specific target (Target 5.2) to eliminate all forms of violence against women and

girls, including gender-based violence, such as domestic violence, sexual violence, and human

trafficking. This study highlights the interconnected web of technology which invariably

multiplies the internet-speed and the potential to control multiple devices from one point, by a

bad actor or a perpetrator responsible for GBV. SDG 5.2 calls for the promotion of gender -

responsive policies and laws to support victims of violence and prevent future exposures. SDG

3.7.2 was also selected to identify the rates of Adolescent Birth Rates which could be an outcome

of GBV and forced early-marriages which adversely impact the education and economic status

of girls. Sexual violence captured by <u>SDG 3.7.2</u> measured Adolescent Birth Rates [ABR] among girls aged 10-14 years and 15-19 years per 1,000 women/girls in that age group.

The 17 Sustainable Development Goals (SDGs) and 169 targets demonstrate the scale and ambition of the new 2030 Universal Agenda. The SDGs seek to build on the Millennium Development Goals and complete what these did not achieve. The SDGs seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economy, societal and environmental well-being. The goals and targets will stimulate action over the next fifteen years in areas of critical importance for humanity and the planet. (UNDESA, n.d.)

According to the World Health organization and the United Nations Women, one in three women suffer some form of violence (Figure 3.) and recent findings indicated that more than 60% of women and girls had encountered some form of cyberviolence and technology facilitated GBV [TFGBV] compared to more than 30% exposed to some form of GBV; an uptick in sexual violence against women and girls during the pandemic also called for further research and innovative GBV interventions. There is a great need for prevention strategies and a call for women to rise as the 'TF GBV Disruptors' in a highly virtual and digital world. If women and girls are not empowered and equipped, the new problem of "digital enslavement", and modern slavery will increase profoundly and bring down the productivity of a nation. In this context, empowerment and gender development programs must be moved to the forefront of fighting TF GBV.

Figure 3. *The magnitude of the problem of Intimate Partner Violence*
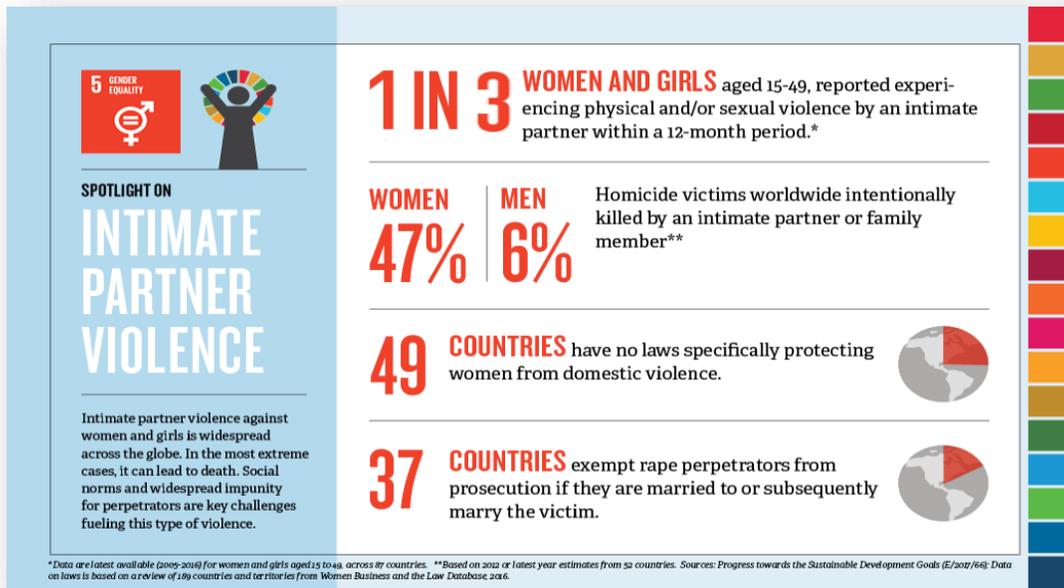
Source: 2016 and 2021 WHO Reports
https://www.who.int/news/item/09-03-2021-devastatingly-pervasive-1-in-3-women-globally-experience-violence

Women's empowerment and economic development are closely related: in one direction, economic development alone can play a major role in driving down inequalities between men and women; on the other-hand, empowering women may benefit development (Duflo, E., 2012), both nationally and globally.

What are Global Indices?

Global indices are instrumental in revealing the socio-economic and environmental determinants that increase or decrease the overall well-being score of a country. Global indicators such as the Gender Inequality Index, Gender Gap Index, Gross National Income, Global Innovation Index, and Human Development index, provide a benchmark to evaluate the socioeconomic strength or weakness of a country. In addition to the SDGs, there are specific global indices that measure the happiness-level, social norms, degree of religiosity, and the crime-levels of each country. These metrics have also been used in correlation with GBV to identify its impact on global indicators. However, there are only very few studies that compile

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the impact of GBV on a compendium of global indicators, which is effectively addressed and prioritized in this study.

Statement of the Problem

Technology facilitated gender-based violence (TF GBV) and sexual violence has been reported as an increasing problem in low- and middle-income countries (LMIC). TF GBV has been rated as one of the most recent and much-overlooked forms of GBV by several United Nations agencies, ever since the onset of the COVID-19 pandemic. The problem of GBV has transcended the physical space and invaded the digital space impacting the vulnerable segments of the global population and having a ripple effect on other forms of violence. A pivotal understanding of a country-specific case-study is essential to obtain a deeper understanding of the GBV landscape of a country, its best practices in terminating GBV, comparable to the global findings. Mexico was selected based on the governmental collaborations and the research support provided by the UNFPA – New York Office and UNFPA-Mexico Office.

Purpose of the Study

The growing problem of GBV, especially TF GBV and sexual violence, must be understood with quantitative and qualitative metrics, from a global and national perspective. It is critical to analyze the GBV data points from an SDG vantage point to understand the global impact of GBV.

The purpose of collaborative research with the United Nations Population Fund [UNFPA]: The United Nations Population Fund has prioritized putting an end to all harmful practices against women and girls by 2030 as one of its three transformational goals and utilized the 'Guidance on leaving no one behind and reaching the furthest behind' (UNFPA, 2022) to address TF GBV among the vulnerable key populations and women living with disabilities; this

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served as the basis to anchor a research collaboration with guidance from the GBV experts of UNFPA.

The purpose of the integration of the parallel research findings from the U.S. Department of Homeland Security (DHS-AEP program, Office of Intelligence and Analysis) was to interweave findings from the DHS-AEP deliverables which threw light on the impact of the unethical use and misuse of technology. The quantifiable metrics obtained from high-level national meetings were critical to highlight the growing problem of attacks in the digital space and to prepare mitigation measures applicable to the GBV scenario.

Theoretical Framework

The theoretical framework of the study was built on the foundational four research questions. The research questions shaped the four stages of this study.

Figure 4. *A Theoretical and Schematic Framework of the study*

Research Question 1: What are the socio-economic and environmental drivers of GBV?

Research Question 2: Do technological advances trigger an increase in the acceleration of SDG 5.2 or does it increase TF GBV?

Research Question 3: How could we apply the global GBV-findings to fill the missing gaps in a country's GBV Prevention efforts? What are the best practices of Mexico in ending TF GBV and ABR?

Research Question 4: Do we have a predictive model to forecast, prepare and equip us for the future scenario of GBV?

Stages of the study:

1. **Phase-1:**

   Data collection and SDG analytics: A review of literature and development of a customized GBV database was completed to identify the predominant and subtle intermediary contributing factors. These factors required an in-depth investigation of its relevant inter-twined relationship with GBV exposures and SDG 5.2. A model GBV database was developed for the following six global regions: Western Central Africa, East South Africa, Arab States, Asia Pacific, Eastern Europe, and Central Asia, and Latin American Countries. Power Sampling was applied to compute the statistical accuracy of the sample-size. The main analytic method used was linear regression and multivariate regression applied to the outcome variable SDG 5.2 and a selected set of independent predictor variables (global indices, Sustainable Development Goals (SDGs), SDG meta- indicators); results reflected the statistical significance and correlate values (positive and negative correlations) contributing to GBV. The socioeconomic determinants were extracted based on the level of statistically significant correlation to SDG 5.2.

2. **Phase-2: Technology Facilitated Gender Based Violence:**

   Collaborative research was undertaken to understand dreadful the impact of digital violence: collaborative research with the United Nations Population Fund and the Public-Private Analytic Exchange Program of the U.S. Department of Homeland Security (DHS-AEP). Findings and inferences from the technical document "Making All Spaces Safe" (UNFPA, 2021) and research findings of the DHS-AEP were integrated into SDG analytics.

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SDG analytics was applied to 122 countries to gauge the prevalence of the harmful use of technology against women and girls. The three components of innovation and technology, correlated with the categorical variable 'gender' (male and female population) and SDG 5.2, were as follows: internet-usage, mobile phone subscriptions, economic autonomy (participation in the workforce), and education.

3. **Phase-3: Country-specific study on Mexico** led to the development of an evidence-based model to identify, prevent, and disrupt TF GBV. Quantitative metrics with statistical correlates which establish the socio-economic determinants of TF GBV and Adolescent Birth Rates (ABR), was applied to construct a prevention model for Mexico (based on the global findings from phase-1 and the GBV-reduction practices of Mexico). Interviews facilitated by UNFPA provided critical data from the policy makers, inter-agencies, global and country-office leaders, GBV specialists and Human Rights experts. A set of youth-empowerment resources were planned, applying youth-engagement strategies to target a reduction in TF GBV and teenage pregnancies.
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4. **Phase-4:** A "TF-GBV specific" future scenario was designed utilizing UNFPA's framework- 'The Four Transformational Future Scenarios'.

Research Questions

This research investigation commenced with the need to probe into the root-cause of the ever-increasing and persistent problem of GBV. The following research questions guided the study:

1. **Research Question 1:** What are the socio-economic and environmental drivers of GBV?

2. **Research Question 2**: Do innovations in technology trigger an increase in GBV? Do innovations significantly impact digital violence (TF GBV) and sexual violence (Adolescent Birth Rates)?

3. **Research Question 3**: What are the best practices applied by Mexico to end GBV at a country-specific-level?

4. **Research Question 4**: Do we have a prediction model that would forecast GBV scenarios and formulate a strategic plan to end TF GBV?

   In a nutshell, the research questions were set to identify the new socioeconomic factors, the hidden influencers of TF GBV, which have a ripple effect on other forms of violence against women and girls. The purpose of the SDG analytics was to strategically shine a spotlight on the existent and futuristic dimension of the socioeconomic determinants of GBV, from a national and global context.

Research Hypotheses

The research questions were encapsulated within two hypothesis statements. The following research hypotheses guided the SDG analytics of this research investigation:

Hypothesis Statement -1 (H1)

Null hypothesis [H1$_0$] Gender inequality does not rank first in its correlation with SDG 5.2 (elimination of violence against women and girls), when compared to the other SDGs and Global Indices.

Alternate Hypothesis [H1$_a$] Gender inequality ranks first in its correlation with SDG 5.2 (has the highest statistically significant correlation with SDG 5.2), when compared to the other SDGs and Global Indices.

Hypothesis Statement-2 (H2)

Null hypothesis [H2$_0$] Internet usage and mobile subscriptions (Technological innovations and ICT progress), does not have a statistically significant impact on gender-based violence.

Alternate Hypothesis [H2$_a$] Internet usage and mobile subscriptions (Technological innovations and ICT progress), has a statistically significant impact on gender-based violence.

Nature of the Study

The study was a cross-sectional and retrospective analysis of the GBV model database. The GBV model database was developed as an outcome of Phase-I of this study, capturing the SDGs and global indices. The study involved applying SDG analytics (correlation of a selected set of variables on the GBV database with SDG 5.2 and GBV exposures (lifetime exposures and exposures in the past 12 months), for the year 2021.

The rationale for the selection of the year 2021, for this investigation was based on data-availability for all global scores by mid-2022, for data analysis. This included the cumulative SDG scores for 2021, year-end values of 2021 global indicators (published by the beginning of

2022). Statistical analysis included quantitative analysis, and linear regression analysis (univariate and multivariate regression models) which was applied to the selected predictor and categorical variables for 2021 datasets. A set of qualitative data was gleaned by using an interview schedule; quantitative data was made available by the National Population Council of Mexico via the United Nations Population Fund, to facilitate a country-specific case-study on Mexico.

The entire study was divided into four phases. The global GBV landscape was analyzed, and the findings were applied to check the GBV scenario and best practices at a country-specific level, to strengthen and expose the neglected intermediary GBV contributing factors.

This research was intertwined with additional research with the DHS-AEP (Public-Private Analytic Exchange Program of the U.S. Department of Homeland Security). Since GBV is not only a domestic crisis but has the capacity to expand and influence national security and national productivity, violence of any nature is considered a threat to national security. Findings and inferences from the AEP research deliverables on Artificial Intelligence, 5G impacts on cybersecurity and deepfake mitigation measures, were applied to phase 2 and phase 4 of this research investigation.

Significance of the Study

A careful assessment of the Intimate Partner Violence (IPV) dashboard of the United Nations Population Fund and the World Health Organization (WHO) estimates indicated that women and girls were the most disproportionately impacted by GBV. There was a great need for in-depth research to identify the subtle and intermediary contributors to the new problem of TF GBV. The year 2021 was chosen for this study to uncover the GBV ramifications in the digital and sexual health of each country, during the COVID-19 pandemic. The problems that surfaced

were a shocking number of women and girls reporting digital harm and teenage pregnancies (measured as "Adolescent Birth Rates") by the SDGs, during and after the peak of the COVID-19 pandemic. This study aims at the demystification and identification of the socio-economic and environmental determinants of gender-based violence; followed by the development of GBV intervention strategies (a TF GBV disruptor model) and culminates with strong policy recommendations to end TF GBV. This study has a profound national and international significance due to the availability of quantitative and qualitative data that supports the gravity of TF GBV and projects the futuristic perspective with predictive analytics to foster preparedness for the unforeseen pandemic of TF GBV.

The gravity of TF GBV as a public health crisis is evident from a publication in the Journal of American Medical Association of Pediatrics by Madigan, S., Eirich, R., Pador, P., McArthur, B. A., & Neville, R. D. (2022), which indicated that toddlers and elementary school children's dependence on a cell phone and digital device reflected by an increase in screen-time by 52 percent. This indicates the extent to which a young child (girls and boys) could stay connected globally and in the process increase their exposure to the vulnerabilities associated with technology. High reliance on the digital world causes an enormous increase in "power-control" tactics skyrocketing in the cyberspace which was attributed to the digital divide (gender-specific ownership of the internet and mobile cell-phone subscriptions). The strategic method applied to identify the intermediary contributors to GBV involved the correlation of GBV indicators with the SDGs and the global indices, thereby shedding light on the predominant and intermediary socioeconomic determinants impacting the landscape of gender-based violence in each country. While SDG 5 reflects the prevalence of gender equality and elimination of GBV in a country, SDG 9 and SDG 17.6, and SDG 17.8 point to the sustainable technological advances in a country.

Definitions of Key Terms

Gender-based violence (GBV). According to the United Nations, GBV stands for "Gender-Based Violence," and it refers to any harmful act that is perpetrated against a person's will and that is based on socially ascribed gender differences. GBV can encompass physical, sexual, or psychological including intimate partner violence, sexual violence, sexual harassment, harmful traditional practices, and other forms of violence. Violence against women and children is the world's most prevalent human rights violation. Gender-based violence (GBV) refers to harmful acts directed at an individual or a group of individuals based on their gender. It is rooted in gender inequality, the abuse of power, and harmful norms. The term is primarily used to underscore the fact that structural, gender-based power differentials place women and girls at risk for multiple forms of violence. While women and girls suffer disproportionately from GBV, men and boys can also be targeted. The term is also sometimes used to describe targeted violence against LGBTQI+ populations when referencing violence related to norms of masculinity/femininity and/or gender norms (United Nations Women, 2019).

Online or digital violence [Technology Facilitated Gender-based Violence (TF GBV)): Online or digital violence against women refers to any act of violence that is committed, assisted, or aggravated by the use of information and communication technology (mobile phones, the Internet, social media, computer games, text messaging, email, etc.) against a woman because she is a woman is called TF GBV.

Online violence can include the following: cyberbullying (sending intimidating and threatening messages), non-consensual sexting (sending of explicit photos or messages without the recipient's consent), Deepfakes (manipulation of videos and pictures to harm and shame a

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victim); Doxing (public release of private or identifying information about the victim). [UN Women, (2019), UNFPA (2021)].

Key Populations. Population characteristics that comprise one or more of the following types of vulnerable individuals: sex workers, transgenders, men who have sex with men (MSM), prisoners, people who inject drugs, and people living with HIV/AIDS. (UNAIDS, 2022).

Figure 5(a). *Key Populations: GBV shapes the risk and exposure to HIV infections.*
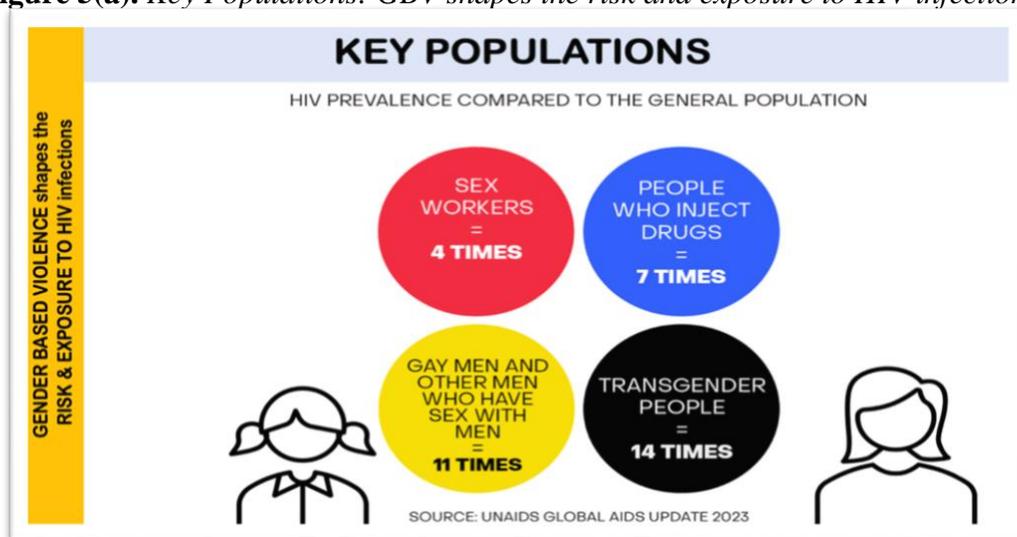
There is growing recognition that deep-rooted, pervasive gender inequalities, reflected in gender-based violence, shape their risk of and vulnerability to HIV infections. (UNAIDS, 2023).

Summary

Gender-Based Violence has taken different forms infesting the digital space with an increase in digital violence since the COVID-19 pandemic. The existing strategies and policies framed to address GBV were geared toward the physical, psychological, economic, and sexual facets of GBV, overlooking the dire impact of TF GBV, which pierces all forms of violence against women and girls. This study sheds light on the global landscape of the socio-economic determinants of GBV with special reference to digital violence and sexual violence.

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Chapter 2: Literature Review

The ecosystem of Gender-Based Violence

The dynamics of digital violence and sexual violence point to very few studies exposing the socioeconomic determinants that fuel these two different forms of violence against women. In today's interconnected world of digital devices, the two forms of violence are racing into an intertwined web of negative outcomes, which if consistently overlooked, will have a threatening impact on domestic and national security. This can be explained only by understanding the extent to which GBV impacts the global indices or national scores of a country and adopting a lifecycle-approach to end GBV at each stage of life. The Intimate Partner Violence (IPV) dashboard is a geospatial dashboard that provides quantitative metrics on GBV rates, education, access to sexual and reproductive health services (SRHS), place of residence, and humanitarian crisis conditions which facilitates consistent monitoring of SDG 5.2.1.

Figure 5(b). *UNFPA's Intimate Partner Violence Dashboard*

Source: UNFPA
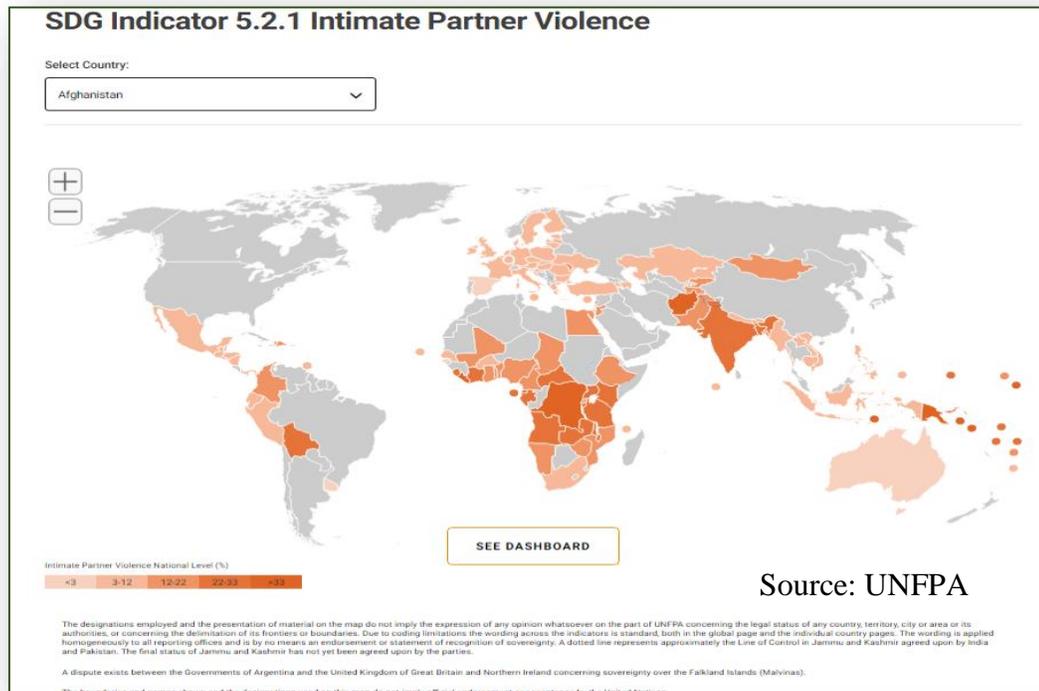
The dashboard highlights the prevalence of GBV to be concentrated in Western Central Africa (WCA), Eastern Southern Africa (ESA), Asia Pacific region (AP), and Latin American Countries (LAC). Selection of one of the countries from the above-listed global regions will bring to light the challenges and best practices in addressing the missing link in GBV interventions. The Latin American Countries indicated heterogeneity in gender inequalities and women's empowerment measures. The ABR was higher by 4% for each 1 standard deviation higher GII (RR 1.04; 95% CI 1.01,1.06), 8% lower for autonomy score (RR 0.92; 95%CI 0.86, 0.99), 12% lower for health-care access score (RR 0.88; 95%CI 0.82,0.95), after adjustment for city level population size, population growth, homicide rates, and sub-city population educational attainment and living conditions scores. (Braverman-Bronstein, A. et al., 2023). This study throws light on the extent to which disrupting GBV would impact ABR. The current scenario indicated a drop in ABR by 2% with best practices adopted to end TF GBV and ABR. Hence, a country-specific study was considered ideal to elicit best practices of Mexico. This study throws light on a method to the madness of TF GBV which is rampant and calls for all genders to increase their knowledge on cyber-hygiene and the ethical use of technology. The pandemic has unraveled the dire impact of gender inequities and exacerbated the GBV problems. According to Rollston, R. et al., (2020) publication in the Lancet, failure to implement comprehensive sex education (CSE) internationally, puts all people at risk for violence. Measures such as lockdowns and physical distancing confined many people to isolated, unsafe places and increased the risk of gender-based violence (GBV). If lockdowns had continued for just yet another year, it is estimated there would have been 61 million more cases of GBV than what would have already been expected. A UNFPA country analysis

in the Arab region concluded that while there is a demand for CSE among the youth, governments, and societies are resistant due to its sensitive nature. (Rollston, R. et al., 2020). CSE should be disseminated in-person and on digital platforms alongside resource materials on cyber-hygiene to arrest the rapid increase in TF GBV. In response to this increase, UN Women launched the 'Shadow Pandemic' public awareness campaign in May 2020. (UN Women Press Release, 2020). Meanwhile, the UN Secretary-General has called for countries to include GBV prevention as a component of COVID-19 recovery plans and to put women and girls at the center of their efforts to recover from COVID-19 (United Nations News, 2020). However, the GBV response-interventions do not have clear-cut interventions presented for the extremely vicious and vindictive torture of technology facilitated violence against women and girls.

The light at the end of the tunnel (ending TF GBV), starts with taking time to digest the socioeconomic determinants of GBV identified in this study, understanding the global implications of GBV, and taking action to build intervention programs using the tools presented in this study. The goal of this research study is to strengthen and add to the GBV prevention toolkit and increase the preparedness to break free from any form of digital enslavement.

According to UN Women, widespread stay-at-home orders to curb the spread of COVID-19 potentially locked women down with their abusers, creating dangerous conditions for violence against women [VAW], often with tragic consequences. Using administrative data from police, violence against women hotlines, and other service-providers, and analyzing big data from online searches and social media posts, UN Women research has found that violence against women and girls has intensified since

the outbreak of COVID-19 with a shocking statistic of one in every three women impacted by GBV in 2020 compared to one in 5 women for the year 2016 and one in 3 women for the year 2020 by WHO 2021 (b). The problem is rapidly increasing in the digital or cyberspace with very few studies and customized programs to prevent TF GBV. Observations indicated reduced support for survivors, and a lack of programs for perpetrators, partly due to operational challenges and reduced funding for law enforcement agencies and local women's organizations. This has led to several warning to end violence against women, by the United Nations' Secretary-General, António Guterres, and former UN Women's Executive Director, who coined the term "shadow pandemic". (UN Women, 2020. UN Secretary General's Policy Brief)

Gender-based violence was associated with barriers to accessing sexual and reproductive health services. Victims of violence can suffer sexual and reproductive health consequences, including forced and unwanted pregnancies, unsafe abortions, traumatic fistula, sexually transmitted infections including HIV, and even death. Failure to analyze and understand the contributing factors and the effectiveness of the support systems and interventions in each country consistently places an increasing number of women and girls at risk for GBV.

The United Nations Agency that has led several initiatives to end GBV has included SDG 5.2 (elimination of all harmful practices against women and girls by 2030) as one of its three transformative goals.

Figure 6. *UNFPA's goal and transformative result to end GBV.*
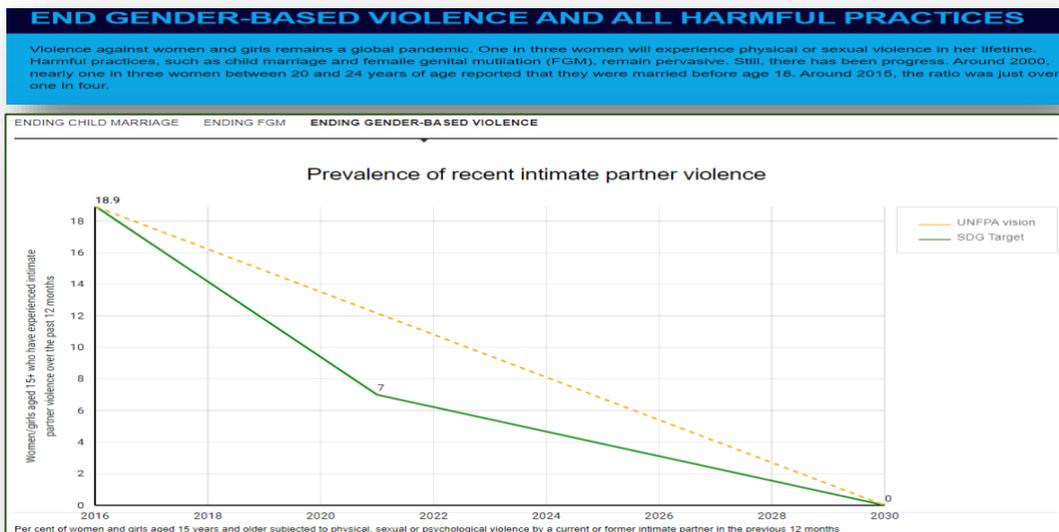
Figure 7. *The role of the United Nations Population Fund in responding to GBV*

Courtesy: Adapted from the UNFPA Transformative Results (2022)

https://www.unfpa.org/data/transformative-results

Keyword Searches:

Keyword searches in the United Nations Statistics Division, the World Bank, the UNFPA -IPV database, the UNDP database, the United Nations Women, the World Health Organization, the ITU (International Telecommunications Union) and PubMed databases resulted in many relevant datasets (see [Appendix A](#)). As gender-based violence is a global concern, the sources for this literature review were global in origin, predominantly from the United Nations.

Table 1

Documentation of the databases, journals, and reports accessed for the research study:

Databases	Journals/Reports
United Nations Division of Statistics	*The United Nations Sustainable Development Goals Report (2022)*
	The United Nations e-library
United Nations Development Program	*The World Development Report (2022)*
World Data	*The World Bank Annual Report. (2022)*
HSIN	*Homeland Security Information Network*
World Bank	
PubMed	*United Nations Statistics Division, United Nations Population Fund*
UNFPA-IPV Dashboard	*The United Nations Joint Program HIV/AIDS- Key Population Atlas*
UNAIDS-KP Atlas	
USAID-DHS data	*United States Agency for International Development - Demographic and Health Surveys*
UN Women	*Report on the UN Women's Global Response to COVID-19*
World Economic Forum	*The Economic Intelligence Unit*
ITU	*ICT Progress*
UNODC	*Violent and Sexual Crime Index*
FBI	*Federal Bureau of Investigation*
DHS-AEP	*U.S. Department of Homeland Security- Public-Private Analytic Exchange Program*

Table 2

Documentation—Search Terms

Main search term	Subsidiary search terms	
"Gender-Based Violence"	+ contributing factors	+ United Nations
	+ socio-economic determinants	+ Technology, ICT, ITU
	+ key populations	+ Adolescent Birth Rates
	+ Safety	+ Cybersecurity
	+ Sustainable Development Goals	+Global Indices
"Technology and Violence"	+ women and girls	+ human trafficking
	+ internet usage	+ screen time
	+ mobile subscriptions	+ mobile phone
	+ broad band subscriptions	+ 5G, AI
Global Impact	+ Technology facilitated violence	+ Policies
	+ GBV statistics	
United Nations	+ "Intimate Partner Dashboard"	+ UNICEF
	+ GBV prevention	+ UNDP
		+ UNDESA
		+UNAIDS

Global analysis of the gender-based violence landscape:

Each phase of this research study was framed around the four research questions, which

was based on an in-depth review of literatures, global reports and country-specific SDG reports.

The Global Goals

The Sustainable Development Goals

The Sustainable Development Goals (SDGs) are called "Global Goals of the United Nations" which aim to end poverty and ensure peace and safety of a country. The SDGs are well-integrated and interlinked. The outcome of one of the SDGs will impact the outcome of other SDGs and that development must balance social, economic, and environmental stability.

Figure 8. *Sustainable Development Goals of the United Nations*

Source: United Nations: Sustainable Development Goals: https://sdgs.un.org/goals [UNDESA]. (n.d.).

The SDGs are designed to end poverty, hunger, gender inequalities, and discrimination. The combination of creativity, technology, and financial resources from all societies is required to achieve the overall SDG target score for each year. Actualizing the SDGs by 2030 could be challenged with an increase in GBV, specifically TF GBV.

The United Nations Population Fund [UNFPA] is implementing integrated solutions across

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the globe to respond to complex development challenges and accelerate progress toward all the SDGs, specifically SDG 5 which focuses on reducing gender inequalities and gender-based violence. The 2030 Agenda for Sustainable Development is encapsulated in the Sustainable Developmental Goals (SDGs), which is an urgent call for action by allcountries, both developed and developing countries working jointly in a global partnership. The SDGs actualize the protocols that end poverty and other setbacks in gender disparities alongside strategies that improve health and education, reduce inequality, and spur economic growth. This study throws a spotlight on the impact of digital violence against women and girls, from a technology standpoint (measured by SDG 9, SDG 17), gender-equality perspective (SDG 5) and SDG 17), and the access to sexual and reproductive health care, in the context of teenage pregnancies measured by the global metrics "Adolescent Birth Rates" (SDG 3.7.2).

Socioeconomic Determinants of Health

The social determinants of health (SDH) are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affects a wide range of health, functioning, quality of life, outcomes, and risks. In the spirit of social justice, the Commission on Social Determinants of Health was set up by the World Health Organization (WHO) in 2005 to marshal the evidence on what can be done to promote health equity and to foster a global movement to achieve it. (World Health Organization, 2008); Braveman, P., & Gottlieb, L. (2014).

The diagram below indicates the extent to which the socioeconomic determinants of health (the SDOH model framed by the World Health Organization [WHO]) are closely associated with the SDGs of the United Nations". The SDG framework was considered as an analog of the SDOH, which served as the fundamental reason for selecting SDG analytics as a framework to extract the socio-economic determinants of gender-based violence.

Figure 9. *Socio-economic determinants of health nested within the*
Sustainable Development Goals of the United Nations
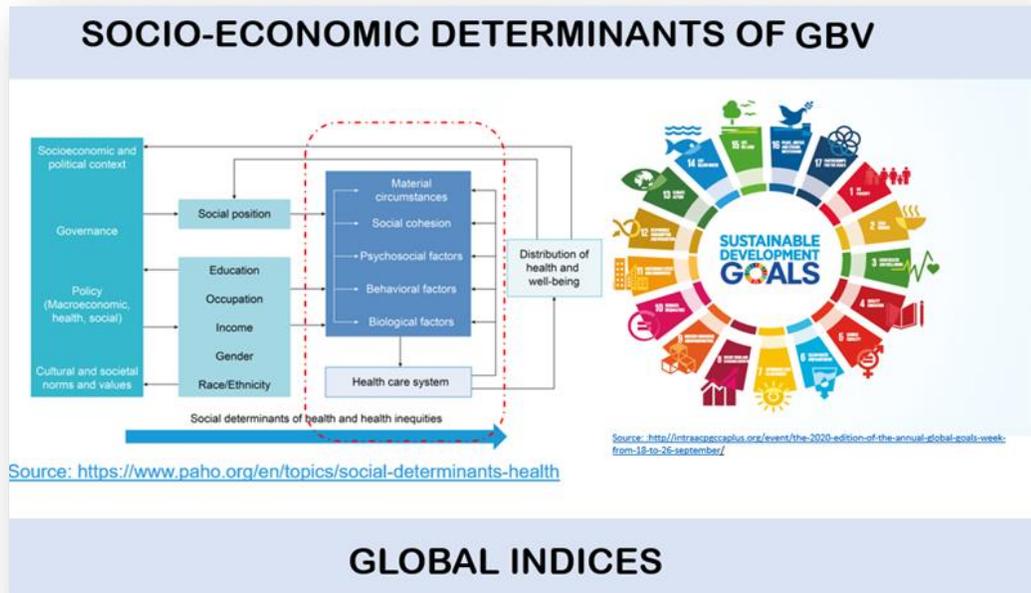
Source: United Nations Statistics Division; World Health Organization

TF GBV is a "non-medical" factor that serves as the conduit for impacting health outcomes, globally. GBV is further accelerated when the perpetrators infiltrate the cyberspace of women who rely on technology for all forms of communication. WHO estimates show that the contribution of sectors outside health to population health outcomes exceeds the contribution from the health sector.

Addressing SDOH is fundamental for improving health and reducing longstanding inequities in health; GBV and TF GBV requires action by all sectors and civil society represented on the SDOH and SDG framework. This study brings to light the importance of addressing TF GBV across all the global regions with a joint effort to expose and disrupt the socio-economic determinants that seal the scenario of our future health outcomes. The World Health Organization elevates the research findings which shows that the social determinants can be more important than health care or lifestyle choices in influencing health. For example, numerous studies suggest

that SDOH account for between 30-55% of the overall health and well-being of a community.

Can SDGs analytics extract the socioeconomic determinants of GBV?

The characteristics of the WHO framework for the socioeconomic determinants of health. [SDOH] is analogous to the SDG framework which also reflects the socio-economic and environmental well-being of each country.

The scores of the SDG goals and SDG meta-indicators (see Appendix B) were therefore used as the foundational metrics to extract the socioeconomic determinants of gender-based violence. The SDG analytics included the correlation of the global indices with the GBV scores (from the IPV dashboard of UNFPA and with SDG 5.2 (measures taken to prevent GBV per country). SDG 5.2 is a target indicator that measures the efforts taken to eliminate violence against women and girls.

Figure 10. *Databases used to create a model GBV database.*
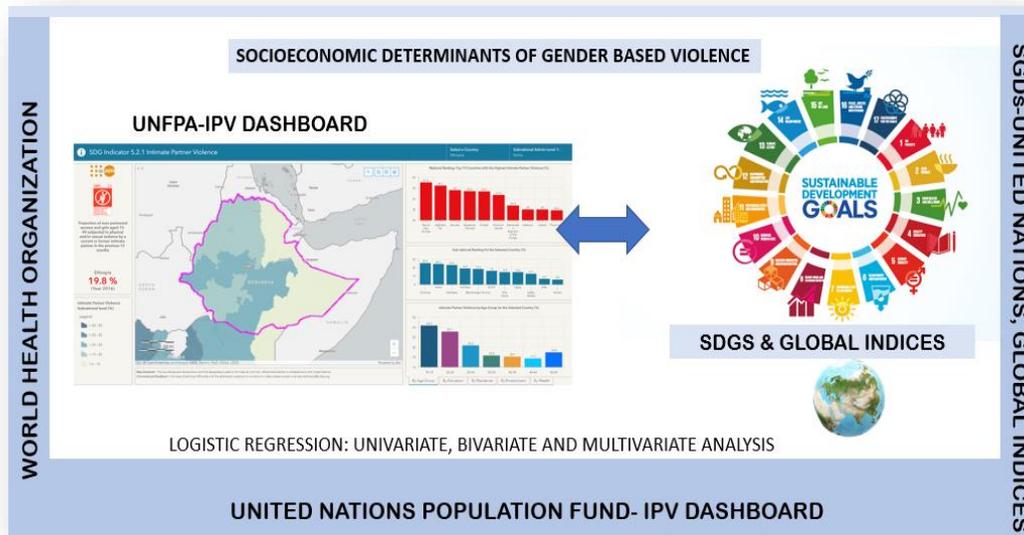
Notes: The SDG Dashboard, Global Indices, and the Intimate Partner Violence Dashboard of

Technology Facilitated Gender-Based Violence:

We live in a digital era with the world at our fingertips. Devices such as smart locks, smart-watches, consumer wearable medical devices to even smart-homes with

appliances that could be turned on or off remotely. Remote access to multiple devices is enhanced with the integration of high-speed internet and WIFI serves as the "wireless" weapon in the hands of a perpetrator. It takes just one bad actor to change the equation of "High-Speed internet + Convenience = Efficiency" to "High-Speed internet=Weapon" used for TFGBV or Cyberviolence". The most recent definition of TF GBV is given in Figure.11, an excerpt from a discussion paper, "Measuring Technology Facilitated GBV", released by UNFPA in 2023.

Figure 11. Definition of Technology Facilitated Gender Based Violence

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Courtesy: UNFPA (2023). [Measuring technology facilitated gender-based violence: a discussion paper.](#)

This definition was developed based on UNFPA's multiple definitions across countries, organizations, and practitioners and collaborative discussions of UN Women and the World Health Organization.

Cyberviolence against women which involves hacking, hampering, and tracking devices will unravel a subtle yet crippling form of violence expanding into interconnected devices with the integration of 5G technologies. It is pertinent to obtain the reason for the rising risk of TFGBV

and GBV-related teenage pregnancies. The most dreaded news emerged when narcissistic and psychopathic behaviors identified among tech-savvy perpetrators led to the misuse of GPS trackers and microchips utilized to tag and track the victim. Tracking and stalking led to attacking the victim during their weakest moment. Malware and hidden applications were installed in the cell phones and devices of the victims providing time-sensitive information on the whereabouts of the victim. Extremely granular specifics such as heart rate and footsteps per day were transmitted to the perpetrator through the internet and interconnected devices. Sportswear and other consumer wearables were utilized as conduits to sustain digital harassment thereby transcending beyond the physical realm and its barriers and piercing through legal protection offered by the Justice Systems (restriction orders). With the advances in 5G technology there is a rapid increase in the speed of the internet and WIFI; along with this capability comes the ability for perpetrators to find remote access into their victims' life.

A recent study conducted by the Economist Intelligence Unit in 2021 among women in the 51 countries with the highest Internet penetration rates (Countries included are Algeria, Argentina, Australia, Bangladesh, Belgium, Brazil, Canada, Chile, China, Colombia, Egypt, France, Germany, Ghana, Guatemala, India, Indonesia, Italy, Japan, Kazakhstan, Malaysia, Mexico, Morocco, Myanmar, Netherlands, Nigeria, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, South Africa, South Korea, Spain, Taiwan, Tanzania, Thailand, Turkey, Ukraine, United Kingdom, United States, Venezuela, and Vietnam) has shown that, globally, 38 percent of women with Internet access have personally experienced online violence, 63 percent of women know someone who had been subjected to it and 85 percent of women had witnessed online

Figure 12: *Prevalence of Online Violence*

Source: The Economist: Intelligence Unit; UNFPA (2021).
https://onlineviolencewomen.eiu.com/

violence being perpetrated against another woman. This study also offered regional estimates for

the prevalence of online violence against women, as represented in Figure 12.

Human Trafficking: The role of technology:

Human Trafficking is modern slavery and takes many forms. The primary portal used to

recruit and traffic vulnerable individuals, are predominantly using technology and hence human

trafficking falls under the TF GBV category. Research conducted by the United Nations Office on

Drugs and Crime (UNODC, 2021) shows how victims are being targeted and recruited via social

media and online dating platforms where personal information and details of people's locations

are readily available. Sexual abuse and other forms of exploitation are taking place virtually and

photos and videos are sold further on different platforms to customers worldwide, resulting in even

more money for the traffickers at no additional cost.

According to the U.S. Department of Homeland Security's Blue Campaign (U.S.

Department of Homeland Security, Blue Campaign (n.d.) human traffickers who trick

people with fake job offers and promises and then exploit them for profit, are taking advantage of online technologies *for every step of their criminal activities*. Human trafficking involves the use of force, fraud, or coercion to obtain some type of labor or commercial sex act. Every year, millions of men, women, and children are trafficked worldwide. Traffickers might use the following methods to lure victims into trafficking situations: Violence, manipulation, false promises of well-paying jobs, and romantic relationships.

Language barriers, fear of their traffickers, and/or fear of law enforcement frequently keep victims from seeking help, making human trafficking a hidden crime. Traffickers look for people who are easy targets for a variety of reasons, including: 1. Psychological or emotional vulnerability, 2. Economic hardship, 3. Lack of a social safety net, 4. Natural disasters, 5. Political instability. The trauma caused by the traffickers can be so great that many may not identify themselves as victims or ask for help, even in public settings.

In today's era, digital violence stands out as the most dangerous form of violence, clandestinely permeating all spheres of life; thereby expanding the radar of cybercrime for the law enforcement and justice systems.

ICT progress and innovations increase the interconnectedness of technological devices:

The recent advances in Technology have increased the interconnectedness of devices via the integration of the 5G infrastructure and Bluetooth connections enabling communications with multiple devices. The high-speed internet, low latency mobile broadband subscriptions in the 5G environment, increase the interlinkage of devices. In the case of GBV, this makes it hard for the victim to place digital barriers and thereby enabling a sustained and higher level of perpetration.

The interconnectedness of devices such as cell phones, iPad, smartwatches, and smart homes, makes it easy for the perpetrator or intimate partner to control or restrict access to online health services, education, work, and social media communications or even shut- down or monitor the partner's device and home, discreetly and remotely.

According to the World Economic Forum 5G report, some of the challenges and global implications of advances in technology are as follows:

5 G Global implications of interconnected devices:

1. Responsibility to defend cyberspace and prevent malicious attacks: Individuals, small businesses, and state and local governments should not use outdated passwords or click on suspicious links since it could have a significant impact on our national security. (The White House, 2023). Cyber-attacks on one device can easily flow into other devices and systems when there are interconnected via Bluetooth or a 5G infrastructure, which impacts the data-security.

2. IoT Vulnerabilities: 5G will support a massive deployment of Internet of Things (IoT) devices, which can introduce new vulnerabilities and potential entry points for cyber-attacks (ENISA, 2022).

Figure 13. *ICT Progress: 5G enabling the interconnectedness of devices.*
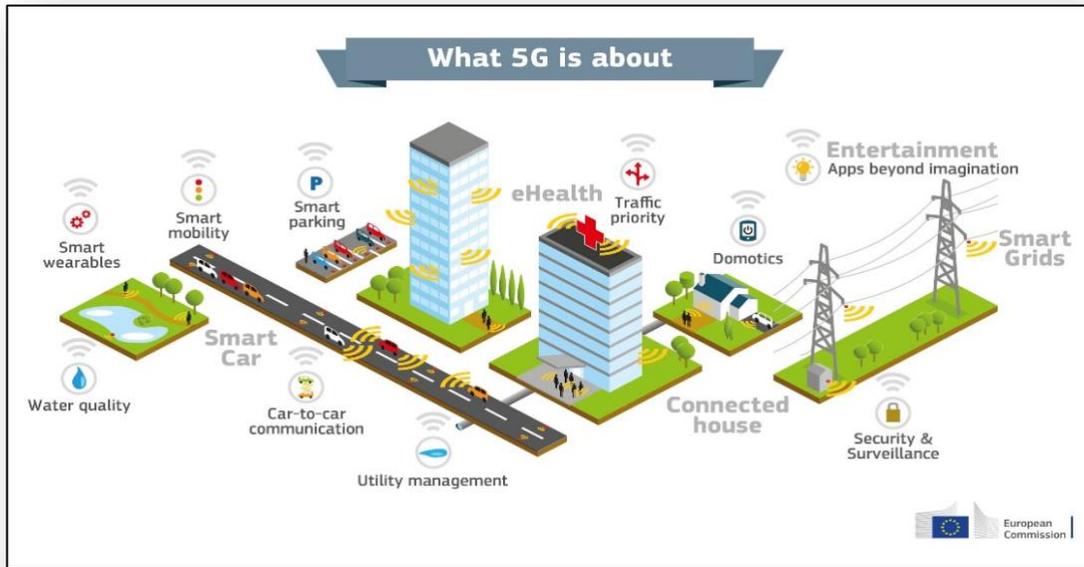
Source: Geospatial World (2019). Graph by the European Commission

Other risk factors to consider are supply chain risks, and nation-state threats (espionage, sabotage, or cyber warfare). The interconnectedness of devices has a domestic impact (in facilitating TF GBV) and has a national security impact. The 5G environment is well depicted by the European Commission in Figure 13. Amidst the advances in technology increasing the interconnectedness of devices, an increase in sexual violence was also reported by several low and middle-income countries (LMIC). This was captured by SDG 3.7, measuring the global scenario of adolescent birth rates (root cause: attached to early marriage, rape and GBV-associated teenage pregnancies). Relationships harnessed in the digital space were reported to cause an increase in teenage pregnancies, indicating the vulnerability of the adolescent age-group.

Sexual Violence: The gravity of the problem of Adolescent Birth Rates/ Teenage Pregnancies

The World Health Organization (WHO) defines Adolescent Birth Rates (ABR) as the annual number of births to women aged 15-19 years per 1,000 women in that age group. It is also referred to as age- specific fertility rate for women aged 15-19 (WHO, 2020). The importance of understanding ABR in each country alongside GBV is the increased immediate and long-term socio-economic costs associated with teen parents and their children. In addition to the health repercussions associated with ABR (low-birth weight, pre-term birth, severe neonatal and postnatal conditions), the emotional and mental torture associated with a GBV-associated teen- pregnancy through sexual assault and violence, leaves long-lasting and permanentdamage to the victim's health, education, financial and social position in the society. The age-structure is to be noticed in this context, which impacts the development of a teenager. Women today are denied their fundamental right to enjoy a complete state of health as defined by the WHO, causes include structural violence as well as disease entities. (Murthy, P. 2009).

A special mention of Dr. Mukwege's work in the field of sexual violence and ABR: Dr. Mukwege and Ms. Murad have been at the frontlines helping and giving voice and agency to women and girls subjected to the horrors of sexual violence and other human rights violations. (UNFPA, 2018) Dr. Denis Mukwege won the Nobel Peace Prize for addressing the 4 million female rape and sexual mutilations even against girl babies is a terrifying and yet ongoing practice. While rape was systematic, violence has intensified in recent years and frequently the genitals of the female was cut up with a knife and not just raped. Dr. Mukwege won the Nobel Prize for repairing rape victims.

The practice of rape was common in gang warfare in certain ethnic groups. Young girls are trafficked or abducted as sexual prey and boys as gang soldiers. The pattern is evident again in creating perpetrators and increasing female victims. If the family refuses to comply, the gangster rape, mutilate and kill all one by one in front of the whole village until they accept the practice. This practice is ongoing in LMIC, amidst several attempts to enforce policies.

"Around the world, sexual violence is being employed as a tactic of war, terrorism, torture, and repression, including the targeting of victims based on their actual or perceived ethnic, religious, political or clan affiliation."

United Nations Population Fund, (2018).

Human trafficking and other forms of modern slavery are aggravated using technology and cell phones. A much more strategic intervention is therefore required and an in-depth understanding of the scenario, to set victims free to actualize their potential. There is a vital requirement to understand the role of technology in reducing ABR and fueling the problem of ABR (pros and cons of technology). The dating apps and private chat rooms make the virtual, "real" by trapping girls into unintended relationships and teenage pregnancies. The influence of technology on the teenage pregnancies is yet to be explored and this study lays the foundation for future research by providing a baseline data for ABR and TF GBV.

Country-specific analysis of GBV:

UNFPA's Intimate Partner Violence (IPV) dashboard provides an overview of the prevalence of GBV which comprises the socio-demographics pertinent to 153 countries. Mexico reported a targeted GBV response in rapidly reducing teenage pregnancies and TF GBV. A

country-specific analysis of GBV was undertaken based on the protocols of the 'Population Situation Analysis' framework of the United Nations Population Fund. Global findings when compared with the intricate GBV problems targeted within each country and solutions or best practices identified, will aid in building a prevention model for other countries. Hence, a deeper study of the GBV scenario in Mexico was encouraged by the UNFPA.

The GBV scenario in Mexico:

In the context of adolescent birth rates at a country- specific level, according to Sánchez-Pájaro, A., et.al (2019) the data from the national surveys for Mexico (2006, 2009, and 2014) estimate of the adolescent fertility rate, indicated 25.9 percent of all teen births in 2003-05, 21.6 percent in 2006-08, and 21.9 percent in 2011-2013. It was found that second and higher- order births are highly prevalent and important contributors to the adolescent fertility rate. According to this in-depth study, it was concluded that postponing second and higher-order births would benefit both mothers and children and reduce the adolescent birth rate. The study suggests interventions to prevent second and higher-order pregnancies to be developed and implemented. This requires empowerment programs on the demographic dividend. The most recent retrospective cross-sectional analysis for the past 25 years on live teenage births in Mexico by Murillo-Zamora et.al. (2019), indicated that teen birth rates decreased over the period analyzed. However, that decline has not been monotonic or homogeneous across Mexico, and recent (2011-2016) increasing rates were observed in some states in girls aged 14 years and younger. Teenage parenthood can negatively affect multiple dimensions of health, and therefore, regionally directed efforts on its reduction must be strengthened. An in-depth literature- review conducted by Tsapalas,D.et.al.(2021), highlighted that although some research has been conducted documenting how GBV is managed or not managed by healthcare providers, Latin

America and the Caribbean countries represent a gap in research on healthcare tools and their effectiveness in these situations. A distinct need for the creation of content-specific protocols for the vulnerable and underrepresented population, was recommended. The economic disparity and onset of GBV are highlighted in a study conducted by Sardinha.L., et.al. (2022). According to this study, violence startsearly, affecting adolescent girls and young women, with 24% (UI 21-28%) of women aged15-19 years and 26% (23-30%) of women aged 19-24 years having already experienced this violence at least once since the age of 15 years. Regional variations exist, with low- income countries reporting higher lifetime exposures to GBV, when compared with high-income countries. In Mexico, a high prevalence of GBV-associated cyberviolence and teenage pregnancies has been reported for the years 2013 to 2018. The country's national development plan and national strategy to prevent teenage pregnancies have implemented empowerment programs strategically to reduce adolescent birth rates. However, there is a need to analyze the existing social dynamics and the effectiveness of the GBV interventions in addition to the GBV support systems for strengthening early detection of girls at risk andthereby preventing underage pregnancies.

The National Prevention Strategy to reduce teenage pregnancies called 'ENAPEA' has a multiprong effort in addressing gender-based violence. This case study will analyze the prevention programs implemented, identify and close gaps in the prevention programs (prioritizing component 6 of the ENAPEA indicators). A careful analysis of the reporting system and school dropouts for the 10–19-year-old girls and adolescents, must be analyzed.

It is important to identify and prevent the ongoing problem of GBV by using predictive analytics. Applying predictive analysis on the SDG 5.2 and SDG 3 for each country will help predict areas that would have to be prepared and better equipped to handle all forms of violence

(especially digital violence) in the current and future GBV scenarios. The UNFPA's four future scenarios for the three transformative results were used as a fundamental template to forecast three future GBV scenarios, for which all countries be well-prepared. There was a huge need to create awareness about the different forms of cyberviolence and to empower women and girls to become "tech-savvy" to disrupt any form of digital violence.

Predictive Analytics for Gender-Based Violence:

Artificial Intelligence (AI) has advanced in leaps and bounds and is currently being used to accelerate the achievement of the SDGs. Amidst the various TF GBV and setbacks which required careful mitigation in the effective and ethical use of technology, it is essential to disrupt TF GBV by applying predictive analytics to GBV-associated socio-economic contributors. AI enables forecasting of challenges based on data from the past ten years, computes the patterns and irregularities, and outlines the challenges in the future. The mapping of the socio-economic determinants will be a critical component to feed the machine learning and predictive algorithms to get to an emergency location, signaling the law enforcement on civil disturbances. To arrive at the successful use of AI to disrupt GBV, the identification of the socio-economic and environmental indicators of this study is of high global significance. UNFPA's four future scenarios forecasts and simulates the future scenarios in the context of UNFPA's three transformative goals. This framework will support the development of GBV scenarios in alignment with the four future scenarios for UNFPA. The results from the predictive modeling will enable the development of forecasts and simulate future scenarios in the context of UNFPA's three transformative goals. This framework will support the development of GBV scenarios in alignment with the four future scenarios for UNFPA. The results from the predictive modeling will enable the development of a business model to identify, prevent and predict GBV at a global and country-

specific level. According to an article published by Rigano. C., (2018) in the National Institute of Justice, by using AI and predictive policing analytics integrated with computer-aided response and live public safety video enterprises, law enforcement will be better able to respond to incidents,

Figure 14. *Role of Artificial Intelligence in predictive analytics*

Source: The London School of Economics and Political Science.

prevent threats, stage interventions, divert resources, and investigate and analyze criminal activity. AI has the potential to be a permanent part of our criminal justice ecosystem, providing investigative assistance and allowing criminal justice professionals to better maintain public safety.

Predictive future scenarios:

UNFPA designed a template to portray the future scenario of its 3 transformative goals which includes GBV. The future scenarios of GBV can be predicted based on the identification of the socio-economic determinants of GBV for the year 2021 and projected for the next ten years with data for the past ten years to sketch out a GBV scenario for 2030 and even 2050. UNFPA's Four

future scenarios for the three transformative results enabled the development of GBV future scenarios, which will be outlined based on the SDG analytics of this research investigation.

Figure 15. *UNFPA's Four Future Scenarios for the Three Transformative Results*

Source: UNFPA (2022).Four Future Scenarios in 2050.

This template [Figure. 14] forms a vital framework to predict the future scenario of the socio-economic determinants of gender-based violence and equip us for the future scenario of GBV, which will predominantly involve digital violence, if adequate mitigation measures are not taken.

Summary

The snapshot of the entire set of literature revealed the evolving dynamics of GBV with the advance in Science and Technology. Although gender gap and gender inequalities, income inequalities play a vital role in perpetuating GBV, it remains glaringly clear that gender development has been lagging as we have gotten too busy progressing in the field of technology without inculcating and developing the humanitarian facet of life.

The humanitarian facet in an era of digital violence should prioritize the wise or ethical use of technology. Programs that foster teaching young boys and girls to identify GBV, varying social norms that enable GBV, and most importantly there is a critical need for a GBV disruptor business with a multi-stakeholder approach to end the modern form of GBV. With the integration of 5G into the digital infrastructure, there is an increase in the interconnectedness of technological devices which has become a conduit for technology-facilitated violence. The implications of 5G were investigated by the Public-Private Analytic Program (AEP) research team (U.S. Department of Homeland Security) and is integrated into the research findings.

Chapter 3: Methodology

The main objective of the study was to identify the socioeconomic determinants of gender-based violence [GBV] and analyze the statistical significance of the extent to which GBV impacts the overall SDG target scores and the global indices. SDG analytics applied on GBV, and its prioritized contributing factors were supported by an in-depth analysis of specific indicators that influence the prevalence of TF GBV and Adolescent Birth Rates. The collective results of the study were used to build a global TF GBV Disruptor model and a GBV prevention business model to arrive at policy recommendations.

Research Design

A cross-sectional retrospective research design was used for this study. A customized GBV model database was created for the year 2021 with datasets from multiple data repositories of the United Nations agencies. The United Nations Statistics Division was the main data repository of a collection of data for various UN agencies as listed in Table 1.

Statistical computations:

SDG analytics involved using STATA version 16.1 for univariate and multivariate linear regression analysis. Comparison of the coefficient values and whether the GBV correlates have a positive or negative relationship to the global indicators will determine the socio-economic enablers of gender-based violence. The SDG 9 metrics were used to compute the impact of innovation on GBV (TG GBV), and SDG 5.2 was used to extract the predominant socio-economic drivers of GBV.

Research Methods

A mixed method (both quantitative and qualitative research methods) was used for this study.

SDG analytics- A quantitative method was used for the global SDG analytics.

Case study: A qualitative study was adopted for the country-specific case study. An interview schedule was developed collaboratively with the UNFPA- Mexico Office. Interviews with the government officials, and public and private sectors, were facilitated by the National Representative and the Assistant National Representative of UNFPA-Mexico Office (Appendix D). The questions elicited information regarding the challenges in GBV interventions and the best practices targeting the reduction of TF GBV and Adolescent Birth Rates in Mexico. The global GBV landscape was compared with the country-specific results to create a GBV Prevention Business Model and a TF GBV Disruptor strategy for countries.

Population

The global population (by gender and age structure) for the year 2021 was obtained from the United Nations Statistics Division and the Central Intelligence Agency. The UNAIDS data repository was accessed to obtain global datasets on the key populations. It is important to understand the gender dynamics, age structure, and sex ratio for the year 2021 to interpret the impact of GBV on the type and age group of the 2021 population. Methodology recommended by the Population Situation Analysis (UNFPA, 2011), a technical document of UNFPA was used for building the strategy for the population analysis to elicit information on the socioeconomic determinants of GBV.

Sample Selection and Sample Size

The first step was to create a database with a selected list of variables. A model GBV database was created via data selection from the data repositories of the United Nations Statistics Division, a review of literature, and a selected set of foundationaldocuments that address both TFGBV and ABR in the context of reducing and ending GBV by 2030.

The Estimated Sample Size

Estimated sample size for multiple linear regression
F test for R^2 testing subset of coefficients
$H_0: R_F^2 = R_R^2$ versus $H_a: R_F^2 \neq R_R^2$

Parameters: $\alpha = .05$, $1-\beta = .8$, $R_R^2 = .1$, $N_T = 120$, $N_C = 3$
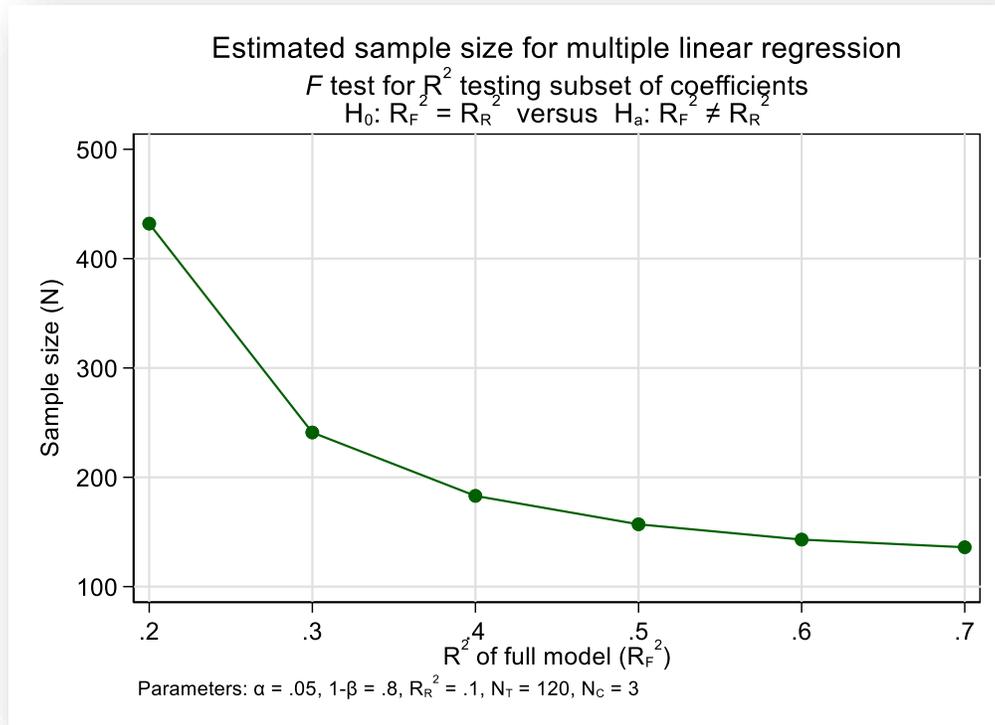
Power for the sampling size was set at 80% and the estimated sample size (N=121) was

obtained using STATA computations with the formula listed below:

```
. power rsquared 0.1 0.7, ntested(105) ncontrol(3)

Performing iteration ...

Estimated sample size for multiple linear regression
F test for R2 testing subset of coefficients
Ho: R2_F = R2_R  versus  Ha: R2_F != R2_R

Study parameters:

        alpha =     0.0500
        power =     0.8000
        delta =     2.0000
         R2_R =     0.1000
         R2_F =     0.7000
      R2_diff =     0.6000
     ncontrol =          3
      ntested =        105

Estimated sample size:

          N =        121
```

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Materials/Instruments

Dashboards of various United Nations agencies, the World Bank, the World Economic Forum, Pew Research Center, the Central Intelligence Agency, Federal Bureau of Investigation were used as tools to detect the overarching contributors to GBV. UNFPA's Intimate Partner Violence Geospatial dashboard and UNFPA's Four Future Scenarios for the three transformational results', USAID data points were used as tools to obtain a visual explanation for the problem of GBV for the past ten years. Other foundational documents used for the study were from the U.S. Department of Homeland Security (Public-Private Analytic Exchange program deliverables.

The foundational documents used for the study are listed below.

Table 3. *The Fundamental and foundational documents of this research study*

	TITLE	WEBSITE
	ICPD: International Conference on Population and Development	https://www.unfpa.org/publications/international-conference-population-and-development-programme-action
	MAKING ALL SPACES SAFE-UNFPA	https://www.unfpa.org/publications/technology-facilitated-gender-based-violence-making-all-spaces-safe
	POPULATION SITUATION ANALYSIS-UNFA	https://www.unfpa.org/publications/population-situation-analysis
	UNFPA'S FOUR FUTURE SCENARIOS-THREE TRANSFORMATIONAL RESULTS	https://www.unfpa.org/publications/four-future-scenarios-three-transformative-results
	U.S.DEPARTMENT OF HOMELAND SECURITY DELIVERABLES	https://www.dhs.gov/publication/2022-aep-deliverables

<div align="center">**Data Collection and Data Analysis**</div>

Data Collection

  The main data sources accessed to build the GBV data model for this study were drawn from the United Nations Statistics Division. 2022 which had composite data from the following international organizations. The database hyperlink will provide access to the data accessed for this study.

- UNDP (United Nations Development Programme). 2022: The Gender Inequality Index, Gender Development Index, and the Human Development Index were introduced by the UNDP annual reports which aim to measure the key dimensions of gender disparities and human development (access to knowledge, a decent standard of living, and a healthy long life) (See Appendix C).

- UNESCO (United Nations Educational, Scientific and Cultural Organization) Institute for Statistics and the UNDP database- The Multidimensional Poverty Index examines poverty across 109 countries while also presenting an ethnicity/race/caste disaggregation for 41 countries. The dimensions of poverty include poor health, insufficient education, and a low standard of living with each of these components related to indicators such as nutrition, years of schooling, drinking water, and housing.

- Global Health Security Index (GHS): The Global Health Security (GHS) Index is an assessment and benchmarking of health security and related capabilities across 195 countries. The GHS Index, which is developed in partnership with the Nuclear Threat Initiative (NTI) and the Johns Hopkins Center for Health

Security at the Bloomberg School of Public Health, working with Economist Impact, was first launched in October 2019.

- **UNFPA (United Nations Population Fund): The Geospatial Intimate Partner Violence dashboard** of UNFPA reflects the socio-demographics and GBV rates for 155 countries.

- **UNICEF** (United Nations Children's Education Fund) reflects more than 300 indicators related to children derived from the Multiple Indicator Cluster surveys which involve any form of violence, vaccination, education, and family socio-economic situational assessment across more than 100 countries.

- **WHO** (World Health Organization) and **UNFPA**: The Universal Health Coverage Index, the Sexual and Reproductive Health Index, and indicators relevant to health and well-being (SDG 3) are extracted predominantly from the WHO and UNFPA.

- **World Bank**: The Gross National Income score is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income).

- **UNDESA** The United Nations Department of Economic and Social Affairs is responsible for the compilation of the Sustainable Development Goals of the United Nations.

- **Our World in Data**: The global population statistics- Data pertinent to the population demographics and change, age structure, fertility rate gender ratio was obtained from UNDESA and data repository published by OurWorldinData

- World Happiness Report is a publication of the Sustainable Development Solutions Network and gives a picture of the political and social divides, humanitarian or climate actions causing an uproar in civil unrest.

- The Pew Research Center measures the religiosity of a country by the total number of the population who stated that religion was important versus and accounts for those who mentioned that religion was not important.

- Sustainable Development Goals: Quantitative ranking and scores for the 17 goals of the United Nations are derived from the United Nations Statistics Division, which compiles data collected by all the United Nations agencies.

- The Information and Telecommunication Union (ITU) and the Global Innovation Index provide metrics on innovations, the internet, and mobile phone usage which include the demographics of the users, advances in Science and Technology, and developments in the critical infrastructure. The Global Innovation Index reveals the most innovative economies in the world, ranking the innovation performance of 132 economies and highlighting the innovation weakness and strengths.

- Social Norm Index: The OECD Development Centre's Social Institutions and Gender Index (SIGI) measures discrimination against women in social institutions across 179 countries. By considering laws, social norms, and practices that restrict women's and girls' rights and access to empowerment opportunities and resources, the SIGI captures the underlying drivers of gender inequality.

- UNODC: The United Nations Office on Drugs and Crime furnishes a data portal that provides data on topics such as violent and sexual crime, Human Trafficking, cybercrime, and drug trafficking in the UNODC's yearly report.

- AEP-DHS: Public-Private Analytic Exchange Program-U.S. Department of Homeland Security provides intelligence on threats to national security. The deliverables accessed for this study were: Artificial Intelligence-national standards to mitigate risks, Vulnerabilities in health information systems and technologies, 5G impacts on cybersecurity and Deepfake mitigation measures.

Selection of the yearly report selected for the study was data pertinent to the year 2022 since the analysis using global datasets had to be limited to the year 2021. Back-tracking datasets for the past ten previous years was critical to facilitate the building of GBV future scenarios; predictive analytics for SDG 5 was carried out to predict the futuristic TF GBV problems and prepare a holistic approach based on the findings of the study. Data availability had to be taken into consideration when building the GBV data model. Appendix C lists a prioritized set of variables or indicators selected for this study.

Data Analysis

Linear regression analysis (univariate and multivariate) was applied to the GBV indicators, Sustainable Development Goals (SDGs), and global indicators. Understanding the global scenario of GBV and its socio-economic and environmental enablers is critical to develop an accurate prevention model that will prevent the modern forms of GBV, mainly technology facilitated GBV.

Assumptions

Assumption 1: It is assumed that gender inequality (measured by Gender Inequality Index) ranks first compared to the other global indicators, as the highest statistically significant contributor to GBV (TF GBV and ABR)

Assumption 2: It is assumed that ICT progress and technological innovation has a statistically significant correlation with GBV.

Limitations

This study is confined to the overall socio-economic and environmental factors that enable GBV. An area of interest for future research is underpinning the psychological, pathological, and neurological contributors to violence (such as intermittent anger outbursts, narcissism, neurological disorders, Disruptive Mood Dysregulation Disorder (DMDD), depression, gaming addiction, and learning disabilities) with the socio-economic determinants of GBV. On the technological front, gaming addiction (violence in online gaming) could be correlated with the socioeconomic determinants of GBV. This study does not include the clinical or physiological components that contribute to GBV. The variable that relates closely to the clinical component is the overarching correlation of GBV with SDG 3 (good health and well-being), mental health rates, and Happiness Index Scores. However, baseline data is made available that covers the predominant socioeconomic drivers of GBV.

Delimitations

The socio-economic determinants of GBV could be strengthened and explained further by expanding the comparative study (from global to local) to a comparative study between clusters of countries belonging to the same economic background. This will shine a spotlight on the unique GBV characteristics prevalent within a cluster of countries or global regions at a

much granular level and expose the similarities and differences in the socio-economic determinants of GBV, which hones the integrity of the existing GBV interventions. This study lays the foundation for a global and country-specific justification for the dynamics of TF GBV.

Ethical Assurances

Since data collection involved the retrieval of international and national data aggregates (secondary data sources) excluding the involvement of any human subjects or individual identifiers; this method of data collection for analysis excluded the requirement for an Institutional Review Board [IRB], in adherence with the protocols in the Belmont Report and The Common Rule. 'The Belmont Report' provided the rationale for the exclusion of this study based on its general framework for ethical decision-making in research. 'The Common Rule' provided the specifics to fulfill the exclusion criteria from the specific Therefore, it was ensured that the global SDG analytics conducted during this study period was conducted ethically and in accordance with federal regulations. Secondary data sources retrieved from the United Nations Statistics Commission were used to lay the foundation for a concrete project that would address the intermediary and much neglected socioeconomic factors contributing to all forms of gender-based violence with a special reference to its correlation with ICT progress by regions and countries.

Summary of methods

The research methods and progression of the study are summarized into a **data map and work-flow chart for the study period:** A data and workflow chart was created to portray the systematic steps followed to arrive at the predominant socio-economic determinants GBV.

Figure 16(a). *Research progress and methods: A work-flow chart*
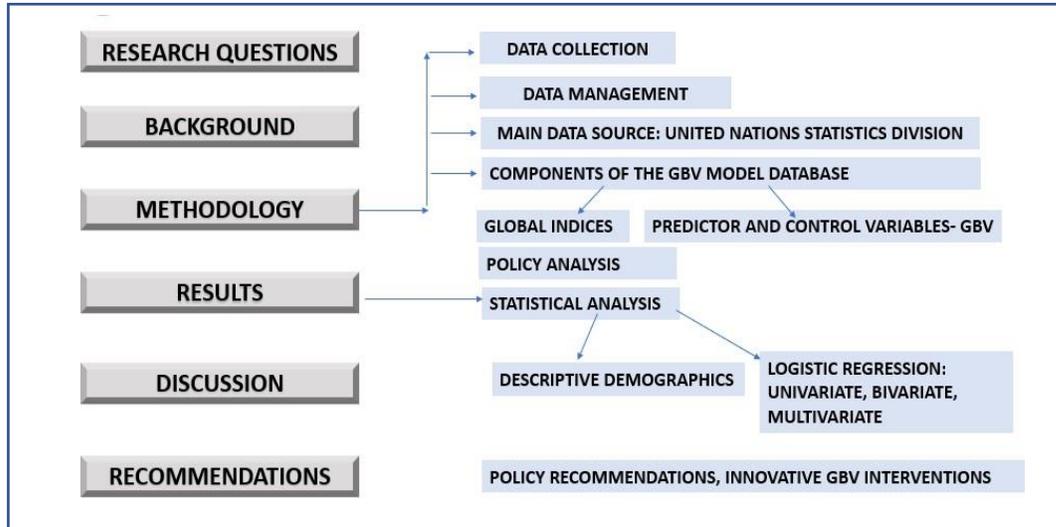
Overview of the four stages of the study: Each phase of this research study was framed to respond to the four fundamental research questions.

Figure 16(b). *The Four Stages of the study*
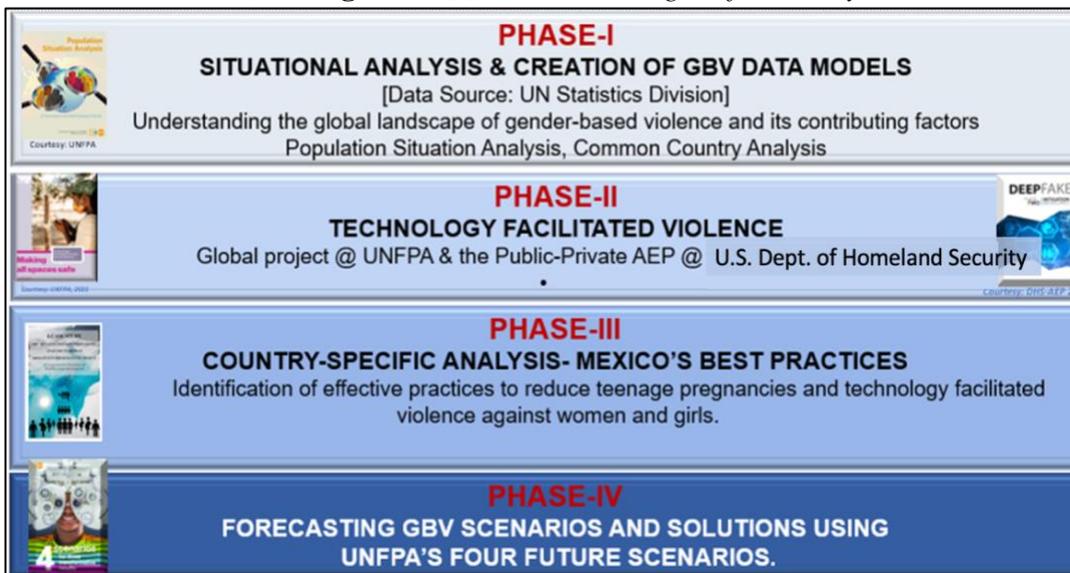
Chapter 4: Findings

Findings on the global analysis revealed that the most uncommonly reported contributor to GBV was the Gender Development Index (contrary to gender inequalities), which had the highest statistically significant positive correlation with SDG 5.2 (efforts to accelerate the elimination of violence against women and girls) when compared with the Gross National Income, the Gender Inequality Index (GII) and other global indicators. Findings also indicated a high level of TF GBV and Adolescent Birth Rates, were interlinked with ICT progress and innovations in Science and Technology. Appendix C provides a list of the prioritized variables used in this study.

Findings on the country-specific analysis of Mexico indicated a surge in TF GBV; ABR which was reduced by 2% in the past two years and awareness of TF GBV was promoted through a holistic interagency approach (a public-private sector approach) with support from the Mexican government through a program called "ENAPEA" also known as, the National Strategy to reduce teenage pregnancies. Effective and operative promotion of advocacy on social media platforms was identified as one of the best practices of Mexico in disrupting TF GBV and developing policy and law after the name of a victim called the 'Olympia Law', which sanctioned punishment up to six years in prison for the act of dissemination of sexual content without consent.

Findings from the predictive analytics in combination with the global and country-specific study were used to create a TF GBV toolkit which included a GBV Prevention Business Model that countries could utilize along with the TF GBV Disruptor strategy and handouts created by the active engagement of the teenagers and youth.

<center>**Results**</center>

Results from the regression analysis of the selected variables for this study led to identifying and delineating a set of socio-economic and environmental enablers which contributed to the GBV exposures of women and girls. Results reflect the categorical and predictor variables showing a statistically significant correlation with GBV indicators. The predominant GBV enablers pointed to gender development, human development, poverty, the economy of a country, the degree of gender inequalities, social biases, religious values, and technological innovations as some of the predominant socioeconomic and environmental contributors to GBV. The progress in ICT [Information and Communications Technology] in low and middle-income countries [LMICs], coupled with a low level of human development, low economy, high-level of gender inequalities, high level of social-cultural norms or biases, more religiosity, high-level of political fragility, vulnerability (Key Populations) and a higher percentage of disabilities among women, was directly associated with a high percentage of GBV and deceleration in the efforts to achieve SDG 5.2.

The positive and negative correlation coefficient values with statistical significance within the range of $p \leq 0.5$ to $p \leq 0.001$ were segregated as the socio-economic and environmental of GBV. Statistical computations applied to the GBV database were univariate, multivariate regression analysis, and predictive analytics. The GBV indicators used for this study were SDG 5.2 metrics, GBV exposures [lifetime exposure, exposure in the past 12 months, Intimate Partner Violence] based on DHS surveys (USAID, n.d.), and estimated GBV rates published by UNFPA's results on the exposure of individuals to GBV (UNFPA, 2022); this includes all forms of violence against women and girls including digital harm.

The rationale for a wide selection of variables was to fulfill the goal of identifying the

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intermediary socio-economic and environmental enablers or influencers of GBV (which might have been overlooked in the past) and utilizing the results to construct an evidence-based "TF GBV Prevention and Disruptor Model". The socioeconomic determinants of GBV, extracted from the correlation of the predictor and control variables (applying the SDG analytics on the SDGs and the global indices) were ranked based on the degree to which GBV impacted (either positive or negative impact) the global goals and indicators. Results indicated that there was a statistically significant impact of the following global indices on GBV (Appendix C): the Gender Development Index, Gender Inequality Index, Global Innovation Index- technological innovations, , Digital Divide -ownership of internet and mobile subscriptions, Education, Social norms among women (than in men), Religiosity, Disability, Fragility, Vulnerability, Key Populations (KP) and the Gross National Income (GNI). The GBV correlates with the Sustainable Development Goals indicating a statistically significant correlation for sixteen SDGs except SDG 15. The results present the profound impact caused by GBV on the overall productivity and security of a country.

The results of the study answered the research questions and are presented systematically under phase-1, phase-2, phase-3, and phase-4 of the study. The GBV indicators used for this study were "GBV experienced in a lifetime" (nested within the UNFPA IPV dashboard provides Intimate Partner Violence data) and SDG 5.2 target scores (efforts to eliminate GBV by 2030), for the 177 countries (data-model-1) and 122 countries (data-model-2). Results are presented based on the four research questions which formed the four stages of the study.

Evaluation of Findings

<div style="border:1px solid black;">

PHASE-I
SITUATIONAL ANALYSIS & CREATION OF GBV DATA MODELS
[Data Source: UN Statistics Division]
Understanding the global landscape of gender-based violence and its contributing factors
Methods adopted from UNFPA's Population Situation Analysis

</div>

Research Question 1 (Phase I) *What are the socio-economic determinants of GBV?*

Each SDG target score in the GBV model database which was used for this study included a list of the potential indicators that reflect the socio-economic characteristics and well-being of each country. A set of SDG meta-indicators were also selected for this study to identify the intermediary factors that enable and sustain GBV. Table 4 comprises the list of global indicators. security, justice, and political environment of a country, which were included in this study.

The impact of GBV on the list of global indicators was utilized to compute the socio-economic determinants of GBV. The presentation of results was based on the research questions which divide the entire study into four stages based on the theoretical and schematic framework of the study [Figure 4]. Each SDG target reflects the socio-economic characteristics and well-being of a country. The SDG meta-indicators along with the global indices shown in Table 4, were utilized for the analysis to identify the intermediary contributing factors to GBV.

Table 4. *The List of SDGs and global indicators correlated with Gender Based Violence*

The table contains the following content organized in sections:

SOCIO-DEMOGRAPHICS

POPULATION VITAL STATISTICS- 2021
GENDER STATISTICS
MALE POPULATION
FEMALE POPULATION
TRANSGENDER POPULATION
GLOBAL REGIONS
CATEGORIZATION
INCOME LEVEL
MEDIAN AGE STRUCTURE
DISABILITY
DISABILITY-Population with disability [Male%, Female%]
Disability Proportion by sex: Female: Male

GBV INDICATORS

UNFPA IPV Geospatial Dashboard
SDG 5.2: Elimination of GBV
GBV in past 12 months
GBV in lifetime

ANTHROPOGICAL DEVELOPMENTS

HUMAN DEVELOPMENT
HDI RANK [2021]
HDI value 2021
HDI_FEMALE VALUE [2021]
HDI_MALE VALUE [2021]
GENDER EQUALITY
GII RANK 2021, GII VALUE [2021]; SDG 5
GENDER DEVELOPMENT
GDI value [2021]
SOCIAL NORM INDEX
Social Norms: By Gender, By No. of biases, Social norms -Education, Political, Economical & Physical Integrity.
RELIGIOSITY
Religion: By Country, by importance
TECHNOLOGY
INTERNET USAGE: By Country
Total Usage by Gender, Rural and Urban settings

IN-DEPTH ANALYSIS — PRIORITIZED INDICATORS

GENDER BASED VIOLENCE: SDG 5.2, SDG 3.7
GENDER INEQUALITY INDEX
GENDER DEVELOPMENT INDEX
SEXUAL AND REPRODUCTIVE HEALTH INDEX
EDUCATION/EMPOWERMENT OF WOMEN
ECONOMIC DEVELOPMENT
TECHNOLOGY & INNOVATION-SDG 9

SGD SCORES [By Countries, Regions, Income] — SUSTAINABLE DEVELOPMENT GOALS

SDG 1: NO POVERTY
SDG 2: ZERO HUNGER
SDG 3: GOOD HEALTH AND WELL-BEING
SDG 4: QUALITY EDUCATION
SDG 5: GENDER EQUALITY
SDG 6: CLEAN WATER AND SANITATION
SDG 7: RENEWAL AND CLEAN ENERGY
SDG 8: DECENT WORK AND ECONOMIC GROWTH
SDG 9: INDUSTRY: INNOVATION & INFRASTRUCTURE
SDG 10: REDUCING INEQUALITIES
SDG 11: SUSTAINABLE CITIES AND COMMUNITIES
SDG 12: RESPONSIBLE CONSUMPTIION AND PRODUCTION
SDG 13: CLIMATE ACTION
SDG 14: LIFE BELOW WATER
SDG 15: LIFE ON LAND
SDG 16: PEACE, JUSTICE AND STRONG INSTUTIONS
SDG 17: PARTNERSHIPS FOR THE GOALS

GLOBAL INDICES

HEALTH
SDG INDEX: OVERALL SCORE: By Countries, by Regions
UHC INDEX
SRH INDEX: Access to Sexual & Reproductive Health Index
GLOBAL HEALTH SECURITY

EDUCATION
SDG 4: Population with atleast secondary-level education
RATIO: Female to Male mean years of education

ECONOMY
GROSS NATIONAL INCOME
RATIO: Female to Male labor workforce participation
MULTIDIMENTIONAL POVERTY INDEX

EQUALITY
GENDER INEQUALITY INDEX, SDGs 5, 10

PSYCHOLOGY
MENTAL HEALTH, HAPPINESS INDEX

SECURITY
TECHNOLOGY: Secure Internet Servers
CRIME INDEX [UNODC, FBI]

STABILITY/VULNERABILITY
Inform Risk Index
Humanitarian Crisis Level
Fragile State Index
Refugee Population Influx
Pandemic: COVID-19: Cases, Death, Vaccinated

JUSTICE
CORRUPTION PERCEPTION INDEX

GOVERNMENT/ POLITICS
Women in Parliament: Share of seats occupied by women

Indicators pertinent to health, education, economy, anthropology, technology, psychology,

The global indicators pertinent to health, education, economy, anthropology, technology, psychology, security, justice, and the political environment of a country were included, to reveal the extent to which GBV could lower the overall score of the global indicator of a country. Based on the list of variables selected for the study, SDG analytics was applied for the selected set of countries found in Table 5.

Table 5. *Development of a model GBV database for the 122 countries*

ESA-COUNTRIES	SDG 5	LAC-COUNTRIES	SDG 5	WCA COUNTRIES	SDG 5	APRO-COUNTRIES	SDG 5
South Sudan	33	Haiti	40.18	Mali	38	Afghanistan	21.73
Angola	51	Belize	56.10	Equatorial Guinea	38.8	Pakistan	28.70
Zambia	58	Peru	65.39	Liberia	39.9	India	33.89
Tanzania	63	Chile	66.20	Congo, Dem. Rep.	41	Papua New Guinea	47.99
Ethiopia	64	Bolivia	68.01	Nigeria	49	Sri Lanka	51.86
Uganda	65	Colombia	68.97	Central African R	50	Bangladesh	52.94
Madagascar	70.9	Brazil	69.24	Senegal	54	Myanmar	62.63
Kenya	76	Dominican Republic	71.77	Ghana	60	Indonesia	62.77
Zimbabwe	78	Mexico	77.88	Niger	61	Philippines	63.79
South Africa	83	Argentina	81.24	Cote d'Ivoire	66	Thailand	69.40
						China	77.14

EECA-COUNTRIES	SDG 5	OECD-COUNTRIES	SDG 5	ARAB COUNTRIES	SDG 5		
Montenegro	53.09	Japan	61.365	Yemen, Rep.	13.44		
Azerbaijan	53.19	United States	76.563	Somalia	25.57		
Romania	57.34	Australia	81.158	Oman	35.97	SDG 5 SCORE-MEASURES TAKEN TO ELIMINATE	
Kyrgyz Republic	58.91	Canada	80.004	Sudan	41.11	KEY POPULATIONS	
Serbia	64.70	Germany	80.461	Lebanon	41.70	SDG SCORE-HIGH, MEDIAN, LOW	
Ukraine	67.67	United Kingdom	83.575	Egypt, Arab Rep.	50.96	HUMANITARIAN CRISIS	
Moldova	69.82	Spain	86.629	Bahrain	51.54		
Uzbekistan	70.23	Denmark	86.833	Qatar	57.25		
Kazakhstan	71.56	France	87.366	Iran, Islamic Rep.	42.32		
Bulgaria	75.05	Finland	91.047	United Arab Emir	76.6		
Belarus	79.84						

SDG analytics were applied to countries selected based on a range of high, median score and low scores for SDG 5.2 and the overall SDG Index; the countries in humanitarian crisis (funded by UNFPA) and with a high percentage for key populations.

Socio-economic demographics of the global population [Year: 2021]

Analysis of socio-demographics of the population for the year 2021, is presented in Table.6. and Table.7. It is essential to understand the social structure of the population before identifying the socio-economic determinants of GBV prevalent in that segment of the population. The socio-demographic characteristics of the populations for 2021 were extracted from the UN Statistical Division [2023].

Table 6. *Socio-demographics of the global population [Year-2021]*

GLOBAL GENDER STATISTICS [Age-structure]		
Population (millions) Both sexes	Total [Number]	Percentage [%]
Age Structure		
0-14	1,992	25.3
15-64	5,130	65.1
65+	753	9.6
	7,875	100
Male Population (millions)		
0-14	1,028	25.9
15-64	2,604	65.6
65+	339	8.5
Male [All ages]	**3,970**	**100**
Female Population (millions)		
0-14	964	24.7
15-64	2,527	64.7
65+	414	10.6
Female [All ages]	**3,905**	**100**
Sex ratio		
		101.7

Source: Datasets retrieved from the United Nations Statistics Division (2022)
and the Central Intelligence Agency (2022)

Indicates a high percentage of the population (in millions) within the age group of 15-64 years; a higher number of the male population (n=3970, in millions, 65.6%) when compared by the female population (n=3905, in millions, 64.7%).

Figure 17 *Median-age structure of the global regions [Year: 2021].*
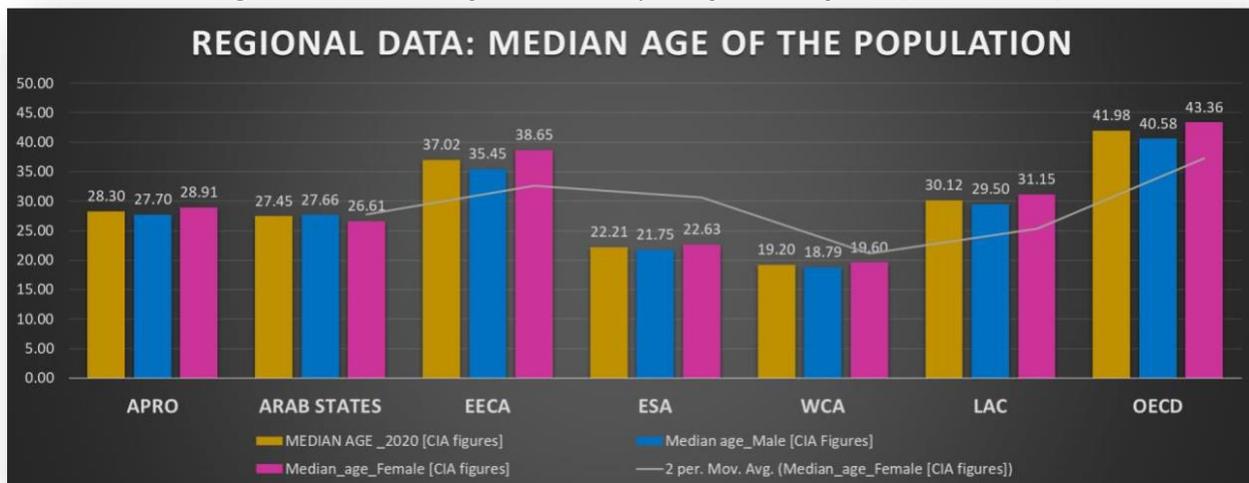
Source: Mean-age structure – data was extracted from the Central Intelligence Agency for the year 2021.
GBV correlates were applied to the median age variable on the model database created for this study.

Figure.17 indicates the median age structure categorized by gender and global regions selected for this study. Results indicated that the median age was highest for the OECD countries (female: 43.36% higher than male population: 40.58%), followed by Eastern Europe and Central Asia (EECA) countries (female: 38.65%; male: 35.45%) when compared to the lowest median age structure for Western Central Africa (WCA) countries (female: 18.79%; male: 19.6%).

Economic structure of the global regions: The Gross National Income per capita for the male and female population across the six regions, was correlated with SDG 5.2, to understand the effort taken by the male and female population based on their income to eliminate GBV in the community. Before applying regression analysis on GBV and the predictor variable (economic status), the countries were categorized based on their economy.

Table 7. *Economic background of the global regions and countries selected for the study.*

Global Regions	Low Income		Low and Middle Income		Upper Middle Income		High Income	
	Total	Percentage	Total	Percentage	Total	Percentage	Total	Percentage
ASIA PACIFIC	1	4	15	30	5	11	1	2
ARAB STATES	4	15	6	12	3	7	6	2
EECA	0	0	4	8	16	35	3	13
ESA	9	35	9	18	4	9	3	6
LAC	0	0	6	12	16	35	4	8
WCA	12	46	10	20	2	4	0	0
OECD	0	0	0	0	0	0	32	67
Total	26	100	50	100	46	100	49	98
	26 Countries		96 Countries				49 Countries	

Table 7: Twenty-six countries were selected from the low-income category; 96 countries from the low-and -middle-income [LMIC] category; 49 countries from the high-income category. The Gross National Income per capita for the male and female population across the six regions was correlated with SDG 5.2, to understand the effort taken by the male and female population based on their income to eliminate GBV in the community. Based on findings from SDG 5.2 scores

and the UNFPA-IPV dashboard scores, priority was given to the regions with the highest prevalence of GBV. Regions within the LMIC category were found to have a higher prevalence of GBV and hence more than 50% of the countries selected for this study belonged to the 'low-income', 'low and middle-income and the 'low and upper-middle income' category (122 countries).

Economic background of the population [FY 2021]:

Table 8 *Economic status correlated with SDG 5.2 (by gender)*

SDG 5 [Elimination of GBV]	β	S.E	t	P>t	95% Confidence	Interval
Female Population-GNI	575.271	59.36711	9.69	0.001**	458.0643	692.4778
_cons	-20387.85	3772.815	-5.4	0.001	-27836.41	-12939.29
Male Population-GNI	713.2888	97.58676	7.31	0.001**	520.6261	905.9515
_cons	-18933.85	6201.696	-3.05	0.003	-31177.68	-6690.019

Results in Table 8 indicated that there was a very high statistically significant positive correlation between the income or financial status of the male and female population with the elimination of GBV. This was mirrored in countries with a high-income level that had a low prevalence of GBV due to an increased effort to eliminate all forms of GBV and the economic independence of women.

Correlation of the global regions with GBV-prevalence [Lifetime-exposure]: The GBV cumulative scores were correlated with the six regions: Western Central Asia (WCA), Eastern South Africa (ESA), Arab States (AS), Asia Pacific (AP), Eastern Europe and Central Asia (EECA) and Latin American Countries (LAC). Table.9: Results indicated that there was a high statistically significant positive correlation indicating an increase in GBV among the low and middle-income countries in Western Central Africa (β=10.19, p$\leq$ 0.001, CI 95% 5.04-15.33);

65

Eastern South Africa region (β=14.81, p≤ 0.001, CI 95% 9.55-20.08); Asia Pacific region (β=8.67, p≤ 0.001, CI 95% 3.57-13.77); Arab States or the North and Middle East regions (β=8.58, p≤ 0.05, CI 95% 1.73-04-15.41).

Table 9. *Correlation of GBV scores with the selected global regions.*

TABLE: GBV CORRELATION WITH GLOBAL REGIONS						
GBV	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
WCA	10.188	2.59	3.93	0.001**	5.04	15.33
LAC	2.862	2.56	1.11	0.26	-2.23	7.96
ESA	14.81	2.65	5.59	0.001**	9.55	20.08
AS	8.578	3.44	2.49	0.02*	1.73	15.41
EECA	-8.882	2.36	-3.75	0.001**	-13.58	-4.18
APRO	8.6722	2.56	3.38	0.001**	3.57	13.77
_cons	11.721	1.98	5.89	0.001	7.77	15.67
Adjusted R-squared value= 0.2755						

There was a high statistically significant negative correlation with GBV for Eastern Europe and Central Asia (β=-8.89, p≤ 0.001, CI 95% -13.58 - -4.18) and no statistical significance in results for the Latin American region although the coefficient value indicates a positive correlation (β=2.86, p≥0.05, CI 95%-2.23- 7.96). Table 9 indicates the regions which showed statistically significant positive and negative correlation to a lifetime exposure of GBV, across the six global regions. WCA*, ESA, and Asia Pacific had a very high statistically significant positive correlation to GBV indicating a high prevalence of GBV in these regions.

The Arab States and the Latin American Countries indicated a statistically significant positive correlation to GBV; Eastern Europe and Central Asia indicated a low prevalence of GBV reflected in the negative correlation of this region with a lifetime exposure of GBV.

Figure 18 indicates the positive and negative correlation of GBV with the selected global regions.

Figure 18. *Global correlates [β values] of GBV for the six global regions [Year-2021]*

Correlation of GBV rates with the six global regions
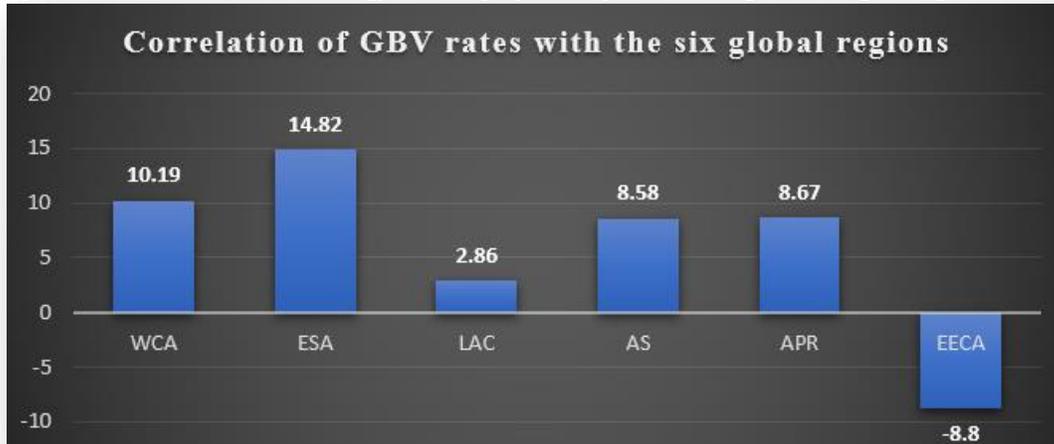
WCA- Western Central Africa; ESA-East and Southern Africa; AP-Asia Pacific region; AS-Arab States; LAC-Latin American Countries, EECA- Easter Europe and Central Asia

Since the income level (measured by gender and region) had a high statistically significant correlation with GBV, this factor was used as a control variable, to understand the impact of any other factors that might be influencing or contributing to GBV besides the categorization of the economic status by gender and by region. The rationale for the selection of global indicators for identifying the socioeconomic determinants of GBV: The socioeconomic demographics of the population and its respective GBV rates (Table.1, Table. 2, Table.3, and Table.4) formed the baseline for the selection of relevant global indicators that would potentially pave the way toward identifying the socio-economic determinants of GBV.

Table 10. *GBV correlates with the mean-age structure of the global population (by gender)*

GBV	β	S.E	t	P>t	95% Confidence	Interval
Mean-age of Female population	-1.8307	0.79396	-2.31	0.023*	-3.40754	-0.2537798
Mean-age of Male population	1.27837	0.89714	1.42	0.158 NS	-0.5034372	3.060169
Constant	43.9752	3.48364	12.62	0.001	37.05636	50.89396
Adjusted R.square= 0.3151						

Results indicate that GBV had a high statistically significant negative correlation with the female population (β=-1.83, p≤0.05, 95% CI: -3.4 to -0.2) [Table.5]. This indicates that with one unit

increase in the median age of women contributed to a -1.83-unit reduction in GBV exposures within a community, unlike the male population which indicated an increase in the mean age contributing to an increase in GBV by 1.27 units. Although the correlation of GBV with the mean age of the male population was not statistically significant, the coefficient value indicated a positive correlation which reflects that the median age of the male population contributed to an increase in GBV. The increase in the mean-age structure of the genders could be linked with additional educational, economic status and an increase in knowledge and people-skills to defend oneself and prevent GBV exposures.

Figure 19. *Sex Ratio [Males per 100 Females] for the global regions [FY 2021]*
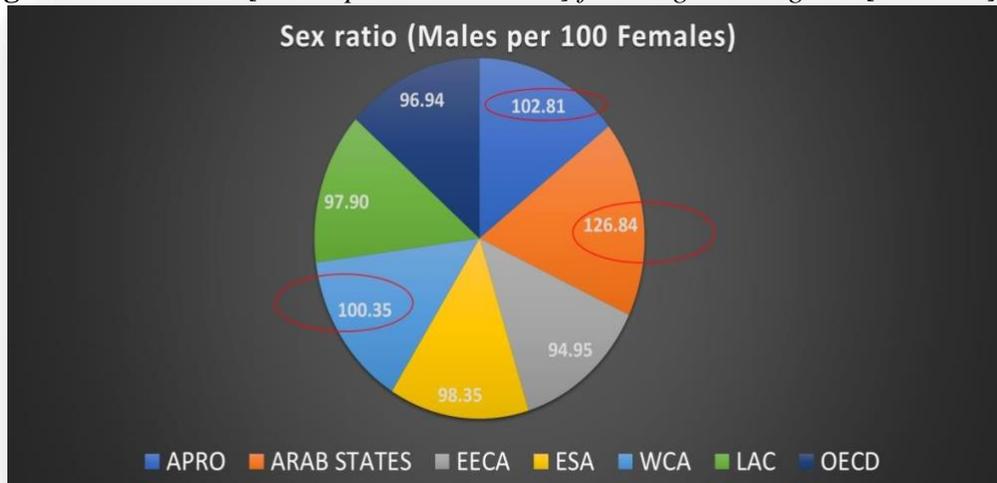
Source: GBV model database reflecting the sex ratio of the global populations (2021)- Gender dynamics for the countries selected for the study

Analysis of the sex ratio (total number of males per 1000 females) of the global regions indicated a higher percentage of the male population in the Asia Pacific Region, Western Central Africa, and Arab States. The findings correlate directly with the high percentage of GBV in the WCA, APRO, and Arab states which concurs with most of the findings which point to men as the cause for GBV which also reflects the hidden power-control over women in these regions. 80 % to 90% of women have been reported as GBV victims and only 5-10% of GBV reported among men.

The percentage of GBV was reported to be high among the key populations according to the global findings from UN Women and UNAIDS (UNAID, 2022). Out of the total female population, women who were sex workers, frequently incarcerated, and those living with HIV were found to be concentrated in low- and middle-income countries; on the contrary, a high number of women with injecting drug use behavior were reported in Easter Europe and Central Asia. Understanding the health disparities and distribution of the key population from the UNAIDS Report 2022 draws attention to the violence experienced in addition to the high percentage of health repercussions among the female key populations. (UNAIDS KP Atlas, n.d.).

Anthropological implications on Gender-Based Violence:

Human Development

The GBV scores were correlated with the level of human development across the six selected global regions. Results indicated a direct and high statistically significant positive correlation of GBV with global regions indicating a low level of human development ($\beta=10.8$, $p\leq0.001$, CI 95% 5.30- 16.29).and a slight statistically significant positive correlation for regions with a moderate level of human ($\beta=7.51$, $p\leq0.05$, CI 95% 2.17- 12.85). A slight statistically significant negative correlation for regions with a very high level of human development ($\beta=-6.89$, $p\leq0.05$, CI 95%: -

Table 11. *GBV correlates with the level of human development.*

GENDER BASED VIOLENCE CORRELATED WITH HUMAN DEVELOPMENT						
Level of Human Development	β	S.E.	t	P>t	95% Conf. Interval	
Very High Human Development [VHHD]	-6.89	2.61	-2.64	0.01*	-12.07	-1.7
High Human Development [HHD]	2.79	2.75	1.01	0.31 NS	-2.67	8.26
Moderate Human Development [MHD]	7.51	2.69	2.79	0.01*	2.17	12.85
Low Human Development [LHD]	10.8	2.77	3.9	0.001**	5.3	16.29
cons	13.31	2.3	5.78	0	8.73	17.88
Adj R-squared= 0.16; Prob>F=0.00						

12.07 to -1.7) reflecting a decrease in GBV for regions with very high human development.

Moderate and Low Human Development indicated a positive correlation indicative of a probability of an increase in GBV for every unit increase in the development level, even among the 'high-human development' category. This could be attributed to the advance in technology which could be utilized as one of the tools to facilitate a modern form of GBV in cyberspace. This led to a correlation between the use of technology with GBV among the male and female populations. To get a deeper insight into the efforts taken to eliminate GBV, the level of human development and regional data was correlated with SDG 5.2.

Having obtained a clear picture of the socio-demographics of the population under study, it was possible to commence the SDG analytics (for the year 2021), using the customized GBV model dataset developed for this study. Each of the research questions framed for this study was answered with quantitative metrics to prove the magnitude of the global impact of GBV.

SDG Analytics: The Sustainable Development Goals of the United Nations (main target indicators and the meta-indicators) were correlated with SDG 5 and GBV to obtain the SDG which had a predominant impact in reducing GBV. According to the results found in Table 12. below, there was a very high statistically significant impact ($p \leq 0.001$) of GBV on all SDGs except SDG 14 and SDG 15; a statistically significant correlation of $p \leq 0.05$, for SDG 13. According to the results found in Table.12, there was a high statistical correlation with gender-based violence (which includes digital violence). Positive correlation indicated that for every unit shift in SDG 1, there was a statistically significant increase [β=0.091 $p \leq 0.043$, CI 95% 0.002-0.179) in the efforts taken to eliminate GBV [SDG 5 score]. All SDGs except SDG 14 and SDG 15 were impacted by GBV.

Table 12. *SDG Analytics: Correlation of the GBV variables with SDGs*

SDG5_N	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
SDG overall score	0.89897	0.1458	6.17	0.000	0.609999	1.18795
SDG1	0.0914	0.04461	2.05	0.043	0.002989	0.17982
SDG2	0.62032	0.13213	4.69	0.000	0.3584545	0.88219
SDG3	0.35115	0.0755	4.65	0.000	0.2015038	0.5008
SDG4	0.3538	0.05246	6.74	0.000	0.2498221	0.45778
SDG6	0.59784	0.10807	5.53	0.000	0.3836534	0.81203
SDG7	0.30075	0.07336	4.1	0.000	0.1553508	0.44615
SDG8	0.75397	0.1509	5	0.000	0.4548904	1.05305
SDG9	0.30142	0.08045	3.75	0.000	0.1419795	0.46087
SDG10	-0.1764	0.05578	-3.16	0.002	-0.2869859	-0.0659
SDG11	0.47529	0.07175	6.62	0.000	0.3330815	0.61749
SDG12	-0.8335	0.25539	-3.26	0.001	-1.339657	-0.3273
SDG13	-0.2979	0.13481	-2.21	0.029	-0.5650784	-0.0307
SDG14	0.08917	0.1734	0.51	0.608	-0.2545156	0.43285
SDG15	0.0294	0.13475	0.22	0.828	-0.237663	0.29647
SDG16	0.41683	0.12285	3.39	0.001	0.1733477	0.66032
SDG17	0.54285	0.11236	4.83	0.000	0.3201648	0.76554

Although SDG 13 (Climate action) did not indicate high statistical significance with SDG 5.2, literature reviews indicated the vulnerabilities of women and girls increased during climate shocks. A very high statistical significance was observed for the correlation of SDG 2 (No hunger) (p<0.001) with SDG 5 (Gender equality) indicating that economic status had a profound impact on the level of GBV in a country. If the economy would be rated as the only reason, then statistically there should be no forms of GBV in regions or countries with a high score in their Gross National Income. However, there was a significant reduction in SDG 5.2 for the Asia Pacific region. LAC region, ESA region, and EECA indicated an increase in the efforts taken to eliminate GBV. It was pertinent to obtain a comprehensive understanding of the impact of GBV exposures across all global indicators in addition to the SDG scores to identify the intermediary socio-economic determinants of GBV. A correlation of SDG 5.2 with the global indicators was conducted alongside an in-depth analysis of the SDG meta-indicators contributing to GBV.

A multivariate analysis was applied to the 17 SDGs in correlation with the GBV exposures. The

multivariate analysis applied to the SDGs reflects the extent to which GBV exposures have the potential to impact the overall potential to accelerate or decrease the achievement of Sustainable Development Goals. Gender-based violence indicated a negative statistical correlation with SDGs 1-5, 7-11, and 15-17; a positive correlation was observed for SDGs 6, 12, 13, and 14. [Table 13].

Table 13. *Multivariate analysis: Impact of GBV exposures on the SDGs*

Variables	Coeff.	t	P>[t]	[95% Conf. Interval]	
SDG 1					
GBV	-1.99	-5.72	0.001	-2.68	-1.3
_cons	102.18	13.99	0.001	87.68	116.68
SDG 2					
GBV	-0.4	-3.61	0.001	-0.63	-0.18
_cons	64.56	27.27	0.001	59.86	69.27
SDG 3					
GBV	-1.24	-6.88	0.001	-1.6	-0.88
_cons	84.93	22.37	0.001	77.39	92.46
SDG 4					
GBV	-1.19	-4.44	0.001	-1.72	-0.65
_cons	91.7	16.26	0.001	80.5	102.9
SDG 5					
GBV	-0.29	0.16	-1.79	0.077	-0.62
_cons	66.25	13.94	0.001	56.8	75.69
SDG 6					
GBV	0.78	-6.22	0.001	-1.03	-0.53
_cons	91.7	29.7	0.001	73.44	83.97
SDG 7					
GBV	-1.11	-5.38	0.001	-1.52	-0.7
_cons	83.41	19.22	0.001	74.79	92.03
SDG 8					
GBV	-0.39	-4.06	0.001	-0.58	-0.2
_cons	71.04	35.09	0.001	67.02	75.05
SDG 9					
GBV	-0.76	-3.94	0.001	-1.15	-0.38
cons	47.26	11.56	0.001	39.14	55.38
SDG 10					
GBV	-0.43	-1.37	0.175	-1.05	0.19
_cons	61.05	9.23	0.001	47.92	74.18
SDG 11					
GBV	-1.12	-5.91	0.001	-1.5	-0.74
_cons	85.4	21.44	0.001	77.5	93.31
SDG 12					
GBV	0.25	4.05	0.001	0.12	0.37
_cons	86.83	66.25	0.001	84.23	89.43
SDG 13					
GBV	0.37	3.31	0.001	0.14	0.59
_cons	61.38	29.07	0.001	79.74	89.05
SDG 14					
GBV	0.2	2.07	0.041	0.01	0.41
_cons	61.38	29.07	0.001	57.19	65.57
SDG 15					
GBV	-0.01	-4.96	0.001	-0.87	-0.37
_cons	72.25	27.43	0.001	67.02	77.48
SDG 16					
GBV	-0.62	-4.96	0.001	-0.87	-0.37
_cons	73.25	27.43	0.001	67.02	77.48
SDG 17					
GBV	-0.63	-4.68	0.001	-0.91	-0.367
_cons	70.43	24.68	0.001	64.77	76.1

From an anthropological perspective, it is essential to understand the impact of human development in association with the efforts to eliminate GBV. The quantitative metrics were unfolded using SDG analytics (GBV correlation with the level of human development of the global regions).

Table 14. *Impact of SDG 5.2 on the overall human development and regional impact.*

SDG5_N	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
HUMAN DEVELOPMENT						
VHHD	9.38768	4.42872	2.12	0.036	0.609176	18.1662
HHD	7.08187	3.2158	2.2	0.030	0.7075955	13.4561
MHD	1.31501	3.28477	0.4	0.690	-5.195976	7.826
LHD	-14.474	3.09456	-4.68	0.000	-20.60893	-8.3384
REGIONAL IMPACT						
WCA	-18.245	3.54342	-5.15	0.000	-25.26754	-11.222
LAC	16.4187	3.54378	4.63	0.000	9.395088	23.4424
ESA	11.7449	3.78736	3.1	0.002	4.238446	19.2513
AS	-19.921	4.31958	-4.61	0.000	-28.482	-11.359
EECA	5.4896	4.29116	1.28	0.204	-3.01533	13.9945
APRO	-1.1466	3.87549	-0.3	0.768	-8.827729	6.53448

Results indicated that increased exposure to GBV with a statistically significant reduction in the efforts taken to eliminate GBV (SDG 5.2) was observed to be the highest for the Arab States (β -19.92, p$\leq$ 0.001, 95% CI: -28.42 to -11.35), followed by Western Central Africa (β -18, p$\leq$ 0.001, 95% CI: -25 to -11). Results indicated that the low-income countries had a high statistical significance with a negative correlation (β= -14.474, p$\leq$0.001); instead of efforts taken to eliminate GBV or TF GBV, there was a clear indication of activities that reduced the efforts to eliminate GBV, which warrants a deeper insight into to root cause of this ancient problem in a digital world. The negative correlation was evident for WCA (β=-18.245, p$\leq$0.001, 95% CI: -25.26 to -11.22), Arab States or the North and Middle Eastern regions (β=-19.92, p$\leq$0.001, 95% CI: -28.48 to -11.22) and the Asia Pacific region (β=-1.146, p=NS, 95% CI:-8.92 to 6.53). Since a high percentage (above 80%) of TF GBV was reported in these regions a further analysis focusing on technology and physical violence was required. To address the digital and physical GBV, two components were selected for the study: 1. ICT progress of a country to analyze digital violence. (Phase-2), 2. Adolescent Birth Rates (to analyze sexual violence). at a global level (Phase-1) and

a country specific-level for Mexico (Phase-3). Predictive analytics was applied to SDG 3 and SDG

5 for Mexico to understand and prepare for future GBV scenarios using UNFPA's four

transformational scenarios. Selection of the SDG meta indicators as variables for this study was

based on the results of the SDG correlation with GBV and SDG 5, thereby selecting variables that

gave a statistical significance between $p \leq 0.5$ to $p \leq 0.01$. SDGs that had no significant correlation

with GBV exposure were dropped from the study. Table 12. Indicated that GBV did not have a

statistically significant impact on SDG 14 and SDG 15. Table 15 represents the preliminary

screening of GBV correlates with a spectrum of global indicators.

Table 15. *GBV correlation with the global indicators*

SDG5_N	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]		PREDICTOR	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]		F	R sq	Adj R	STATISTICAL SIGNIFICANCE
SDG 5=Gender equality and Elimination of GBV																	
HUMAN DEVELOPMENT																	
VHHD	9.38768	4.42872	2.12	0.036	0.609176	18.1662	_cons	55.1634	1.57996	34.91	0.000	52.03166	58.2952	0.036	0.0399	0.0311	*
HHD	7.08187	3.2158	2.2	0.030	0.7075955	13.4561	_cons	54.2337	1.76137	30.79	0.000	50.74232	57.725	0.030	0.043	0.0341	*
MHD	1.31501	3.28477	0.4	0.690	-5.195976	7.826	_cons	55.9637	1.79914	31.11	0.000	52.39749	59.5299	0.690	0.0015	-0.0078	NS
LHD	-14.474	3.09456	-4.68	0.000	-20.60893	-8.3384	_cons	60.5429	1.63098	37.12	0.000	57.30937	63.7765	0.000	0.1711	0.1632	**
REGIONAL IMPACT																	
WCA	-18.245	3.54342	-5.15	0.000	-25.26754	-11.222	_cons	59.3681	1.5041	39.47	0.000	56.38705	62.3492	0.000	0.1956	0.1883	**
LAC	16.4187	3.54378	4.63	0.000	9.395088	23.4424	_cons	52.9746	1.5414	34.37	0.000	49.91957	56.0296	0.000	0.1645	0.1569	**
ESA	11.7449	3.78736	3.1	0.002	4.238446	19.2513	_cons	53.9646	1.60765	33.57	0.000	50.77832	57.1509	0.003	0.0811	0.0726	*
AS	-19.921	4.31958	-4.61	0.000	-28.482	-11.359	_cons	58.4139	1.47826	39.52	0.000	55.484	61.3438	0.000	0.1633	0.1556	**
EECA	5.4896	4.29116	1.28	0.204	-3.01533	13.9945	_cons	55.2895	1.62919	33.94	0.000	52.06051	58.5185	0.204	0.0148	0.0058	NS
APRO	-1.1466	3.87549	-0.3	0.768	-8.827729	6.53448	_cons	56.2978	1.68568	33.4	0.000	52.95678	59.6387	0.768	0.0008	-0.0084	NS
GLOBAL INDICES																	
GII value	-53.634	8.42994	-6.36	0.000	-70.34498	-36.922	_cons	80.0435	3.91312	20.46	0.000	72.28621	87.8008	0.000	0.2745	0.2677	**
HDI value	56.6172	10.8346	5.23	0.000	35.14109	78.0934	_cons	19.7526	7.1332	2.77	0.007	5.613356	33.8918	0.000	0.2018	0.1944	**
YDI	32.987	5.98259	5.51	0.000	21.17575	44.7983	_cons	39.7728	4.06962	9.77	0.000	31.73826	47.8073	0.000	0.154	0.1489	**
GDI	183.863	12.71	14.47	0.000	158.7632	208.963	_cons	-112.47	12.0683	-9.32	0.000	-136.3001	-88.635	0.000	0.5652	0.5625	**
GNI	0.00138	0.00043	3.19	0.002	0.0005239	0.00224	_cons	50.9532	2.28209	22.33	0.000	46.42208	55.4844	0.002	0.0979	0.0883	*
MPI_overall	-46.727	9.80959	-4.76	0.000	-66.21863	-27.236	_cons	62.6138	2.09374	29.91	0.000	58.45362	66.7741	0.000	0.2032	0.1942	**
MPI_Intensity of deprivatic	-0.9743	0.20553	-4.74	0.000	-1.382551	-0.5661	_cons	100.034	9.37034	10.68	0.000	81.42408	118.645	0.000	0.1963	0.1876	**
MPI_Inequality among the	-1205.6	229.003	-5.26	0.000	-1661.654	-749.46	_cons	72.2666	3.65306	19.78	0.000	64.99088	79.5423	0.000	0.2672	0.2576	**
Happiness Index	7.21418	1.78041	4.05	0.000	3.674245	10.7541	_cons	21.7727	9.10262	2.39	0.019	3.674266	39.8712	0.001	0.1619	0.152	**
Inform Risk Index	-5.1398	1.14361	-4.49	0.000	-7.421867	-2.8578	_cons	80.393	5.61786	14.31	0.000	69.18271	91.6032	0.000	0.229	0.2177	**
Humanitarian Crisis	-2.6267	1.10481	-2.38	0.019	-4.819169	-0.4342	_cons	60.2861	2.21152	27.26	0.000	55.89795	64.6742	0.019	0.054	0.0444	*
Fragile State Index	-0.4241	0.08991	-4.72	0.000	-0.6024702	-0.2457	_cons	89.6678	6.91694	12.96	0.000	75.94482	103.391	0.000	0.182	0.1738	**
Global Health Security Ind	0.80485	0.07412	10.86	0.000	0.6584545	0.95124	_cons	28.3672	3.21272	8.83	0.000	22.02211	34.7123	0.000	0.4258	0.4222	**
SRH Index	1.11401	0.1782	6.25	0.000	0.7567377	1.47129	_cons	-7.7959	10.1713	-0.77	0.447	-28.188	12.5963	0.000	0.4199	0.4091	**
SRH_Enabling environment	0.22993	0.25712	0.89	0.378	-0.2931778	0.75304	_cons										
SRH_Health Systems	0.39513	0.21705	1.82	0.078	-0.0464567	0.83673	_cons										
SRH_INTEGRATEDSERVICES	0.43178	0.16935	2.55	0.016	0.087238	0.77632	_cons	-7.992	16.4943	-0.48	0.631	-41.5499	25.5659	0.002	0.3889	0.3333	*

Based on the results found in Table. 15, GDI (Gender Development Index) had the highest positive

correlation (β=+183, p≤ 0.001, 95% CI: 158.76-208.96) with SDG 5.2 (elimination of GBV)

followed by HDI (Human Development Index) with a high statistical significance (β=+56.617, p≤

0.001, 95% CI: 35.14 – 78.09), Gender Inequality Index (β= -53.63, p≤ 0.001, 95% CI: -70.34 to

-.36.92), Multidimensional Poverty Index (β= -46.62, p≤ 0.001, 95% CI: -66.21 to -27.23). Other

global indicators that reflected a positive correlation with GBV were the Youth Development

Index (β=32.98, p≤ 0.001), Happiness Index (β= 7.21, p≤ 0.001), Global Health Security Index

(β=0.80, p≤ 0.001), Gross National Income (β = 0.001, p≤ 0.001), Sexual and Reproductive

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Health (SRH index) (β=1.11, p$\leq$ 0.001), Inform Risk Index(β=-5.13, p$\leq$ 0.001), Humanitarian Crisis(β=-2.67, p$\leq$ 0.001), Fragile State Index(β=-0.42, p$\leq$ 0.001) and the Global Innovation Index(β=0.355, p$\leq$ 0.001, 95% CI (0.28 to 0.48). The above-listed variables are the predominant socio-economic determinants of GBV.

Table 16. *Population with disabilities and GBV exposures*

Reference variable: SDG 5.2	Mean	±SE	t - Test	P - Value	Results
Total Population with disabilities	333.8	66.8	2.6	0.009	**

There was a statistically significant correlation between the segment of the population living with disabilities (p$\leq$0.05) and SDG 5 (efforts taken to eliminate gender-based violence). Table 16 gives the results for statistical computations applied to data-model-1 (177 countries). Further analysis indicated a difference in the impact of disabilities in the male and female population on GBV. Evidential results prove that people living with disabilities have a higher exposure to GBV.

Table 17. *GBV correlation by gender and disability index*

Correlation	β	S.E.	t	P>t	95% CI	
Reference variable: SDG 5.2						
Female Population with disabilities	-0.14	0.06	-2.24	0.03*	-0.26	-0.01
Male Population with disabilities	0.16	0.08	1.91	0.06	-0.01	0.32

There was a statistically significant (p$\leq$0.05) negative correlation observed for the female population living with disabilities, with SDG 5.2. With every increase in women with disabilities (β=-0.14, p$\leq$0.03, 95% CI -0.26 to -0.01), there was a decrease in the achievement of SDG 5.2 compared to an acceleration in the achievement of SDG 5.2 for every unit increase in the male population with disabilities. (β=+0.16, p$\geq$0.05 NS, 95% CI -0.01 to 0.32). Further investigation is

pivotal to comprehend the setbacks such as the type and form of GBV that increases, because of a higher percentage of the female population living with disabilities.

Key Populations:

The characteristics and challenges encountered by the key populations were correlated with SDG 5.2 [*efforts taken to eliminate GBV*]. Considering the main characteristics of the key populations, the relevant SDG meta-indicators of SDG 3, SDG 5, SDG 8), were chosen for the analysis. Physical and digital enslavement, unemployment, substance use disorders, and HIV infections are commonly reported among sex workers, transgenders, men who have sex with men, prisoners, people who inject illicit drugs, and people living with HIV/AIDS. When women and girls fall into the" Key Population" category, their exposure to GBV increases ten times more. It is essential to understand the 12 populations left behind from the data published by UNAIDS on the key populations (UNAIDS KP atlas, n.d.).

Table 18. *Correlation of SDG 5.2 with the vulnerabilities encountered by the KPs**

Correlation	β	S.E.	t	P>t	95% CI	
Reference variable: SDG 5.2						
Female Population	-4.48E-09	1.47E-08	-0.3	0.762	-3.37E-08	2.47E-08
Slavery: Physical/Digital Sex-workers	-0.21	0.05	4.40	0.001**	-0.11	-0.30
Unemployment	-0.14	0.06	2.49	0.01*	-0.03	-0.25
Substance Use Disorders	-0.21	0.06	3.26	0.001**	-0.08	-0.33
HIV	-0.09	0.06	-1.53	0.13	-0.20	0.03
Prisoners	-0.15	0.03	4.14	0.001	0.08	0.23

*KP-Key Populations

Physical and digital enslavement, unemployment, substance use disorders, and HIV infections

indicated a statistically high and negative correlation to the achievement of SDG 5.2. Increase in vulnerabilities and risk behaviors impacted the progress toward the achievement of SDG 5.2. [Slavery β=-0.21, p≤0.001, 95%CI: -0.11 to -0.3; Unemployment/lack of economic autonomy leading to risk behaviors β= -0.14, p≤0.05, 95% CI: -0.03 to -0.25; substance use disorder impacting the subjective well-being β=-0.21, p≤0.001, 95%CI: -0.08 to -0.33].

Economy, Innovations, and the digital divide: Factors such as low literacy and income levels, geographical restrictions, lack of motivation to use technology, lack of physical access to technology, and digital illiteracy contribute to the ***digital divide***. Results of this study shows the correlation of SDG 5.2 with the above listed components digital divide.

SDG 4, SDG 8 and SDG 9, SDG 10, and SDG 16, point to the extent to which education, financial independence, income inequalities, bank account ownership, employment, ability to exercise one's rights, impacts the social and digital divide within a country.

Table 19. *GBV Correlates exposing the digital divide and its impact on TF GBV*

Reference Variable: SDG 5.2	Coef.	S.E.	t	P>t	[95% Confidence	Interval]
Education						
Ratio of female-to-male mean years of education received	0.320	0.035	9.160	0.001**	0.251	0.390
Labor Force Participation						
Ratio of female-to-male labor force participation rate (%)	0.274	0.035	7.850	0.001**	0.205	0.344
Account Ownership						
Adults with an account at a bank or other financial institution or	0.030	0.047	0.640	0.525	-0.063	0.122
Labor Rights						
Fundamental labor rights are effectively guaranteed (worst 0–1	0.097	0.048	2.010	0.047	0.001	0.192
Innovations and Technology						
Population using the internet (%)	0.032	0.059	0.550	0.583	-0.084	0.149
Mobile broadband subscriptions (per 100 population)	-0.014	0.050	-0.280	0.782	-0.112	0.085
Income Inequalities						
Gini coefficient	-0.124	0.056	-2.200	0.03*	-0.236	-0.012
Palma ratio	0.030	0.044	0.680	0.496	-0.058	0.118
Corruption Perception Index						
Corruption Perceptions Index (worst 0-100 best)	0.060	0.073	0.810	0.420	-0.086	0.205
Press Freedom Index						
Press Freedom Index (best 0-100 worst)	-0.148	0.051	-2.900	0.05*	-0.249	-0.047
_cons	25.913	4.152	6.240	0.001**	17.676	34.151

Linear regression results indicated a negative correlation observed between "mobile usage" (β= -0.014; 95% CI: -0.112, 0.085) and SDG 5.2, which was higher than the impact of internet usage

(β= 0.032; 95% CI: 0.084, 0.149). The ownership of a bank accounts [β= 0.30; 95%CI: -0.063, 0.122] correlated positively with SDG 5.2; Female to male ratio of labor force participation, had a high statistically significant positive correlation with SDG 5.2 [β=0.274, p≤0.001; 95% CI: 0.205, 0.344].

Education [female to male ratio of years of education received], had a high statistically significant positive correlation with SDG 5.2 [β= 0.36, p≤0.001; 95% CI: 0.251- 0.390]. An increase in the freedom of press and media indicated a negative correlation with SDG 5.2, indicating that for every unit increase in the Press Freedom Index (best 0 – 100 worst), there were restrictions in advocacy and freedom of expression in eliminating abuse, which brough down SDG 5.2 score by 0.15 times [β= -0.148, p<0.005; 95% CI: -0.249 to -0.047].

Inequalities in income, measured by GINI (a summary of the measure of income inequalities) had a negative impact on SDG 5.2 indicating a lack of economic autonomy negatively impacting the access to technology, prevalent among the population belonging to the lower-income strata. Based on the SDG analytics from phase-I of this study, it was confirmed that economic status (measured by 'Gross National Income') had an adverse impact on the female population than the male population. Income inequalities contributes to decreasing the odds of economic autonomy to ownership of the internet and technological devices, for women and girls.

The ownership of internet by the male within a household, was identified as a fundamental "power-control dynamic" in the context of TF GBV; this creates a rift thereby increasing the digital divide. Findings indicated that TFGBV and ABR was found to be high in countries which had a high statistical correlation with GBV. The LMICs indicated a higher percentage (more than 40%) of the male population with the ability to hold personal bank accounts attributed to a higher participation in workforce and a higher income-level.

Table 20. *Role of the justice system in terminating gender-based violence*

Reference Variable: SDG 5.2	ß	S.E	t	P>t	95% Confidence Interval	
JUSTICE (SDG 16)						
Access to and affordability of justice (worst 0–1 best)	0.114	0.03	3.33	0.001	0.04	0.18
CORRUPTION (SDG 16)						
Corruption Perceptions Index (worst 0-100 best) [SDG 16]	0.34	0.04	8.05	0.001	0.26	0.43
SAFETY (SDG16)						
Population who feels safe walking alone at night in the city or area where they live (%)	0.107	0.04	2.36	0.019	0.01	0.19

Results also indicated that the efficiency of the Justice System of a country is critical to accelerating the SDG 5.2 of a country [β= +0.114, p<0.001]; Corruption Perception Index (β= 0.34, p<0.001] indicated a statistically significant correlation with SDG 5.2. Countries with a higher level of corruption reflected a higher level of GBV. The unequal distribution of income had a negative correlation with SDG 5.2.

Table 21. *GBV correlated with SDG meta-indicators for SDGs 11, SDG 12, SDG 14, SDG 16, and SDG 17*

GBV-SDG 11,12,14:	Coef.	SE	t	P>t	[95%	Conf.		Coef.	SE	t	P>t	[95%	Conf.
GBV							SDG 5						
Sumofn_sdg11_slums	-0.07	0.03	-2.72	0.01	-0.12	-0.02		0.07	0.05	1.48	0.14	-0.02	0.16
Sumofn_sdg11_pm25	-0.08	0.03	-2.24	0.03	-0.14	-0.01		0.29	0.06	4.89	0.00	0.17	0.41
Sumofn_sdg11_pipedwat	-0.05	0.03	-1.63	0.11	-0.12	0.01		0.06	0.06	1.16	0.25	-0.05	0.18
Sumofn_sdg11_transport	-0.11	0.03	-3.40	0.00	-0.17	-0.04		0.15	0.05	2.76	0.01	0.04	0.26
Sumofn_sdg12_msw	0.02	0.03	0.60	0.55	-0.05	0.09		0.00	0.06	-0.03	0.98	-0.12	0.11
Sumofn_sdg14_cleanwat	0.04	0.04	0.96	0.34	-0.04	0.11		0.00	0.07	0.01	1.00	-0.13	0.13
_cons	34.77	3.80	9.16	0.00	27.23	42.31		22.17	6.61	3.35	0.00	9.04	35.29
GBV-SDG 16:	Coef.	SE	t	P>t	[95%	Conf.		Coef.	SE	t	P>t	[95%	Conf.
GBV							SDG 5						
Sumofn_sdg16_homicides	0.04	0.02	1.81	0.07	0.00	0.08		0.01	0.04	0.29	0.77	-0.08	0.10
Sumofn_sdg16_detain	-0.01	0.02	-0.24	0.81	-0.05	0.04		0.10	0.05	2.07	0.04	0.00	0.20
Sumofn_sdg16_safe	-0.12	0.03	-3.84	0.00	-0.19	-0.06		-0.12	0.07	-1.70	0.09	-0.27	0.02
Sumofn_sdg16_prs	0.02	0.04	0.58	0.57	-0.05	0.10		0.06	0.09	0.65	0.52	-0.12	0.23
Sumofn_sdg16_u5reg	-0.12	0.02	-5.29	0.00	-0.17	-0.08		0.05	0.05	0.92	0.36	-0.06	0.15
Sumofn_sdg16_cpicorrupt	-0.12	0.06	-2.13	0.04	-0.23	-0.01		0.21	0.12	1.71	0.09	-0.03	0.46
Sumofn_sdg16_clabor	0.03	0.02	1.45	0.15	-0.01	0.07		0.00	0.04	0.00	1.00	-0.09	0.09
Sumofn_sdg16_weaponse	-0.02	0.20	-0.13	0.90	-0.42	0.37		-0.10	0.44	-0.23	0.82	-0.98	0.77
Sumofn_sdg16_rsfPRESSFI	-0.01	0.04	-0.12	0.90	-0.09	0.08		-0.16	0.09	-1.73	0.09	-0.34	0.02
Sumofn_sdg16_justice	-0.05	0.03	-1.73	0.09	-0.11	0.01		0.11	0.07	1.74	0.09	-0.02	0.24
_cons	37.57	20.05	1.87			77.43		59.15	44.88	1.32	0.19	-30.06	148.37
GBV-SDG 17:	Coef.	SE	t	P>t	[95%	Conf.		Coef.	SE	t	P>t	[95%	Conf.
GBV							SDG 5						
Sumofn_sdg17_govex	-0.06	0.04	-1.37	0.18	-0.14	0.03		0.33	0.07	5.01	0.00	0.20	0.46
Sumofn_sdg17_govrev	-0.01	0.03	-0.35	0.73	-0.07	0.05		0.02	0.05	0.30	0.76	-0.09	0.12
Sumofn_sdg17_statperf	-0.18	0.05	-3.81	0.00	-0.27	-0.09		0.24	0.08	3.17	0.00	0.09	0.39
_cons	30.17	2.40	12.55	0.00	25.39	34.94		32.04	3.88	8.25	0.00	24.33	39.75

A very high statistically significant correlation (p≤ 0.001) was observed for GBV with SDG 11

(transport), SDG 16 (street safety at night), and the Performance Index of the National Statistical System.

Social norms and religiosity of countries correlated with GBV:

An interesting correlation between the GBV influencers was identified by applying linear regression analysis on the Social Norm Index and SDG 5.2 scores. Results presented the extent to which social norms and religion shaped the perspectives and attitudes toward tolerance of violence and justification of violence against women and girls. The Social Norm Index is a collection of data points that reflect the percentage of male and female population with at least one bias, two biases, and no bias. This global index is essential due to the review of literature which point to the importance of cultural belief, tradition, and social norms shaping the tolerance and prevalence of GBV. Table 22 provides a representation of GBV correlation with each of the components which constitute the Social Norm Index. Results indicate that there is a statistically significant negative correlation of SDG 5.2 for both genders. There is a higher correlation value for the female population (β= +0.19, $p \leq 0.05$, 95% CI: 0.06- 0.32) with no biases interlinked with an increase in elimination of GBV when compared to the male population with no biases ((β= +0.18, $p \leq 0.001$, 95% CI: 0.07- 0.29), although a high statistical significance was observed for the male population. This signifies that the male population (with no socio-cultural biases) can positively impact the reduction and elimination of GBV followed by women. On the contrary, men with two socio-cultural and traditional biases indicated a statistically significant negative correlation to SDG 5 (β= -0.57 $p \leq 0.001$, 95% CI: -0.85 to -0.29) when compared to women with at least two biases (β= -0.55, $p \leq 0.001$, 95% CI: 0.86- 0.24).The linear regression analysis indicates the critical role of social norms that sustain GBV and is a strong but subtle influencer and enabler of GBV putting women and girls at risk of both digital and sexual violence.

Table 22. *Multivariate regression of SDG 5.2 on the Social Norm Index and Religiosity of countries (by gender and the extent of social biases)*

MULTIVARIATE REGRESSION: SOCIAL NORM INDEX and SDG 5 [Elimination of GBV]							
Reference: SDG 5.2	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]		Adj R-squared
Social Norm Index [SNI] global score	-0.89	0.31	-2.85	0.01**	-1.52	-0.26	0.15
_cons	140.46	28.92	4.86	0.00	82.01	198.92	
Share of people with at least one bias: [SNI-1]							
Female Population	-0.19	0.07	-2.85	0.01**	-0.32	-0.06	0.17
_cons	103.53	4.03	25.70	0.00	95.39	111.68	
Male Population	-0.18	0.05	-3.40	0.001**	-0.29	-0.07	0.22
_cons	105.64	3.22	32.80	0.00	99.13	112.15	
Share of people with at least two biases: [SNI-2]							
Female Population	-0.55	0.15	-3.59	0.001**	-0.86	-0.24	0.24
_cons	102.70	9.32	11.02	0.00	83.86	121.53	
Male Population	-0.57	0.14	-4.08	0.001**	-0.85	-0.29	0.29
_cons	114.54	8.46	13.54	0.00	97.45	131.64	
Share of people with no biases: [SNI-0]							
Female Population	0.19	0.07	2.85	0.01*	0.06	0.32	0.17
_cons	-3.53	4.03	-0.88	0.39	-11.68	4.61	
Male Population	0.18	0.05	3.40	0.001**	0.07	0.29	0.22
_cons	-5.64	3.22	-1.75	0.09	-12.15	0.87	
RELIGIOSITY of a country:							
Religiosity Source: Pew Center Research	0.62	0.18	3.37	0.001**	0.25	0.99	0.62
_cons	56.99	1.68	33.75	0.001	53.64	60.33	56.99
*** High Statistical Significance * Statistically Significance*							

The high statistically significant negative correlation of social norms with SDG 5 indicates the underlying reason for an increase and continued sustenance of GBV despite laws and policies enforced to end GBV. (β= -0.89, p$\leq$ 0.001, 95% CI: -1.52 to -0.26). Results indicate that men with

a higher number of social biases (more than 2 biases) contributed to sustaining and reversing the efforts taken to eliminate GBV in the community (β=-0.57, p$\leq$0.001, 95%CI: -0.85 to -0.29) when compared to women (β=-0.55, p$\leq$0.001, 95%CI: -0.86 to -0.24). However, the difference in the coefficient values was very minor between the two genders, indicating that negative social norms existed in both genders which negatively impacted SDG 5.2. This calls for an urgent requirement for gender development programs to integrate addressing acceptable social norms which align with the regulations and policies relevant to GBV and TF GBV.

Religiosity and SDG 5.2:

Likewise, countries that indicated the highest religiosity had a positive relationship with SDG 5 (more initiatives and efforts taken to eliminate GBV). Based on the results, a high level of religiosity had a high statistically significant positive correlation with SDG 5 (β= 0.62, p$\leq$ 0.001, 95% CI: 0.25-0.99). This is a critical finding which calls for an urgent requirement to integrate accurate norms into faith-based settings. According to the Pew Research Center, countries that were identified as the most religious had the highest prevalence of GBV. Based on the findings, it is evident that a combination of negative socio-cultural, and traditional beliefs coupled with religious norms increases the exposure of women and girls to violence and exploitation due to a decreased initiative to eliminate GBV. This finding was further verified by applying a multivariate regression analysis of the social norm index and religiosity index on total GBV exposures and SDG 5.2. (Table. 23).

Table 23. *Multivariate regression of Social Norm Index and Religiosity on SDG 5*

Correlation	β	S.E.	t	P>t	95% CI	
Reference: SDG 5.2						
Social Norm Index	-0.92	-0.21	-4.42	0.001**	-1.35	-0.50
Religiosity	-8.59	-11.5	-0.74	0.46 NS	-32.01	14.82
_cons	120.80	11.84	10.19	0.001	96.81	144.79

The multivariate regression analysis revealed a vivid picture with quantitative metrics on the high statistically significant negative correlation of the Social Norm Index with SDG 5. 2 (β= -0.92, p$\leq$ 0.001, 95% CI: -1.35 to -0.50). It is to be noted that although there was no statistically significant correlation between religiosity and SDG 5.2, the multivariate regression of the coefficient value was geared toward a higher negative spectrum ((β= - 8.59) when compared to the Social Norm Index ((β= - 0.92). Results indicate that it is critical to involve faith-based organizations in the holistic multistakeholder GBV interventions to effectively impact socio-cultural and traditional values and belief-system which negatively impacted SDG 5.2.

Table 24. *Factors contributing to the Vulnerability of a population.*

Correlation	β	S.E.	t	P>t	95% CI	
Reference variable: SDG 5						
Fragile State Index	-0.43	0.08	-4.90	0.001**	-0.61	-0.25
_cons	90.07	6.83	13.17	0.001	76.515	103.63
Humanitarian Crisis	-2.66	1.08	-2.45	0.016*	-4.81	-0.51
_cons	60.30	2.15	28.03	0.001	56.03	64.56
Inform Risk Index	-5.21	1.10	-4.7	0.001**	-7.42	-3.00
	80.69	5.41	14.89	0.001	69.89	91.49

There was a high statistically significant correlation (p$\leq$ 0.001) for SDG 5's relationship with both the Fragile State Index (β= -0.43; p$\leq$ 0.001) and Inform Risk Index (β= -5.21; p$\leq$ 0.001). This indicates that one unit increase in either the Fragile State Index score or the Inform Risk Index triggers a reduction in efforts to eliminate GBV by 0.43 units and 5.21 units.

Having obtained a set of socioeconomic determinants of GBV, the research investigator ranked each determinant in the order of the magnitude of the impact of GBV on the global indicator variables selected for this study. The ranking was based on the linear regression coefficient values (β) and the degree to which the variable had a statistically significant positive or a negative correlation with SDG 5.2. Only variables which had a statistical significance in the range of p$\leq$

0.05 to p≤ 0.001, were used for the ranking of variables. Table 25 represents the most important

results of this study, showcasing the top 15 socioeconomic determinants of GBV.

Multivariate analysis on the predominant socio-economic determinants of GBV:

Table 25. *Ranking of the socio-economic and environmental indicators of GBV for 2021*

Ranking of the Socio-economic Determinants of GBV [FY 2021] - *Ranks #1 to #3*	β	S.E.	t	P>t	95% CI	
Reference variable: SDG 5.2						
1. Gender Development Index	**185.03**	**12.64**	**14.64**	**0.001****	**160.07**	**209.99**
_cons						
The life expectancy of the Male population	-0.67	0.48	-1.40	0.16	-1.62	0.27
The life expectancy of the Female population	0.29	0.48	-1.40	0.53	-0.65	1.24
Expected years of schooling- Male	-2.31	1.02	4.47	0.001**	2.36	6.11
Expected years of schooling- Female	4.23	0.94	-2.27	0.02*	-4.33	-0.29
Average years of schooling- Male	-3.18	1.18	-2.70	0.008*	-5.51	-.85
Average years of schooling- Female	3.51	1.12	3.13	0.002*	1.29	5.73
Gross National Income per Capita- Male	-.0007	.0001	-6.32	0.001**	-.0009	-.0004
Gross National Income per Capita- Female	.001	.0001	8.08	0.001**	.0009	.001
_constant	55.82	11.84	4.71	0.001**	32.42	79.21
2. Gross National Income						
GNI of the Female Population	575.27	59.36	9.69	0.001**	458.06	692.47
GNI of the Male Population	713.28	97.58	7.31	0.001**	520..62	905.95
constant	59.40	15.50	3.56	0.001	42.45	80.32
3. Human Development Index	**66.56**	**6.53**	**10.19**	**0.001****	**53.66**	**79.46**
_constant	13.55	4.84	2.80	0.006*	3.99	23.11

Table 25. (*Continued*): *Ranking of the socio-economic and environmental indicators of GBV*

Ranking of the Socio-economic Determinants of GBV [FY 2021] (*Rank #4 to #15*)	β	S.E.	t	P>t	95% CI	
4. Gender Inequality Index	**-56.17**	**4.77**	**-11.76**	**0.001****	**-65.60**	**-46.74**
Women in parliament	0.51	0.07	6.73	0.001**	0.36	.66
Female population with secondary education	0.84	.12	6.64	0.001**	0.59	1.10
Male population with secondary education	-0.67	0.14	-4.77	0.001**	-0.95	-0.39
Workforce participation - Female adolescents	0.41	0.05	7.04	0.001**	0.29	0.53
Workforce participation- Male adolescents	-0.06	0.12	-0.55	0.58NS	-0.31	0.17
_cons	24.49	8.62	2.84	0.005	7.38	41.59
5. Youth Development Index	**46.37**	**10.82**	**4.29**	**0.001****	**24.82**	**67.93**
_constant	29.48	7.32	4.03	0.001**	14.90	44.06
6. Happiness Index	**7.18**	**1.69**	**4.24**	**0.001****	**3.81**	**10.55**
_constant	21.89	8.68	2.52	0.013*	4.64	39.15
7. Inform Risk Index	**-5.21**	**1.10**	**-4.70**	**0.001****	**-7.42**	**-3.00**
_constant	80.69	5.41	14.89	0.001	69.89	91.49
8. Sexual and Reproductive Health Index	1.11	0.17	6.25	0.001**	0.75	1.47
constant	-7.79	10.17	-0.77	0.001	-28.18	12.18
9. Median Age-Structure	1.08	0.11	9.52	0.001	0.86	1.31
10. Global Health Security Index	0.80	0.07	10.86	0.001**	0.65	0.95
_constant	28.36	2.31	8.83	0.001	75.94	103
11. UHC	**0.58**	**.087**	**6.74**	**0.001****	**0.414**	**0.759**
_constant	22.00	5.26	4.18	0.001	11.57	32.43
12. Population aged 0-14 years	**-0.95**	**.099**	**-9.55**	**0.001****	**-1.15**	**-0.75**
_constant	86.92	2.89	30.04	0.001	81.21	92.63
13. Social Norm Index	**-0.82**	**0.09**	**-8.44**	**0.001****	**-1.017**	**-0.62**
_constant	107.22	5.31	20.17	0.001	96.59	117.84
14. Global Innovation Index	**0.35**	**0.0370**	**9.60**	**0.001****	**0.282**	**0.42**
_constant	45.11	1.97	22.86	0.001	41.22	49.01
15. Corruption Perception Index	**0.41**	**0.04**	**10.12**	**0.001****	**0.33**	**0.49**
_constant	44.97	1.91	23.53	0.001	41.20	48.71

Results prove that Gender Development ranked first in its coefficient value (β=185.03; p≤ 0.001)

when correlated with SDG 5.2 and GBV exposures. It is to be noted that economic status is a well-

established contributing factor of GBV and the data-model was controlled for 'economy'. Results indicated that for every unit increase in the GDI of a country, there is an acceleration of SDG 5.2 by 185 units. The other main socioeconomic influencers were the economic background of women (β=575.27; p≤ 0.001) and men (β=713.28; p≤ 0.001) (measured by the Gross National Income per capita) and the level of human development measured by the Human Development Index (β=66.56; p≤ 0.001). The Gender Inequality Index (β=-56.17; p≤ 0.001) was ranked as the fourth determinant that impacted GBV followed by a set of indicators presented in Table 25. This disproves assumption #1 (which states that GII has the highest statistical correlation with SDG 5.2). In lieu of GII, this study unraveled the importance of gender development (GDI) to enhance ethical, moral, and social values to end TF GBV, besides economic autonomy.

PHASE-II
Impact of innovations and ICT progress on Technology Facilitated GBV

Research Question 2 (Phase 2): Does technological advances trigger an increase in the acceleration of SDG 5.2 or does it increase TF GBV?

Table 26. *Internet Usage correlated with GBV exposures [characterized by gender and demographics in urban and rural settings)*

GBV-INTERNET USE	β	S.E.	t	P>t	[95%	Conf. Interval]	_Constant	R-sq
INTERNET USERS-TOTAL	-1.99	0.75	-2.65	0.015*	-3.56	-0.42	95.16	0.2595
Male Users	-1.93	0.75	-2.58	0.018*	-3.49	-0.37	95.12	0.2494
Female Users	-2.07	0.77	-2.69	0.014*	-3.67	-0.46	95.44	0.2655
URBAN-TOTAL	-1.49	0.66	-2.27	0.034*	-2.87	-0.12	96.39	0.2047
Urban Male Users	-1.43	0.63	-2.26	0.035*	-2.76	-0.11	96.50	0.2032
Urban Female Users	-1.55	0.70	-2.23	0.038*	-3.00	-0.10	96.32	0.1985
RURAL-TOTAL	-2.10	0.93	-2.26	0.035*	-4.03	-0.17	83.66	0.2041
Rural-Male	-2.06	0.92	-2.23	0.037*	-3.98	-0.13	84.13	0.1992
Rural-Female users	-2.17	0.94	-2.31	0.032*	-4.13	-0.21	83.52	0.2106

To identify the extent to which GBV had infiltrated cyberspace, the ITU data on internet usage was correlated with GBV by gender and by place of residence (urban or

rural settings).

Based on the findings of the GBV correlates across the global regions, the age structure pertinent to internet usage was extracted from the ITU [International Telecommunications Union]. Since GBV was significantly high in low- and middle-income countries, a close watch on the age structure of the internet users was tracked utilizing data from ITU, World Telecommunications Indicator database. For every unit increase in female internet users, there was a decrease in GBV by 2.07 units [β:-2.07; $p \leq 0.05$, 95% CI: -3.67, -0.46]; compared to a decrease in GBV by only 1.93 units among male population [β:-1.93; $p \leq 0.05$, 95% CI: -3.49, -0.37). The TF GBV was highest among the urban internet users evident from the reduction in GBV by only 1.49 units (β:-1.49; $p \leq 0.05$, 95% CI: -2.87, -0.12) when compared to the rural population (β:-2.10; $p \leq 0.05$; 95% CI: -4.03, -0.17). The male population showed a lower potential of reducing GBV (urban male internet users: β:-1.43; $p \leq 0.05$, 95% CI: -2.76, -0.11; rural male internet users: β:-2.06; $p \leq 0.05$, 95% CI: -3.98, -0.13) when compared to the female population of internet users (urban female internet users: β:-1.55; $p \leq 0.05$, 95% CI: -3, -0.10; rural female internet users: β:-2.17; $p \leq 0.05$, 95% CI: -4.13, -0.21). Results in Table 26 confirmed that the ethical use of the internet was poor among the urban population and caused a deceleration of SDG 5.2, although they had a higher access to technology than the rural population. This also indicates that the ICT progress in urban settings involved an unethical use of the internet. The advent of the 5G environment which increases the interconnectedness of technological devices used in an urban setting, could account for the perpetrators using technological devices (cell phones, laptops, iPad, and smart devices in homes) to victimize and harass women and girls. The diagrammatic expression in Figure 20, indicates that women used technology to accelerate SDG 5.2 while a moderate to a high level of perpetration and misuse of technological innovations and internet usage was prevalent among male population;

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the results aligned and augmented the existing global scenario of gender-based violence.

**Figure 20**. *Graphical representation of internet usage by gender and demographics*
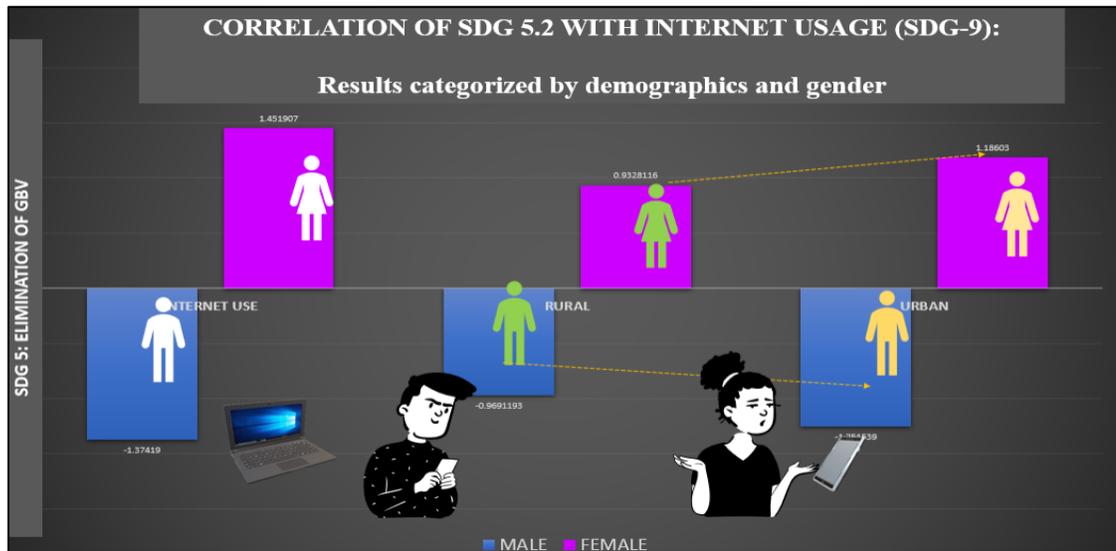
Table 27. *Age structure and Internet Usage characterized by gender and demographics.*

Regions	Internet users: < 15 years as a % of all < 15 years	Internet users: 15-24 years as a % of all 15-	Internet users: 25-74 years as a % of all 25-74	Internet users: 75+ years as a % of all 75+
Africa	39.34	65.53	51.80	7.18
Arab States	NA	98.42	91.46	69.35
Asia & Pacific	80.34	96.79	82.94	29.49
CIS	82.34	92.01	81.21	14.52
Europe	75.11	97.79	81.37	41.46
LAC	67.87	87.20	68.37	15.11
Average %	69.00	89.62	76.19	29.52
Source: ITU, World Telecommunication/ICT Indicators Database, January 2022				
CIS: Common Wealth and Independent States				

Results indicated the highest percentage of internet users within the age structure of 15-years to 24 years (89.6%), followed by the age group of 25 - 74 years (76%). More than 50% of users found among the younger population less than 15 years old (69%).

Literature-review analysis on high internet reliance and usage also showed a high percentage of ownership of the internet and mobile phone subscriptions pertinent to the male population in low- and middle-income settings. Economic conditions and misuse of the internet by the urban

population indicated a need for gender development to promote the ethical use of the internet and technological devices.

Table 28. Technology and innovations impacting other forms of violence.

Variables	β	S.E.	t	P>t	95% CI	
Reference variable: SDG 9						
Adolescent Birth Rate	-0.32	0.04	-7.92	0.001**	-0.40	-0.24
Crime Index	-0.39	0.05	7.30	0.001**	0.28	0.49
GBV	-0.66	0.17	-3.79	0.001**	-1.01	-0.32
Modern-day slavery	0.15	0.04	3.34	0.001**	0.06	0.24
_constant	58.11	5.22	11.12	0.001	47.72	68.49
Reference variable: SDG 5.2						
Internet Usage	0.31	0.03	8.21	0.001**	0.23	0.38
Mobile subscriptions	0.18	0.06	3.00	0.003*	0.62	0.30
_constant	41.19	2.50	16.45	0.001	36.25	46.14
Internet usage (Male and Female)						
Male Internet users	-1.37	0 .29	-4.72	0.001**	-1.95	-0.79
Female Internet users	1.45	0.27	5.35	0.000**	0.90	1.99
Urban (Male and Female)	0.19	0.23	0.83	0.416	-0.28	0.67
Rural (Male and Female)	-0.08	0.16	-0.55	0.588	-0.42	0.24
_constant	55.53	11.49	4.83	0.000**	31.75	79.31
Male Internet Users with demographics						
Male [Urban Internet Users]	-1.25	.426	-2.93	0.008*	-2.13	-0.36
Male [Rural Internet Users]	-0.96	0.03	-2.78	0.011	-1.69	-.24
Female Internet Users with demographics						
Female [Urban Internet Users]	1.18	0.38	3.11	0.005*	0.39	1.97
Female [Rural Internet Users]	0.93	0.33	2.80	0.011	0.23	1.62

The urban male internet users showed the highest level of perpetration when compared to the rural male population and female population (urban, rural). One factor that is inferred is access to technology in an urban setting. Another factor is explained by WHO: during COVID-19, the adolescent population were hard hit by mental health disorders (Table 29); this age-group also indicated the highest percentage of internet usage, which unravels the potential reason for an increase in the unethical use of technology. Results in Table 28 indicate a significant correlation between internet usage and mobile phone usage with SDG 5.2.

The "Virtual is Real"- Table 28 depicts the multivariate analysis indicating the impact of digital violence, physical and sexual violence on SDG 5.2. An increase in the usage of the internet and mobile phones was found to accelerate SDG 5.2 but also had a statistically significant impact on GBV-level, Adolescent Birth Rates, and modern-day slavery. Results indicate that male internet users showed a negative correlation (β= -1.37, p$\leq$ 0.001) to SDG 5.2 when compared to a positive correlation observed among female internet users (β= 1.45, p$\leq$ 0.001). This means that for every unit increase in male internet users, there was a decrease in the achievement of SDG 5.2 by 1.37 units (-1.37) compared to an acceleration in SDG 5.2 for female internet users by 1.45 units. The rural internet users (β= -0.08) indicated a higher level of perpetration (a deceleration in SDG 5.2 achievement) when compared to urban internet users (β= 0.19) with a positive impact in accelerating SDG 5.2. However, a deeper analysis indicated that urban male internet users showed a higher level of negative correlation with SDG 5.2 (β= -1.25) when compared to rural male users (β= -0.96). This indicated access to more technological devices and unethical use of technology.

The results from the findings of the U.S. Department of Homeland Security and the UNFPA indicated cybersecurity measures owned by a country reflected the digital safety metrics at a national and subnational level, which contributed to national security. At a granular level, this inference points to the potential of facilitating digital enslavement in countries with a low number of secure internet servers. Other forms of slavery called "modern slavery" which involved human trafficking were found to rely heavily upon the internet, and technology for each step of their criminal activity.

This led to applying SDG analytics to unravel and measure the correlation of 'modern-day slavery' (a form of GBV) with SDG indicators, innovation, and technology (SDG 9) and other global indices. Deepfakes, cyber-harassments, and digital enslavement are as "real" and harmful

and can be sustained for a longer time due its digital nature; it also favors the perpetrator to remain hidden by masking identities on the digital platform. Women and girls exposed to cyber harassment (knowingly and unknowingly) are trapped and lured into human trafficking or one-time encounters with strangers leading to devastating health consequences and unwanted pregnancies (adult and teenage). A brochure, a TikTok video, and a scientific article were developed by high school students and a college student, as an outcome of this research, to create awareness of cybercrime and specific types of technology facilitated violence. (Figure 21)

Figure 21. *Misuse of technology for cybercrime and other forms of violence*
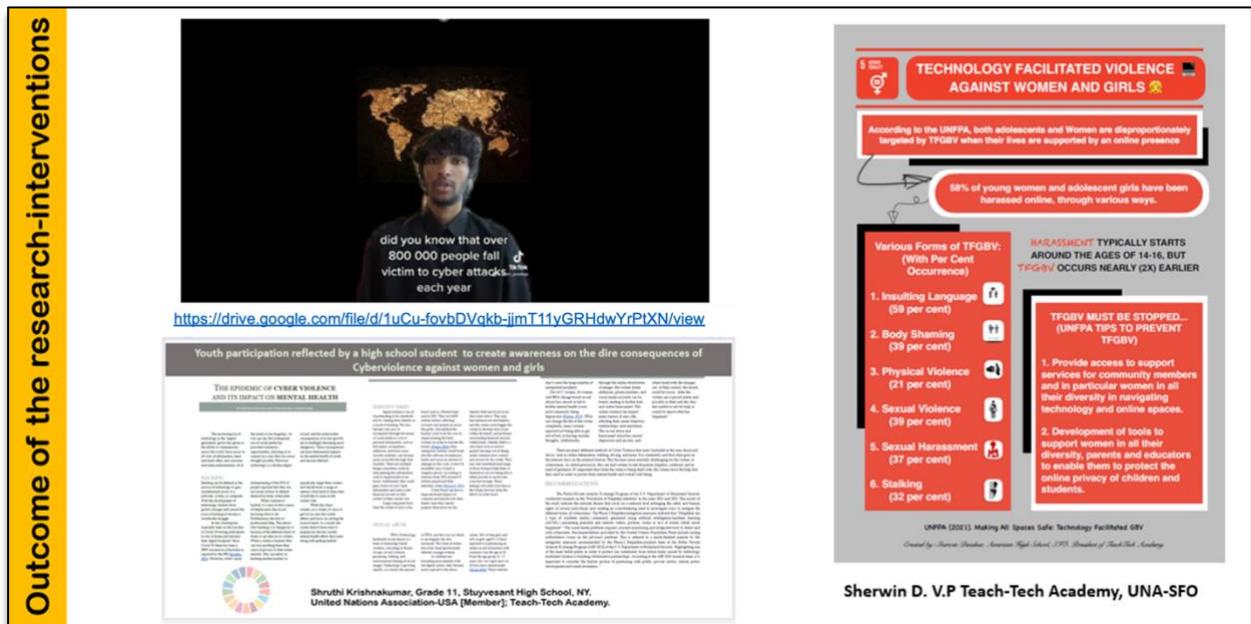
The TikTok video, brochure and article, are found in Appendix E.

Based on the results obtained for the age structure and gender for internet usage, the global scenario of mental health disorders was correlated with internet usage to get quantitative evidence on the mental health status of the most frequent user population. Mental health problems in the year 2021 were found to remain at an all-time higher level after the COVID pandemic.

**Table 29**. *Impact of TF GBV on mental health [FY 2021]*

Variables	β	S.E.	t	P>t	95% CI	
Reference variable: Mental Health Disorders						
SDG 5.2	-1.30e-08	6.51e-08	-0.20	0.842	-1.42e	1.16e
constant	56.22	1.65	33.95	0.001**	52.93	59.51
Reference variable: Internet Usage						
Mental Health Disorders	4.94e-08	1.05e-07	0.47	0.639	-1.59e	2.58e
constant	48.02	2.67	17.97	0.001**	42.72	53.32

* e- one million

Results indicated that for every unit increase in mental health disorders, there was an increase in internet usage by 4.94 million units; an overall statistically significant correlation of $p \leq 0.001$ was observed for the correlation between mental health disorders and internet usage for the year 2021. This could be due to the COVID pandemic shutdowns. Global reports published by the World Health Organization [WHO] indicated a spike in the percentage of mental health disorders due to COVID-19 in the age structure of 15-25. According to the WHO in 2019, 301 million people were living with anxiety disorder including 58 million children and adolescents; 280 million were living with depression, including 23 million children and adolescents, 40 million people experience bipolar disorders and most importantly 40 million people (including children and adolescents were living with conduct-dissocial disorder. These disorders could easily be interlinked with the unethical use of the internet serving as a weapon to add to the power-control dynamics in a "smart world". The dire consequence of TF GBV can be explained by looking at the dynamics of a "smart home". A smart home comprises several gadgets which have the feature to control all the routine functions within a household from the entry to the house to turning the lights, cooler, and heater within a house. When this feature is owned by a perpetrator with power-control issues or a mental health concern, it could be used to harass the victim. This is a perfect

example of the possibilities of "cloud control" (online perpetration) impacting the real world.

Figure 22. *Features of a smart home -A "Cloud-control" enabling environment*
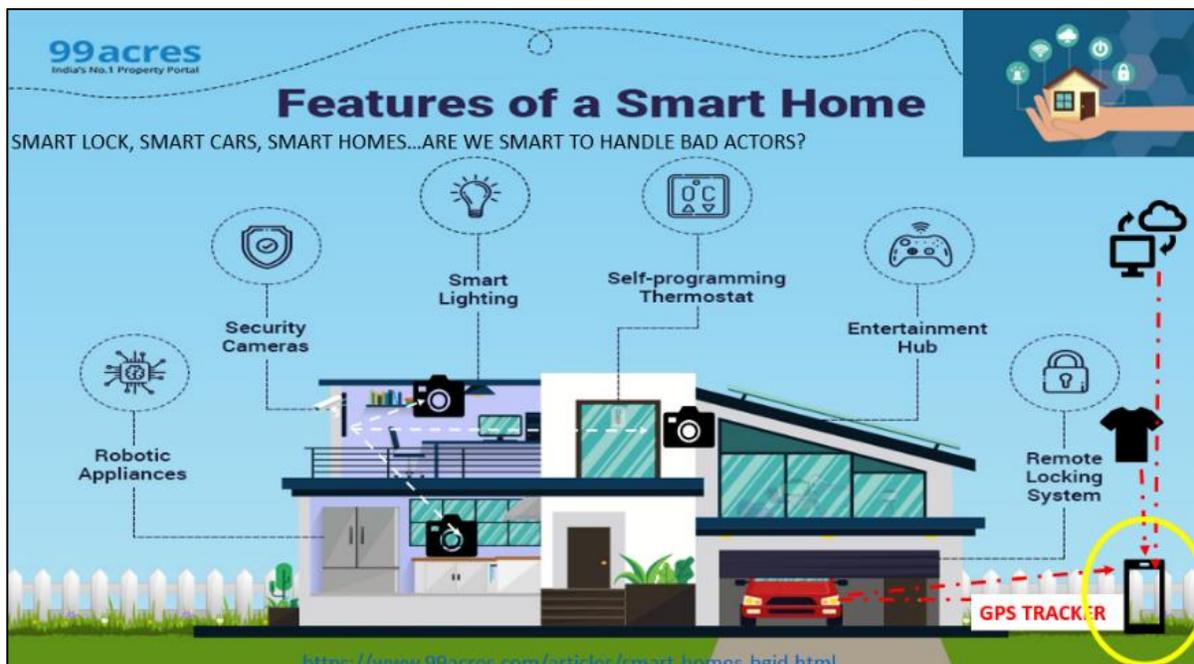
Source: 99acres: The image was adapted from website '99acres', titled "Features of a Smart Home". Retrieved from: https://www.99acres.com/articles/smart-homes-bgid.html

This applies to the virtual relationships and commercial luring of women and girls into the sex industry or human trafficking. Remote monitoring without the consent of the victim has also led to capturing video snippets and photographs leading to threats such as revenge porn; TF GBV causes the perpetrator to have a wider dissemination in a timeline of few seconds and this tremendously increases the magnitude of the damage to the victim and sustains perpetration. Mental health issues were found to be associated with GBV leading to a profound level of TF GBV. Several grey literature and ongoing studies by the investigation agencies indicated an addiction to online gaming or online spying by perpetrators causing psychological, physical, and sexual threats to the victim, especially if the victim decided to separate from the perpetrator. Mental health conditions could be one more contributor to this vicious cycle of abuse.

Government ensuring online safety- Secure Internet Servers:

A global overview of the efforts taken by the governments in different countries to secure the online or digital platform was obtained from the World Data Bank (2022) and ICT reports to extract data on the internet safety of each country. Results indicate the metrics for "Secure Internet Servers" established by each country. The Table below indicates the progress in setting up a secure internet server per country for the past ten years (2010-2020).

Table 30. *Global progress in the investment in secure Internet servers*

Secure Internet servers (per 1 million people)										
COUNTRIES	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
USA	2481.716	2986.265	3841.698	4303.127	5129.545	6358.875	11435.1	30338.03	65833.81	123980	140808.3
AUSTRALIA	1402.794	2171.394	3187.899	3505.126	3938.586	4574.111	9810.215	21544.79	32903.59	36718.77	39794.43
RUSSIA	17.09492	28.86104	57.57612	79.73131	120.3591	321.4019	1163.948	3541.097	5190.623	9336.908	13344.76
BRAZIL	28.25046	44.09296	70.54639	86.83026	112.3376	158.9608	410.0444	1581.639	2036.384	2740.911	3087.189
CHINA	1.199069	1.956083	3.766089	5.134092	9.705072	19.55923	47.59654	207.6492	443.5128	729.7387	948.5734
INDIA	1.669798	2.273076	4.506311	6.152203	8.444731	11.68795	38.29546	123.0999	187.8043	389.198	479.9246
MEXICO	13.41888	17.2954	26.82603	31.60894	40.96211	57.88693	119.6594	185.4824	225.7455	271.4862	322.7652
CONGO	0	0.227539	1.773758	1.94689	3.166584	3.706684	4.61755	4.696029	6.101789	6.133255	8.336215
HAITI	0.201019	0.396027	1.073074	1.346067	2.369891	3.833374	4.520305	4.552752	5.304237	5.32714	7.629884

Secure servers are those servers that use the secure socket layer protocol to protect communication from unintended recipients. More commonly referred to as SSL servers, secure servers will communicate between Web servers and Web browsers using cryptography or encrypted and decrypted communication.

The USA indicated the highest number of secure internet servers when compared to other countries. Countries with the lowest number of secure internet servers (Western Central Africa) were found to have the highest percentage of GBV. The United States of America had the highest number of secure internet servers, clearly indicating the massive effort taken from a government perspective to reduce the possibility of TF GBV on a sub-national level. This concurs with findings published by the World Economic Form: the impact of 5G increasing the internet speed and the

interconnectedness of devices making it easier to perpetrate and cause harm.

As cybersecurity-awareness programs and certifications are recommended to be integrated as part of the gender-empowerment measures, the government has taken measures across the globe to ensure the safety and security of civilians by investing in secure internet servers. Based on the significant impact of internet usage on GBV, it was pertinent to research data on the initiatives taken from a governmental standpoint.

Mitigation measures: Research deliverables of the U.S. Department of Homeland Security and United Nations Population Fund

The mitigation measures to be taken in the context of TF GBV were obtained from the research candidate's participation in a research program at the U.S. Department of Homeland Security [DHS-AEP] and the United Nations Population Fund [UNFPA].

The findings from the Public-Private Analytic Exchange Program of the U.S. Department of Homeland Security [AEP-DHS] presented findings on the impact of Artificial Intelligence, vulnerabilities in health information technologies and 5G impacts on cybersecurity. The research investigators' participation in the research program of the AEP-DHS (2019-2023) enabled collaborative teamwork with intelligence analysts from the government and private sectors. The findings were vetted by the Office of the Directorate of National Intelligence, prior to the publication of the results. It was pertinent to understand the integration of advances in technology in tandem with the mitigation measures integrated into a country's government and private sectors which reduces TF GBV.

The goal of Phase II of this study was to understand the domestic and national context of threats caused by technology and the extent to which the government and private sectors have worked collaboratively to arrive at mitigation measures for TF GBV. In this phase, the concrete

mitigation measures taken by the government to reduce the malicious use of Artificial Intelligence, deepfake identities, and unsafe-interconnected devices in a "5G" world, were analyzed from the standpoint of national security and human rights protection. This phase of the study involved the extent to which the government of the United States of America had taken safety measures to make cyberspace a safe place for women and girls. The deliverables and findings are accessible online at https://www.dhs.gov/publication/2022-aep-deliverables.

Outcome: The research candidate contributed to interweaving findings from the AEP-DHS and this collaborative research with UNFPA, to organize a webinar for headquarters of UNFPA. The webinar "Making All Spaces Safe" was organized for UNFPA. The webinar highlighted the importance of addressing TF GBV, not only from a domestic violence context but highlighted its ripple effect on the national security of a country. Experts from the Federal Bureau of Investigation, Department of Homeland Security, and New York Medical College were invited by the research candidate to present findings on the AEP-DHS deliverables and on health-economy, which evidentially supported the most recent findings from Phase-II of this research investigation. The research candidate contributed to the building of one of the technical documents of UNFPA titled Making All Spaces Safe: Technology Facilitated Gender-Based Violence". Collaborative work and writing work done alongside the GBV and Human Rights team of the UNFPA headquarters, expounded on the entire spectrum of digital violence and its relevant solutions. This global document is accessible online at: https://www.unfpa.org/publications/technology-facilitated-gender-based-violence-making-all-spaces-safe

> More data and information on the mitigation measures are available from the collective findings of research carried out in conjunction with the current study with the DHS and UNFPA.

1. UNFPA: https://www.unfpa.org/publications/implementation-summary-safe-ethical-use-technology-gbv-harmful-practices

2. Public-Private Analytic Exchange Program, U.S. Department of Homeland Security:

   - AEP deliverables: https://www.dhs.gov/aep-deliverables

   - Deepfake Mitigation: https://www.dhs.gov/sites/default/files/2022-10/AEP%20DeepFake%20PHASE2%20FINAL%20corrected20221006.pdf

3. The Blue Campaign of the DHS point to fact sheets on ways to prevent TF GBV and cybercrime.

Results obtained from GBV correlation with the SDG scores and global indices indicated the highest coefficient value with a very high statistically positive correlation for the 'Gender Development Index'. Results indicated that there was a setback in gender development as Science and Technology had been prioritized in the past few decades leading to the misuse of technology for harmful practices and as a weapon to control and harass vulnerable women and girls.

Table 31 depicts the impact of the misuse of technology on global indicators.

Digitalization of education, health, banking, water supply, and critical infrastructures has opened the door to back-door attacks in the future. Based on the list of global goals and global indices impacted by technological misuse, there is a critical need to prioritize cybersecurity among civilians to ensure the safety of the home and the country due to the multi-prong impact of technology on global goals.

Table 31. *Impact of TF GBV on the global indicators*

| VIOLENCE: TF GBV / Modern-day slavery [Physical & Digital]	β	S.E.	t	P>t	95% Confidence Interval	
Reference variable: SDG 5.2						
Global Indices						
GDI 2021	187.73	40.86	4.59	0.001**	107.03	268.43
GII 2021	7.07	28.23	0.25	0.80	-48.69	62.83
HDI 2021	26.36	35.23	0.75	0.46	-43.23	95.95
constant	-131.81	52.05	-2.53	0.01*	-234.61	-29.01
Economical						
GINI Coefficient	0.21	0.08	2.72	0.01*	0.06	0.36
PALMA ratio	-0.11	0.11	-1.00	0.32	-0.32	0.10
Research & Expenditure	0.50	0.10	4.94	0.001**	0.30	0.71
Owns a Bank Account	0.30	0.14	2.20	0.03*	0.03	0.57
Multidimensional Poverty Index	-1.62	20.18	-0.08	0.94	-41.85	38.60
Adjusted GDP growth (%)	0.46	0.12	3.85	0.001**	0.23	0.70
constant	53.47	5.39	9.93	0.001	42.84	64.10
Health						
Mental Health	0.00	0.00	-2.54	0.02*	0.00	0.00
Disability	0.01	0.00	2.67	0.01*	0.00	0.02
Global Health Security	0.63	0.29	2.11	0.05*	0.06	1.20
SRH Index	0.00	0.08	-0.57	0.09	-0.16	0.16
Universal Health Coverage	0.75	0.21	4.46	0.08	0.34	1.17
constant	61.33	4.60	13.33	0.001**	52.03	70.63
Press -PFL (best 0-100 worst)						
Press Freedom Index	0.55	0.09	5.96	0.001**	0.37	0.73
constant	32.49	6.18	5.26	0.001**	20.30	44.68
Water & Vulnerability Index						
Scarce water consumption	-0.24	0.07	3.16	0.001**	-0.09	-0.38
Vulnerability: Fragile State Index	-1.42	0.36	-3.95	0.001**	-2.14	-0.70
constant	3.06	10.68	0.29	0.78	-18.02	24.14

It is evident from the results in Table 31 that TF GBV has an impact on the acceleration and deceleration of SDG 5.2 evidenced by the coefficient values and statistical significance for the correlation of SDG 5.2 with each of the listed global indicators in Table 31.

Research Question 3 (Phase 3): How could we apply the global GBV findings to fill the missing

gaps in a country's GBV Prevention efforts? What are the best practices of Mexico in ending TF

GBV and adolescent birth rates(ABR)?

Mexico reported prioritizing the need to reduce teenage pregnancies in addition to ending TF

GBV. This led to the analysis of SDG 3.7 (Adolescent Birth Rates -GBV-associated teenage

pregnancies) and SDG 5.2 (efforts taken to end TF GBV)

Figure 23. *The interlinkage between technology facilitated gender-based violence and*

Adolescent Birth Rates for the six global regions.
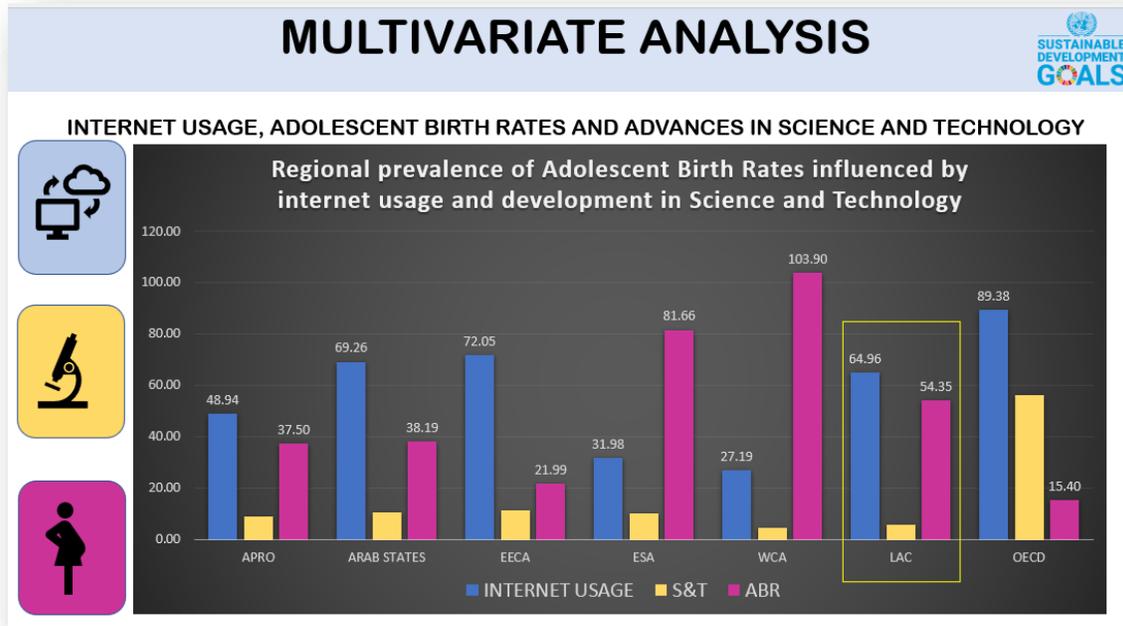
Correlation of internet usage, GBV, and ABR: Results indicated the highest percentage of ABR

for WCA (103%) followed by ESA (81%). The highest percentage of Internet usage in EECA

was coupled with low levels of ABR in contrast to the LAC which indicated an almost equal

score of above 50% for both internet usage and Adolescent Birth Rate indicating a potential

interlinkage of the internet usage and ABR for LAC.

A lower median age of the male and female population was correlated with a higher incidence of

GBV, as evident in Figure 17, aligned with a similarity in the age-structure of internet users per

region. LAC had an overall mean age of 30.12 years, 29.5 years for the male population and

31.15 years for the female population when compared to high median age for EECA [overall

median age-39 years; males (35.4 years); females (38.6 years)]. The higher the median age of a

region, the lower the prevalence of GBV; results inferred from the age-structure indicated that a

higher level of human development that occurs with age, decreases GBV. Therefore, it was

pertinent to understand the impact of human development on ABR. (Figure 24).

Figure 24. *Bivariate Analysis: Adolescent Birth Rates and Human Development*
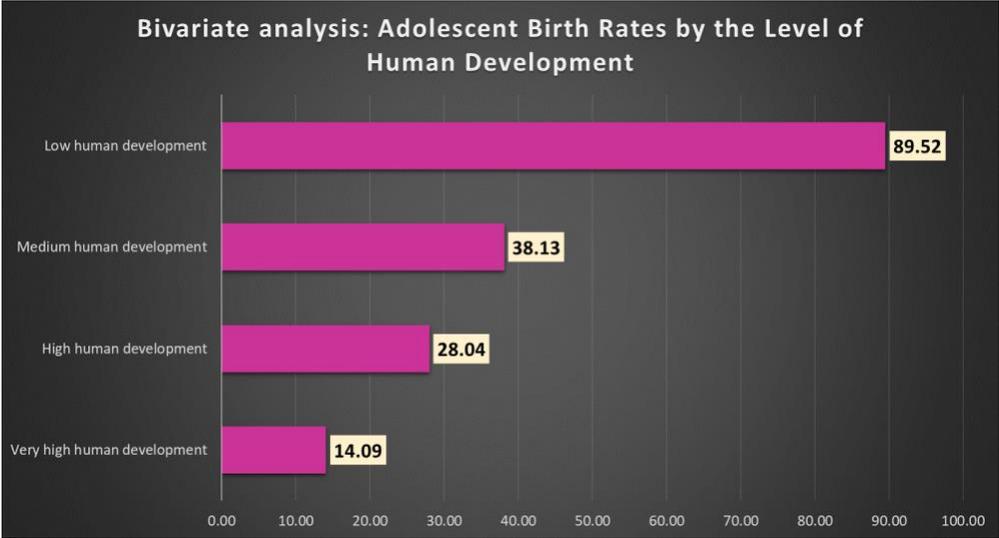
Results proved that the regions with the lowest level of human development reflected the highest

percentage of ABR, thereby indicating the importance of human development in reducing

violence. Figure 24.

Phase-3: **Research Question 3**: What are the best practices applied by Mexico effective in ending GBV at a country-specific level?

**Figure 25.** *SDG Dashboard: Elevated Adolescent Birth Rates in Mexico.*
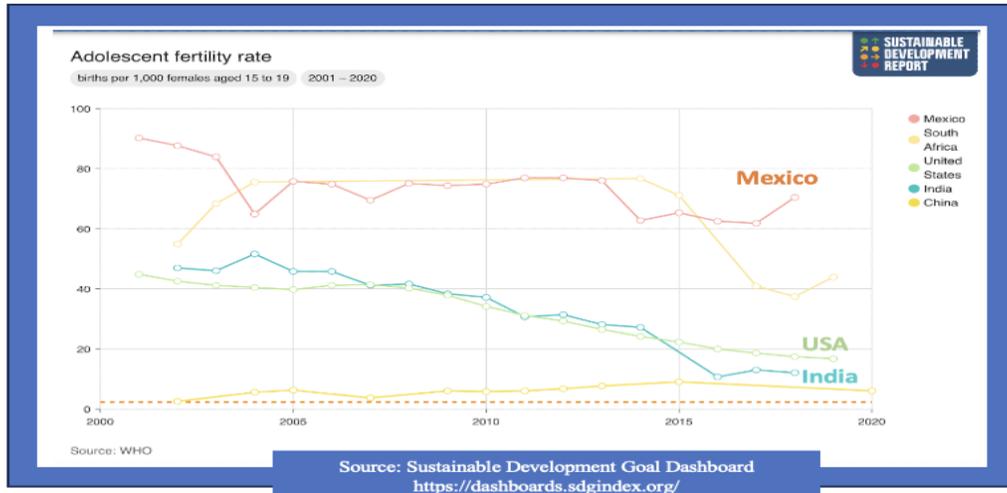
Results on the SDG analytics dashboard indicated that there was a slight drop (2%) in ABR since 2018 and no increase in ABR. The global indices for all Latin American Countries were tabulated (Table 32), to understand the socio-economic indicators that drive or reduce ABR in Mexico and other LACs.

Table 32. *Latin American Countries: Scores for the Global Indicators [arranged in descending order of SDG scores]*

LAC COUNTRIES	SDG 5	HD	INCOME	GII	HDI	HDI_MALE	HDI_FEMALE	YDI	SDG INDEX	FRAGILE S	SNI_F%	SNI_M%
Argentina	81.23567	VHHD	UMIC	0.287	0.842	0.833325	0.835521	0.699	72.72849	46.1	73.47	77.65
Barbados	71.55325	HHD	HIC	0.268	0.79	0.799111	0.772531	0.779	69.52174	..	..	..
Belize	56.09875	MHD	LMIC	0.364	0.683	0.671552	0.688838	0.619	65.28278	..	..	..
Bolivia	68.00825	MHD	LMIC	0.418	0.692	0.679814	0.704911	0.691	67.50652	..	..	..
Brazil	69.24025	HHD	UMIC	0.39	0.754	0.750013	0.75468	0.637	72.76016	73	88.89	90.16
Chile	66.202	VHHD	HIC	0.187	0.855	0.838413	0.867268	0.782	77.77225	42.5	69.43	79.51
Colombia	68.96925	HHD	UMIC	0.424	0.752	0.743729	0.755727	0.646	69.97817	76.6	91.73	91.07
Costa Rica	80.91225	VHHD	UMIC	0.256	0.809	0.806326	0.809722	0.75	73.7037	40.2	..	..
Cuba	80.66075	HHD	UMIC	0.303	0.764	0.744772	0.774844	0.744	74.27978	59.2	..	..
Dominican Republic	71.77425	HHD	UMIC	0.429	0.767	0.771504	0.76078	0.668	70.70452	64.4	..	..
Ecuador	76.8615	HHD	UMIC	0.362	0.74	0.730716	0.745436	0.672	71.49955	69.4	93.06	93.64
El Salvador	68.41675	MHD	LMIC	0.376	0.675	0.660207	0.684867	0.615	69.5571	68.9	..	..
Guatemala	56.2095	MHD	UMIC	0.481	0.627	0.595718	0.64988	0.562	60.9273	79.2	..	..
Guyana	65.98325	HHD	UMIC	0.454	0.714	0.704002	0.719595	0.617	63.21558	..	..	..
Haiti	40.18025	LHD	LMIC	0.635	0.535	0.506098	0.563766	0.598	52.70678	97.7	97.96	99.9
Honduras	62.94475	MHD	LMIC	0.431	0.621	0.607425	0.633044	0.595	62.99182	76.8	..	..
Jamaica	77.58325	HHD	UMIC	0.335	0.709	0.703788	0.710548	0.724	68.83049	60	..	..
Mexico	77.875	HHD	UMIC	0.309	0.758	0.752509	0.761102	0.776	70.15888	67.2	88.21	87.19
Nicaragua	81.9295	MHD	LMIC	0.424	0.667	0.647751	0.677704	0.673	67.08687	77.1	..	..
Panama	65.01875	VHHD	UMIC	0.392	0.805	0.811686	0.798282	0.701	63.94908	46	..	..
Paraguay	66.32625	HHD	UMIC	0.445	0.717	0.712813	0.719878	0.687	67.07709	65.2	..	..
Peru	65.39225	HHD	UMIC	0.38	0.762	0.742054	0.781076	0.734	71.9085	67.6	86.31	89.61
Suriname	65.79825	HHD	UMIC	0.427	0.73	0.72771	0.727229	0.645	71.72689	..	..	..
Trinidad and Tobago	65.10175	VHHD	HIC	0.344	0.81	0.80142	0.813864	0.674	65.31033	..	..	..
Uruguay	71.41533	VHHD	HIC	0.235	0.809	0.812179	0.794503	0.734	76.99694	33.4	75.38	73.73
Venezuela, RB	60.10367	MHD	UMIC	0.492	0.691	0.679218	0.690932	0.612	60.40391	..	..	..

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Results indicated that the Gender Development Index and Human Development Index (HDI) were critical components of the global GBV landscape for 2021. This was applied to Mexico in the context of reducing teenage pregnancies and as a result, the Youth Development Index (YDI)was selected for SDG analytics of Mexico. The YDI contributes to the ethical use of technology in reducing GBV (especially TF GBV and ABR). Social norms and cultural biases formed a hidden determinant for the ongoing forms of sexual violence and TF GBV. Countries with High Human Development were also found to have a lower percentage of social biases [Social Norm Index]. Increasing youth participation was identified as one of Mexico's best practices. Table 33.

Table 33 *Analysis of the Youth Development Index for Mexico*

NATIONAL PREVENTION OF TEENAGE-PREGNANCIES

Instituciones: CENSIDA, CNEGySR, CONAPO, CONEVAL, IMJUVE, INDESOL, INMUJERES, INSP, SE-SIPINNA, SEP, STPS/SNE

ENAPEA

Valor del Índice de desarrollo juvenil 15 a 29 años, 2019 (Porcentaje) (IMJUVE)

MEXICO CITIES	STATISTICS						t - Test	P - Value	R^2	RESULT
	N	MEAN	±SE	a	b	r				
YOUTH DEV INDEX	33	0.58	0.0144	....						
WELLBEING	33	0.63	0.0332	0.37	0.3282	0.7585	6.4798	0.0000	0.5753	**
INCLUSION	33	0.59	0.0324	0.54	0.0643	0.1446	0.8137	0.4220	0.0209	NS
PARTICIPATION	33	0.55	0.0301	0.40	0.3104	0.6502	4.7645	0.0000	0.4227	**
ECONOMY/PROSP	33	0.54	0.0144	0.30	0.5176	0.5185	3.3758	0.0020	0.2688	**

Source: IMJUVE estimates based on INEGI.

The Gender Development Index showing the highest correlation with SDG 5.2 (Phase-I: SDG analytics) was the rationale for the selection of the Youth Development Index (The Commonwealth, 2022) for Mexico (Phase-III), given the high teenage pregnancy rates in

Mexico. Participation and economic well-being of the youth in community programs contributed to a high YDI and low ABR at a sub-national level.

The list of public and private sectors contacted to elicit information via UNFPA resulted in the identification of the Interagency Approach as one of its best GBV prevention efforts. (Table 34). Table 35 represents a list of the best practices adopted by Mexico to reduce TF GBV and ABR. A survey conducted via collaboration with UNFPA led to the collection of the unique interagency approach (Table 34) and best practices (Table 35) of Mexico. Results indicated that the interagency approach of Mexico and advocacy against TF GBV using social media yielded an impact in reducing ABR by 2%. The current percentage of online violence in LAC is 91% compared to 74% in Europe. Careful analysis indicated a high score in gender development alongside technology with a reduction in gender inequality catered to the low percentage of digital violence in Europe and Central Asia [EECA]. The goal of this research is to end TF GBV by 2030. Country-specific data was compared with the global scenario of ABR, social norms and religiosity posed a pivotal challenge in Mexico. This challenge was tackled efficiently by the governmental programs of Mexico, which targeted the youth and adolescents with custom-tailored programs that promote gender development via comprehensive sex education sessions. A multistakeholder holistic approach was undertaken by Mexico to reduce TF GBV and teenage pregnancies.

An overview of the GBV scenario of India was collected via UNFPA-India office. An interagency approach was being adopted from the government level to street-side vendors, to end ABR and rape. Mexico's model was being considered to reduce TF GBV.

Table 34 *Interagency Approach of Mexico*

INTERAGENCY APPROACH: MEXICO

UNFPA MEXICO

		ENAPEA MEXICO	
INSTITUTION	**MAIN STRATEGY**	**EXPERTS**	
UNFPA-HQ, MEXICO, INDIA	TECHNICAL DOCUMENTS, AWARENESS, COLLABORATIVE WORK	**DR. Alanna Armitage** [National Representative, UNFPA-Mexcio] **Mr. Ivan Castellanos**, Assist. National Representative Ms. Dosia Calderón [National Program Officer on Human Rights and Gender] Ms. Gabriela Rivera [National Program Officer on SRH]	
Educational Institution	Education: SDG 4	Ministry of Education, specially the focal point for the National Strategy on Teenage prevention	
Law enforcement agency	Peace, Justice, Strong Institutions SDG 16	National Council on the Prevention and Eradication of Violence against Women. **[CONAVIM]**	
Health-care Institution	Good Health: SDG 3SRH youth friendly services strategy	National Center on Gender equity and Center for Reproductive Health [CNEGSR] **Prof. Karla Flores Celis**	
Community based organization	SRH services, Youth network SDG 3.7	ELIGE-Youth Network on Sexual and Reproductive Health **Director Valeria Vásquez Vázquez**	
Government	Policies, Knowledge dissemination	National Population Council [technical secretariat of the National Strategy on the prevention of teenage pregnancy] **Dr. Maricruz Muradas Troitino; Mr. Noé Valdiviezo Villanueva**	

Table 35 *Best practices of GBV interventions in Mexico*

COUNTRY SPECIFIC ANALYSIS

PHASE-III: UNFPA MEXICO

ENDING TFGBV -NATIONAL PREVENTION OF TEENAGE PREGNANCIES [ENAPEA-MEXICO]

PROGRAMS, POLICIES, STRATEGIES	• ENAPEA program activities • MEDIA-Olimpia Act https://www.unfpa.org/thevirtualisreal/olimpia-coral-melo
INSTITUTIONS RATED WELL FOR REDUCING GBV SERVICES	• Women's Institute, CONAVIM, the Educational System and international organizations • Youth Friendly Services – Comprehensive Sexual Health Education in and out of school-settings
MENTAL HEALTH	• 15% of GBV cases traced back to perpetrators with mental health problems
SERVICES FOR PERPETRATORS	• UNAVI, Family Violence Care Units (need to revive these services) • Reduction of recidivism by 50%.
DATA	National Survey on the Dynamics of Relationships in Households (ENDIREH, 2021)
RECOMMENDATIONS	• To continue creating innovative pathways to address SE determinants of GBV-GDI • Empower women via Faith Based Organizations to change social norms impacting GBV. • To enhance the awareness on cyber-hygiene and increase the utilization of support centers. • Continue efforts on advocacy against TFGBV on social media platforms; Programs for perpetrators.
REGULATIONS	SNPASEVM: ARTICLE 35, General Law of Access of Women to a Life Free of Violence (LGAMVLV, 2007) and its Regulation (2008); TFGBV- ADVOCACY SOCIAL MEDIA.
POLICIES	• Public policy instruments: the National System to Prevent, Attend, Punish and Eradicate Violence against Women. • (SNPASEVM) and the Comprehensive Program to Prevent, Address, Punish and Eradicate Violence against Women; Enhanced interagency approach.

OLIMPIA CORAL MELO CRUZ
Courtesy: UNFPA-Mexico

Results in Figure 26 indicate that the higher percentage in social biases and religiosity

(for WCA, ESA, and LAC), was identified as one of the drivers for the high rate of

Adolescent Birth Rates.

Figure. 26. *Multivariate analysis on teenage pregnancies, religiosity, and social norms:*
A regional analysis.
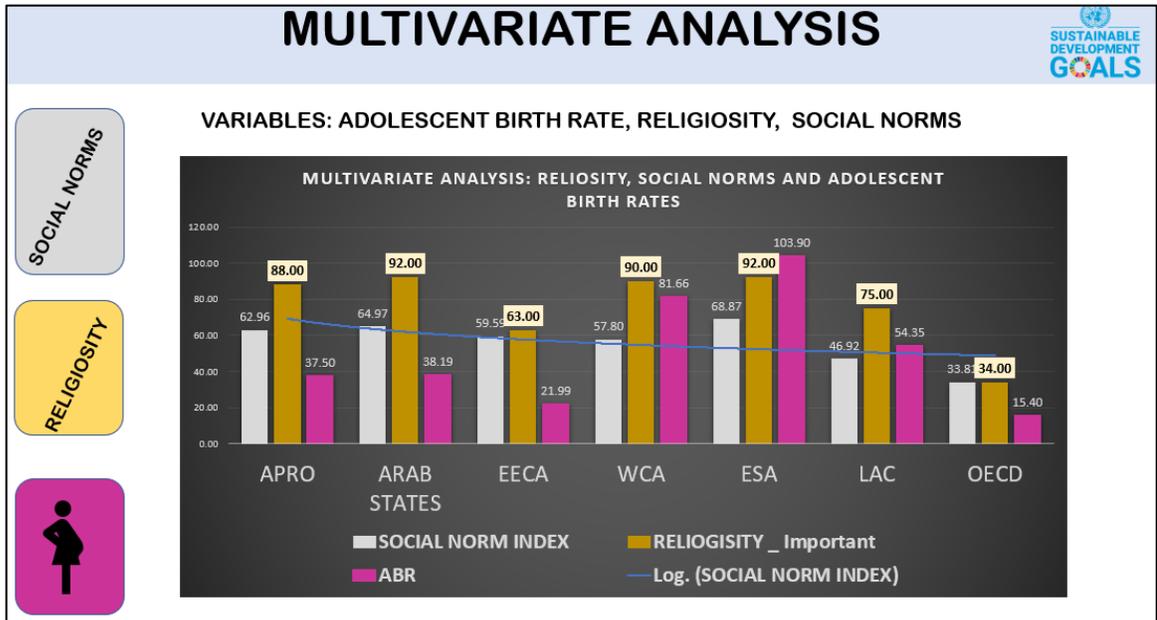
The level of religiosity was above 70% for the LAC region; ABR rates were above 50%.

This indicates that despite the policies and legislations to reduce GBV, there was no

change in the social norms and traditional religious beliefs which could explain the high

rate of GBV.

FORECASTING GBV SCENARIOS AND SOLUTIONS USING
UNFPA'S FOUR FUTURE SCENARIOS.

Research Question 4 (Phase 4): Do we have a predictive model to forecast, prepare and equip us

for the future scenarios of GBV?

Predictive analytics was applied using Microsoft Excel with data for the past ten years for

Mexico- SDG 3 and SDG 5. Figure 27 and Figure 28 project the SDG 3 and SDG 5 scores for

the next ten years with the potential to increase the score to 92.1 (for SDG 5.2) and 86.7 (for

SDG 3) by 2030. Based on the results of this study it is possible to achieve the higher end of the

predicted scores if adequate measures are taken for the following critical measures: 1. To

increase awareness on TF GBV via gender development programs and reduce gender inequalities

2. Economic and technological empowerment of women 3. Enhance access to safety and sexual

and reproductive health care services 4. Ensure political stability and national security 5.

Effective interventions are planned for the key populations and women living with disabilities.

Results indicated a steady acceleration in SDG 5 when compared to SDG 3. Observing

the SDG scores for previous years and adopting measures that triggered an increase in the SDG

scores is recommended. A logbook documenting the policies and practices that facilitate the

acceleration of SDGs is recommended to prevent any deceleration and to explain checkpoints

and setbacks in the past. Focusing on TF GBV will be the highest priority in the future. GBV

forecasting alongside disease-detection will pave the pathway to manage clinical conditions and

address the social problem of TF GBV in the future.

Figure 27. *Predictive Analytics on SDG 5.2 for Mexico [2001-2030]*

Source: United Nations Statistics Division (2022). Global SDG Index Dashboard.
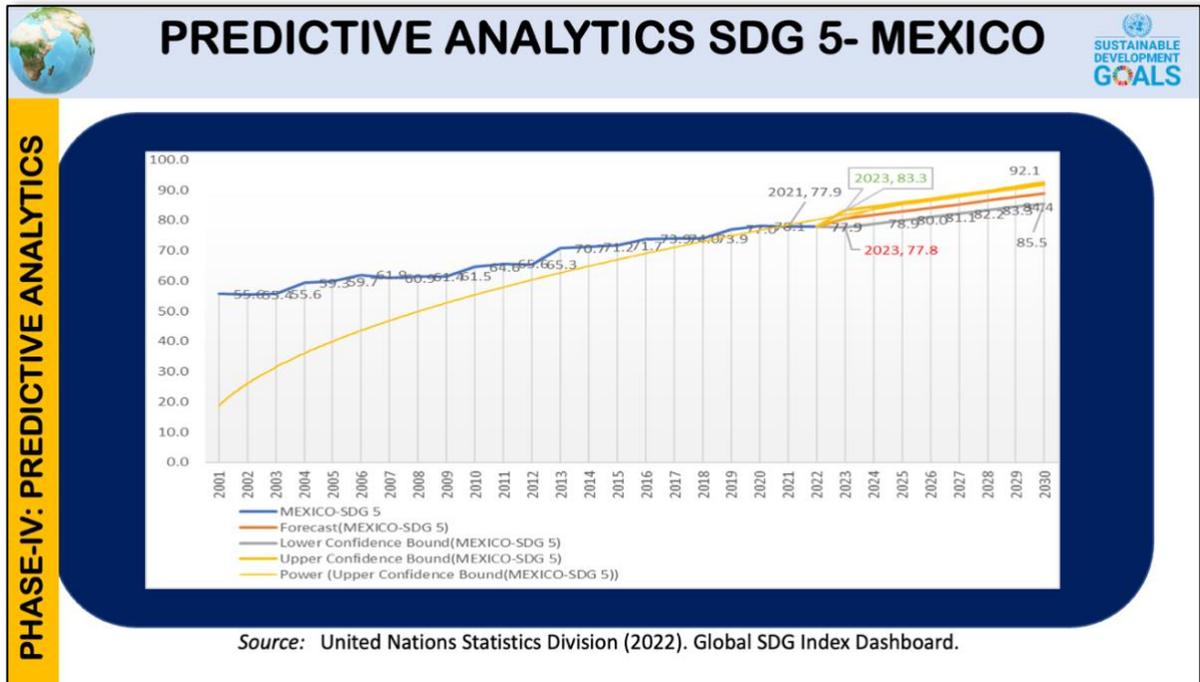
Figure 28. *Predictive Analytics on SDG 3.7 for Mexico [2001-2030]*

Source: United Nations Statistics Division (2022). Global SDG Index Dashboard.
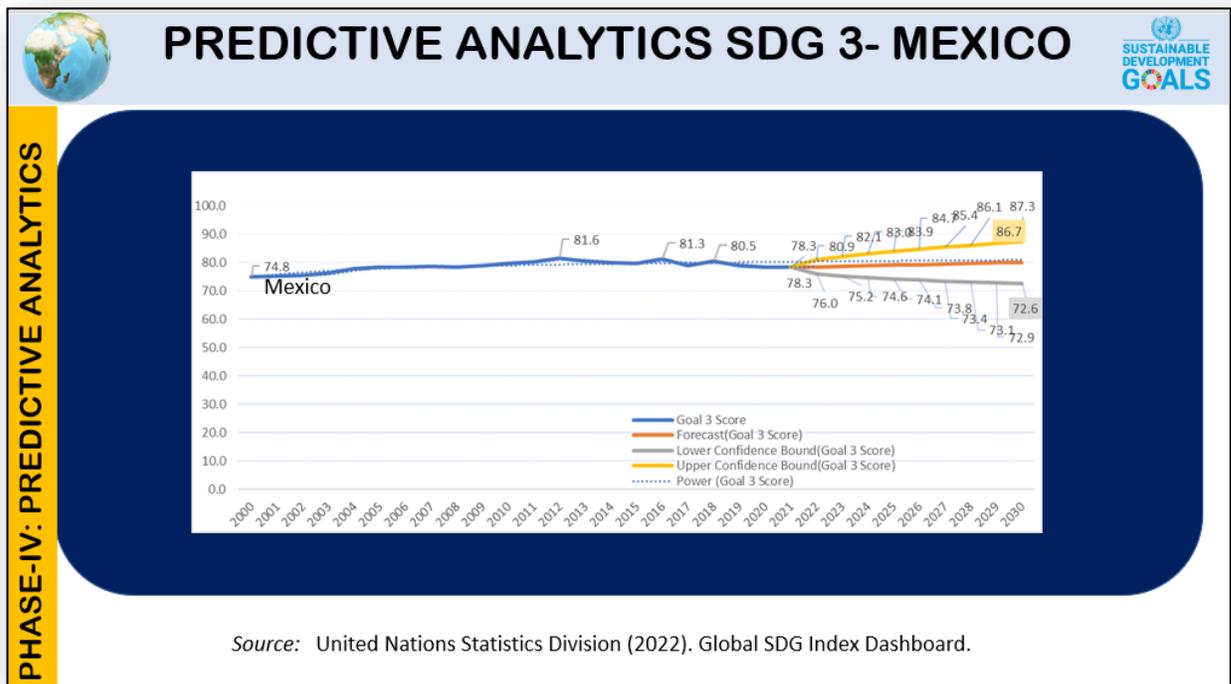
An illustration of the benefits of using Artificial Intelligence to predict domestic violence

is found in Appendix F.

The three future GBV scenarios (UNFPA, 2022) aligned with Scenarios 1,2 and 3. 1. The Blooming biotech, 2. Connecting poles apart and 3. Ruling in the digital beast thereby exposing the future scenarios which would create a digital divide if gender development and gender inequality continue to increase amidst the advances in Science and Technology. [Figure 29].

Figure 29. *The Future GBV Scenarios (Years 2030 and 2050)*
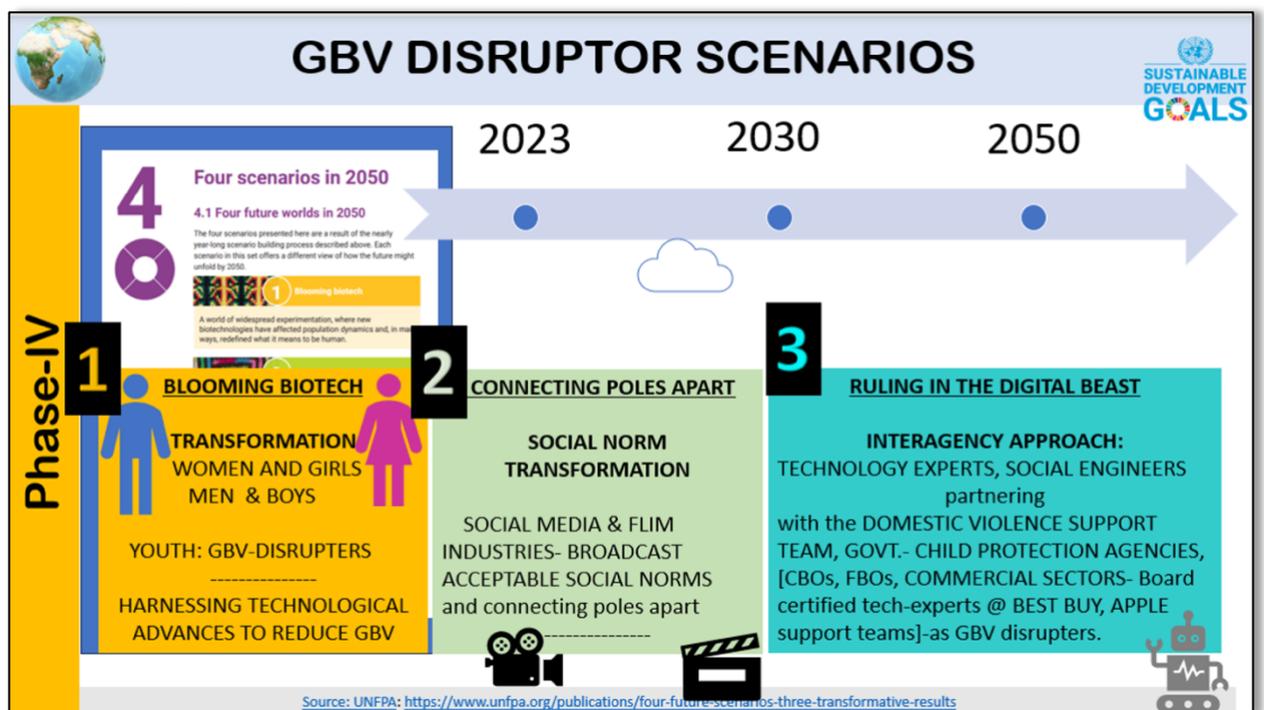
The increased reliance on and usage of the internet and cell phones would require mitigation measures to ensure the online security of communications, and financial transactions, and adequate methods to shield oneself from infodemics. The results of the global and country-specific findings led to the development of a GBV Prevention Business model Figure. 29 based on UNDP's strategic approach) for a country-specific analysis.

Figure 30. *GBV Disruption Business Model*

Figure 31. *TF GBV Disruptor Strategy to end cyberviolence – a holistic interagency approach.*

Results indicate that there are two pathways to progress and accelerate the achievement of the SDGs. If the current progress in achieving SDG 5.2 and SDG 3, does not evolve to equip women and girls against TF GBV, there is a possibility of deceleration in the achievement of SDG 5.2, at a much rapid rate by 2050. This is mainly attributed to the complexities and intrusion in the digital space making it easier for online violence to increase. The analytics also depict a possible dip in progress if the challenges and setbacks from previous years are not rectified or effectively addressed.

A GBV prevention business model and a TF GBV Disruptor model (Figure 30) were prepared based on the global SDG analytics and the country-specific study on Mexico's challenges and best practices.

Summary

Organizations and institutions should prepare to equip themselves and their community with the TF GBV Disruptor toolkits, and GBV Prevention Business model, empower women and girls (educationally, and economically), and promote gender development for all genders, with programs designed for both the victims, perpetrators, and policymakers on the ethical use of technology. A public-private sector approach should be adopted to address the socio-cultural and religious norms in alignment with the strict policies and mandates against TF GBV. Ending TF GBV by 2030 should be of utmost importance and synonymous with the fire drill and safety protocols adopted by every organization. This will facilitate the protection of our women and girls in the future from any form of digital and sexual violence.

Chapter 5: Implications, Recommendations, and Conclusion

Based on the results of the study, the implications of digital violence and sexual violence were found to occur at different stages of an individual's life. A life-cycle approach is recommended to disrupt and end GBV at each stage of life. It is necessary to integrate awareness programs on cyber-security and ways to prevent TF GBV, to progress systematically and strategically toward achieving SDG 5.2 (eliminating all forms of violence against women and girls). A schematic diagram was developed representing the different age structures and the extent to which a life-cycle approach is required to tackle the problem of TF GBV across different age groups.

Figure 32. *A Life Cycle Approach to End GBV*
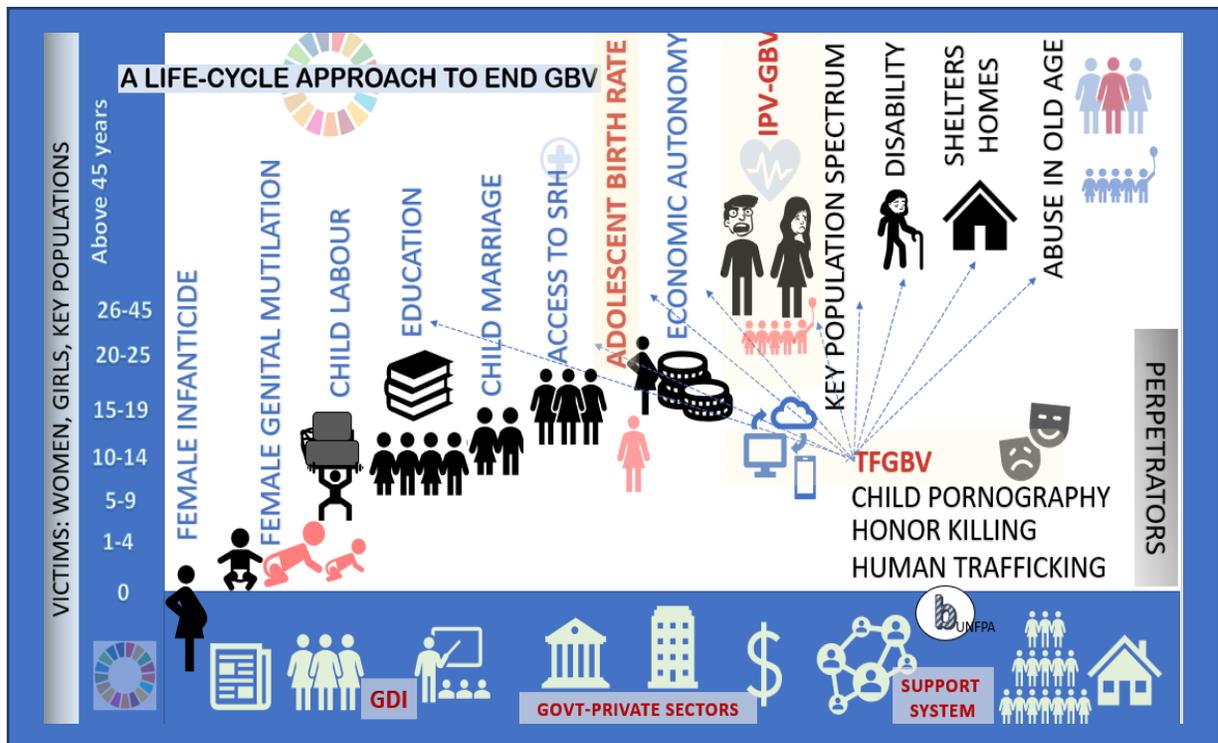
The arrows in the diagram indicate the areas that TF GBV intersects and pierces into. There was a critical need to prioritize GBV prevention among women and girls, the key

populations, and individuals with disabilities. The entire TF GBV disruptor toolkit is found in [Appendix G](#).

Based on the findings it was evident that the median age structure of a country was critical to understand the exposures to GBV and hence a life-cycle approach to end TF GBV was charted. Figure. 32 was created to depict GBV inflicted upon women and girls from the stage of a fetus (female infanticide) to female genital mutilation, conflicting gender norms dictating a poor quality of education for girls when compared to boys, early marriage or trapped into teenage pregnancies, lack of access to education, sexual and reproductive health services at the adolescent stage due to shame and lack of knowledge leads to further health and economic setbacks; at a marital age, one in three women are impacted by Intimate Partner Violence, the GBV implication worsens when the woman or girl belongs to the Key Populations or has a disability (caused by GBV or prone to more exposures of GBV as a result of disabilities). The red text 'TF GBV' in Figure 32, indicates the seriousness of the problem since it cuts through multiple layers of the socio-economic indicators: causing harm to online education, online banking, access to telehealth services, power-control over smart homes by shutting down the heater or cooler and water-controls remotely and expands to a national level via luring victims into human trafficking and different forms of modern slavery. Figure. 32 encapsulates the findings of this research.

Since gender development was ranked as the first socio-economic determinant of GBV, it is important to adopt a holistic interagency approach to enhance the importance of gender development programs.

Global innovation should include an adequate improvement in gender development to arrive at a final score for the innovation index of a country. This is to ensure that anthropological

development of the population is prioritized more than the rapid growth in information and

communication technologies (people-skills over technical skills).

The results of this study indicate the core problem of a rapid decline in socialization, civil

conversations, and humanitarian values in the digital world. This is evidenced by the

skyrocketing increase in TF GBV. The cost of GBV is increasing predominantly in low- and

middle-income countries such as WCA, ESA, and the Asia Pacific region. However, the problem

persists even in highly industrialized countries. Research investigations prove that technology is

being weaponized to harm women and girls. Mitigation measures integrated into the TF GBV

Disruptor strategy should be adopted by all institutions irrespective of the level of GBV rates in

that specific country or region.

Implications:

Research Question 1

Gender Development Index (GDI), Gross National Income (GNI) per capita, Human Development

Index (HDI), and Gender Inequality Index (GII) were the top four socioeconomic indicators based

on the coefficient values obtained from the multivariate regression analysis. Results prove that

Gender Development ranked first in its correlation with SDG 5.2 and GBV exposures (β=185.03;

$p \leq$ 0.001). This indicates that for every unit increase in the GDI of a country, there is an

acceleration of SDG 5.2 by 185 units, GNI per capita (575 units for women; 713 units for men);

HDI (an increase of 66.56 units) and a strong deceleration of SDG 5.2 achievement because of

gender inequalities (-56.17 units). The socioeconomic influencers of GBV exposures were as

follows: the economic status [GNI per capita of women (β=575.27; $p \leq$ 0.001) and men (β=713.28;

$p \leq$ 0.001), the level of human development measured by the Human Development Index [HDI]

(β=66.56; p$\leq$ 0.001). Gender Inequality Index [GII] (β=-56.17; p$\leq$ 0.001) was ranked as the fourth determinant which impacted GBV followed by a set of indicators presented in Table 25. This disproves assumption #1 that GII has the highest statistical correlation with SDG 5.2. This study unraveled the importance of taking into consideration 'gender development' to enhance the ethical, moral, and social values to end GBV.

GDI strongly influenced the degree and rate of GBV and TF GBV on a global scale. A well-educated woman with strong economic independence increases the productivity of a family and the GDP of a country; on the contrary, a woman's creativity and overall productivity is curbed in an abusive GBV centric controlled- setting. Since most of the perpetrators were men, globally, women were the most adversely impacted population.

It is essential to invest in STEM (Science, Technology, Engineering and Mathematics) programs, empowerment initiatives, enhance cyber-hygiene, infuse ethical use of technology, transform the socio-cultural, traditional paradigm among women. Women should be empowered to report abusive environments promptly; it is essential for women and girls to invest in their well-being (physical, emotional and financial). Empowering a woman and investing in programs that uplift women, have the potential to increase the productivity (GDP) of a country and the Gross National Income (GNI) of a country.

Research Question 2

Given the complexities of innovation which enhances our work and productivity, it was identified from the results of Phase II that TF GBV was a very serious problem that could impact a woman's career, health, and even her life. The Virtual is Real- Table 28 presents the impact of digital violence on physical violence and sexual violence. Results indicated that for every unit increase in male internet users, there was a decrease in the achievement of SDG 5.2 by 1.37 units

(β= -1.37, p≤ 0.001) compared to an acceleration in SDG 5.2 for female internet users by 1.45 units (β= 1.45, p≤ 0.001). The overall results indicated that the rural internet users (β= -0.08) indicated a higher level of perpetration (negative correlation with SDG 5.2; a deceleration in SDG 5.2 achievement) when compared to urban internet users (β= 0.19; a positive impact in accelerating SDG 5.2). However, a deeper analysis indicated that urban male internet users showed a higher level of negative correlation with SDG 5.2 (β= -1.25) when compared to rural male users (β= -0.96). This indicated access to more technological devices and unethical use of technology. The misuse and unethical use of technology will lead to hacking or interception of a victim's smart devices, online bank accounts, telehealth accounts, educational accounts with institutions, and even automobiles by remotely shutting down the systems, thereby putting the victim's life in danger. While perpetrators enjoy a long duration of victimization due to the anonymity presented in the digital world, the extent to which the productivity of a woman is reduced has an exponential impact on her financial, psychological, and overall well-being. Since there was a statistically significant correlation between mental health disorders and SDG 5.2, it is essential to analyze the prevalence of narcissism, disruptive mood disorders, and depression (which have been closely associated with TF GBV).

Ensuring secure internet services, and more women taking ownership of the internet, WIFI, and mobile subscriptions, are ways to propel women and girls toward freedom from TF GBV. However, women and girls must understand the dynamics of the domestic and national security impact of TF GBV and inculcate good cyber hygiene. Women in parliament and on the social media platform should ensure there is a heightened awakening of sound ethics and values through value-orientation sessions integrated into schools and via gender development programs. Research question 2 unraveled the diverse set of global goals and global indices impacted by the

unethical use of technology. The growth of the 5G environment which promises a growth in medicine, engineering, and interconnectedness of devices to increase the speed and efficiency of our work, has also become a conduit to TF GBV. It is essential to understand the mitigation measures presented by the AEP-DHS to understand the role of Artificial Intelligence and 5G and turn it to our advantage.

Research Question 3

The rationale of using the Youth Development Index (YDI) instead of the HDI index for Mexico, resulted in highlighting the metrics that would potentially continue to reduce teenage pregnancies and TF GBV by 2030. Evidence of a drop in ABR by 2% is indicative of good GBV interventions in Mexico. Phase-III results indicate the importance of conducting country-specific interventions, understanding the GBV scenario of each country, and then comparing it with the global socioeconomic determinants of GBV, to expose those intermediary GBV-influencing factors. The research question-3 facilitated the development of the GBV Prevention Business Model, which could be used to replicate this study for regional and country-specific comparisons.

Research Question 4

Research question-4 paved the way for predictive analytics. Predictive analytics helps us prepare for emergencies. GBV is a public health concern, but it has not yet been considered as a public-health emergency. The results of this study which depicted the impact of ICT progress on the different global indicators and most importantly its potential to either decelerate the achievement of SDG 5.2, calls for an urgent requirement to predict the future GBV scenario and protect us. The future scenario of GBV (Figure 29) that was designed based on the results of the

study proves the following: 1. A need to scale up cybersecurity, 2. Create awareness on TF GBV and 3. Present solutions to report and disrupt any form of online violence.

On the other hand, the socio-economic determinants of GBV identified in this study could be used to map future GBV scenarios and interventions. Agent-based modeling and artificial intelligence could be used to our benefit for the prediction of setbacks, and emergencies such as pandemics, and climate shocks and prepare a strategy to survive and prevail in future GBV scenarios. Predictive analytics has enabled us to understand the specific tools and knowledge gaps to be addressed in time to be able to tackle the huge digital traffic and rule and reign in the digital beast. The GBV Prevention Business Model and the TF GBV Disruptor strategy were developed based on the findings from phase I, II, III, and IV.

Recommendations

This study recommends interagency groups work with policymakers to enforce the prevention of TF GBV by creating awareness about TF GBV and solutions to maintain cyber-safety; given the evidence of the impact of TF GBV on other areas of health and well-being of women. Although special awareness and TF GBV Disruptor programs should target women and girls belonging to the key populations and individuals with disabilities, there is a need to extend the TF GBV disruptor program across all age groups of women and men, girls and boys, and other genders. The underlying reason is to inculcate the ethical use of the internet and ensure women and girls are protected. Since this study reveals that most of the unethical use of the internet was concentrated in low and middle-income countries and predominantly prevalent among the male population, it is recommended to introduce projects that enable women to use technology to disrupt TF GBV and boys to use technology wisely and ethically to make the most

of the digital world to advance human life and development. The cost attached to TF GBV is in millions of U.S. dollars and no human being should take pride in engaging in any form of TF GBV. Immediate reporting of any such criminal behavior is important among all genders. This is taught via effective gender development programs, life-skill training coupled with value-orientation sessions on the ethical use of technology. The gender development programs should include a note on the existing policies and consequences of TF GBV, such as, punitive years in prison for the violation of human rights.

Recommendations for reporting cybercrime:

Technology facilitated violence is a crime since it violates human rights and warrants timely reporting to the respective law enforcement authorities or domestic violence support centers. The Internet Crime Complaint Center (https://www.ic3.gov) in the U.S.A. is the nation's central hub for reporting cybercrime. Under-reporting and documentation of cyberviolence is one of the biggest challenges to disrupting TF GBV. Documentation of cyberviolence requires skill and meticulousness. Documentation of cybercrime, any kind of TF GBV has a track-record of inefficiency and deficiency of details, which in turn fails to point to the source and nature of the perpetrator, due to its technological complexities. *Screenshots and video clips*, featuring the salient features of digital abuse (TF GBV), such as ones indicating anonymous and remote login alerts, unauthorized passcode changes, and manipulation of the Microsoft Office tools (journaling with the actual date and time of occurrence) is vital and must be integrated into the gender-development sessions; curriculums should include the strategic steps for documentation and reporting, in order to enhance the efficiency of reporting TF GBV. Empowering all professional experts to identify TF GBV that might be indicated or shared among their employees or students is vital; this increases the timely reporting of TF GBV. Timely and

consistent reporting of TF GBV builds credibility of the victim's struggle which might fall by the wayside, if it is not captured and brought to the attention of an institution or organization, in a resolute effort to end TF GBV.

Recommendations for Practice

This study recommends integrating the GBV Disruptor Business model and the TF GBV Disruptor Strategy for both the victims and the perpetrators; and to ensure GBV interventions is inclusive of all genders, adapted for all age and knowledge levels, thereby taking accountability to end TF GBV by 2030. The concept of domestic violence impacting global goals is an empowerment concept and eye-opener for educational workshops and interventions at a corporate level, educational and correctional institutions. Emotional Intelligence is an armor and is a recommended training for law enforcement officers, educators, Public Health officers, counselors, who deal with societal complexities (Chandra. D et al., 2021) It is highly recommended to utilize UNFPA's publication on "Guidance on the safe and ethical use of technology" in the TF GBV Disruptor programs, to ensure we end all harmful practices against women and girls. Economic empowerment of women is critical to enhancing economic independence. Gender development coupled with economic empowerment of women will break barriers in the digital divide and increase access to education, work and sexual and reproductive health services, and exertion of human rights. Any form of violence against women and girls is a violation of human rights. Enabling women to achieve economic independence coupled with adequate knowledge of TF GBV disruption, creates future leaders and activists among women. Women should have economic autonomy to own internet, mobile phone subscriptions and understand the complexities of an interconnected digital world, to stay free from TF GBV.

A customized model was designed to depict the importance of the gender development and economic empowerment of women. The foundational documents based on which this model was designed, is found at the bottom of the image. Figure. 33.

Figure 33. *Women's Economic Empowerment: a customized model*
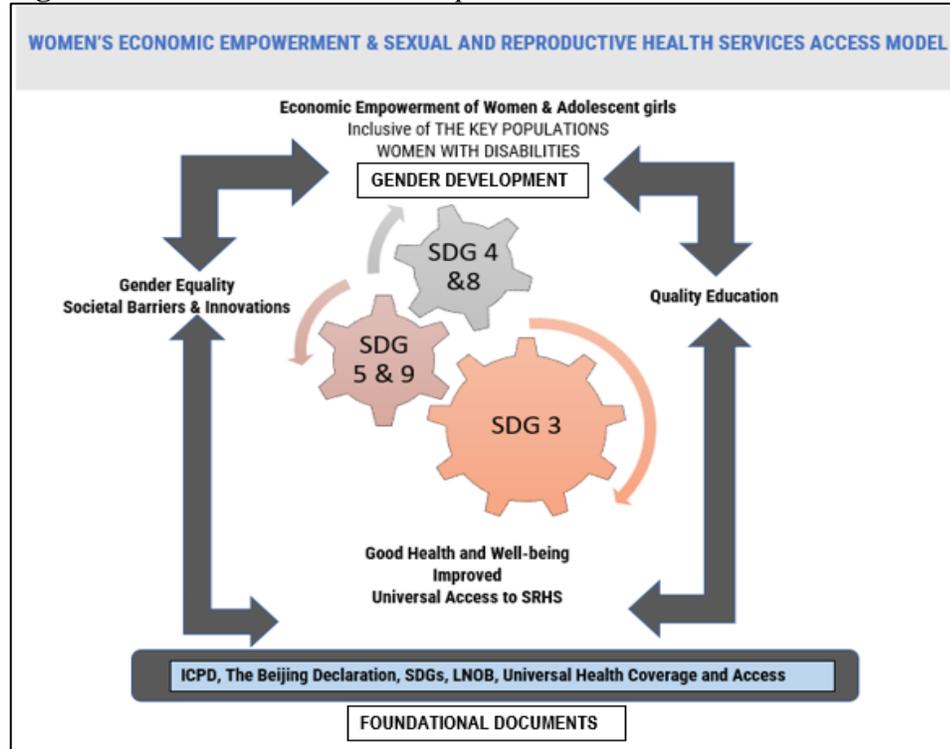
Figure 33 indicates the importance of SDGs [3, 4, 5,8,9] in the economic empowerment model.

Recommendations for Future Research

Expanding this research framework to a cluster of countries with the same GDI (controlling the GII and Gross National Income, variables) and identifying the reasons for an increase or decrease in TF GBV and ABR, will be beneficial. It will be important to include data points for the technological infrastructure of each country (such as 5G deployment, secure internet servers, and cybersecurity awareness scores), into the GBV model database. This research study focused on global SDG analytics and comparison with one country-specific case

study. This study forms the foundation for future studies on the clinical aspects of digital abuse. The recommendations to policy makers, change catalysts, government and private sector experts, are encapsulated in Figure 34.

Figure 34. *Recommendations based on the results of the study.*

Policy Recommendations:

A policy statement was framed based on the findings of this study, which reflect TF GBV mitigation via gender development:

'All academic institutions, government and private sectors, community-based organizations, and faith-based organizations must enhance cyber-hygiene and the ethical use of technology via efficient and consistent gender-development programs. Gender development programs must aim at enhancing the acceleration of SDG 5.2 across all age structures, with a special focus on the youth and adolescent population'.

Conclusion

The findings of this study are consistent with the most recent publication of the National Cybersecurity Strategy of the United States of America which states that "People and technology are increasingly interlinked, further enabling the very best, as well as the worst, of humanity". (The White House, 2023).

Gender Development is quintessential and has been an overlooked component in the race to excel in the field of ICT, innovations Science and Technology. Based on the findings of the current study, it is concluded that gender development is essential for a value-driven empowerment on the ethical use of technology that will eventually reduce the multifaceted problem of Technology Facilitated Gender-Based Violence [TF GBV]. A reduction in TF GBV will disrupt other forms of online crime and violence such as human trafficking and sexual violence which can be reduced by targeted awareness programs. All genders should be empowered to shoulder responsibility to end TF GBV. According to the White House (2023), the recently published National Cybersecurity Strategy states that we live in decisive times with ambitions for the further values-driven development of our digital ecosystem.

There is an immediate need to empower women and girls, enhance economic autonomy, integrate holistic interagency interventions (engaging public-private sectors), harness technological advances, mitigate cybersecurity threats with a sustained monitoring effort to eliminate violence against women and girls, by 2030.

Research Hypotheses: Concluding remarks.

Out of the two hypothesis statements **H1 and H2**, the null hypothesis for **H1 (H1$_0$)** and the alternate hypothesis for H2 (**H2$_a$**), proved to be true based on the statistical computations (univariate and multivariate linear regression models) used for the SDG analytics of this research investigation.

Hypothesis-1 (H1)

Null Hypothesis: H1$_0$ Gender inequality does not rank first in its correlation with SDG 5.2, when compared to the other SDGs and global indices.

Alternate Hypothesis H1$_a$. Gender inequality ranks first in its correlation with SDG 5.2 (has the highest and statistically significant impact on SDG 5.2), when compared to the other SDGs and global indices.

Hypothesis statement-2 (H2)

Null hypothesis: H2$_0$. Internet usage and mobile subscriptions (Technological innovations and ICT progress) do not have a statistically significant impact on gender-based violence.

Alternate Hypothesis H2$_a$. Internet usage and mobile subscriptions (Technological innovations and ICT progress), have a statistically significant impact on gender-based violence.

It was further proved that it is essential to first identify the socio-economic determinants of GBV, specific to each country before identifying and preventing TF GBV and its impact on physical or sexual violence.

In conclusion, it is essential for each country, especially the low-and-middle-income countries (LMIC), to prioritize gender development programs that will incorporate ethical use of technology in alignment with the strict policies and laws. Figure 35. captures the key concluding points.

Figure 35 *Conclusion: Key Takeaways*

A genuine progress in ICT can be obtained only by including the 'GDI score' in combination with the 'Global Innovation Index score' (for each country); this cumulative score will portray a holistic progress in the field of innovations and technology.

A recommended formula for Global Innovation Index is to include the GDI score (per country): goal is to understand and promote an ethical progress in ICT , without violation of human rights:

Global Innovation Index (Total Score) = Global Innovation Index score + Gender Development Index score

Genuine progress in information and communication technologies (ICT) should be obtained by including the GDI (Gender Development Index) as one of the critical components of the Global Innovation Index (GInI), to arrive at a final score for the Global Innovation Index. Holistic progress in the Information Communications and Technology (ICT) of a country is one in which there is progress in gender development alongside a progress in ICT. (Appendix G)

There is a great need to prioritize public-private partnerships and holistic programs targeting both populations (1) The victims [mainly the women, girls, key populations, and women living with disabilities] and (2) The perpetrators. The findings of this study will benefit policymakers, change catalysts, and experts in the field of technology, medicine, public health, public safety, and national security. Future Artificial intelligence (AI) tools could utilize the GBV determinants to map future episodes of TF GBV and prepare for any public health crisis associated with digital violence. Governments and community organizations can extract the socioeconomic determinants (exposed in this study) and generate a customized GBV intervention to reduce ABR and TFGBV. Based on the findings and UNFPA's four future scenarios of the three transformational results, additional measures should be taken to enhance cybersecurity to prevent a multifold increase in TFGBV by 2050.

Summary

Cyberviolence-mitigation measures, awareness programs, and capacity building for commercial and social institutions to conduct technological device checks should be promoted alongside issuing policies and laws to end technology facilitated gender-based violence [TFGBV]. Addressing TFGBV will have a direct and indirect impact on the entire spectrum of GBV. Technology Facilitated GBV permeates the financial realm, health, education, transportation, and critical infrastructures of a home or a country. It is essential to increase the GDI and GNI scores of the female population in each country in. order to end TF GBV.

Technology's impact on GBV will only be more invasive, disruptive, and harmful, creating a ripple effect in enhancing other forms of violence. The adverse impact of TF GBV is bound to increase if adequate mitigation measures, gender development and holistic interventions are not undertaken to protect women and girls. In conclusion, it is importance of focus on gender development and the ethical use of the technology. It is pivotal to make "all spaces safe" to ensure and enforce, domestic and national security.

This study proves that digital connectivity has been used as a tool for repression and coercion, (in the year 2021), particularly against women and girls in the low and middle-income settings, globally. There is an immediate need to enhance gender development initiatives, increase economic autonomy, integrate holistic interagency interventions, to eliminate violence against women and girls, by 2030.

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Appendices

Appendix A: Brief introduction to the data repositories of the United Nations

- o The United Nations SDG report 2022: The global indicator framework for Sustainable Development Goals was developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed upon at the 48th session of the United Nations Statistical Commission held in March 2017. https://unstats.un.org/sdgs/indicators/indicators-list/

- o The United Nations digital library contains resource materials categorized by the type of document, image or video and the list of UN bodies. It is accessible at https://digitallibrary.un.org/ and https://www.un-ilibrary.org/

- o The World Bank report highlights the pressing economic risks and concrete steps that policymakers can take to address them and support a robust and equitable recovery from the pandemic. https://www.worldbank.org/en/publication/wdr2022

- o Homeland Security Information Network: The Homeland Security Information Network (HSIN) is the Department of Homeland Security's official system for trusted sharing of Sensitive but Unclassified (SBU) information between federal, state, local, territorial, tribal, international and private sector partners. Mission operators use HSIN to access Homeland Security data, send requests securely between agencies, manage operations, coordinate planned event safety and security, respond to incidents to keep their communities safe. https://www.dhs.gov/homeland-security-information-network-hsin

- The UNSD serves the analytical purposes of the United Nations and the public. Mandated by the UNSC, annually collects national accounts data from Member States using a questionnaire based on the SNA framework to obtain official national accounts data from Member States. These data are also used for monitoring the scope, detail and compliance to the SNA of the compilation of the national accounts by countries. These data are published in the National Accounts Statistics: Main Aggregates and Detailed Tables and can also be obtained from the UNSD website (https://data.un.org).

- UNFPA Geospatial IPV Dashboard. features national data for 119 countries, sub-national data, and disaggregated data on IPV by age, place of residence, employment, education, and household wealth. https://www.unfpa.org/geospatial-dashboard-intimate-partner-violence

- UNAIDS KP Atlas. The UNAIDS Key Populations Atlas is an online tool that provides a range of information about members of key populations—sex workers, gay men and other men who have sex with men, people who inject drugs, transgender people and prisoners—worldwide, together with information about people living with HIV. https://kpatlas.unaids.org/

- USAID data: The demographic and Health surveys (DHS) program has collected, analyzed, and disseminated accurate and representative data on population, health, HIV and nutrition through more than 400 surveys in over 90 countries. https://dhsprogram.com/data/

- UN Women data: The UN Women furnishes data on SDG indicators, progress of the world's women 2019, thematic areas (violence against women; women, peace and security; marriage, children and work) and transparency getaways. https://data.unwomen.org/

- World Economic Forum provides data on national accounts, inflation, unemployment rates, balance of payments, fiscal indicators, trade for countries and country groups (aggregates), and commodity prices whose data are reported by the IMF. https://intelligence.weforum.org/topics/61d4ac3b03014262bfe425001fb41b45

- United Nations Development Program: brings together data from the UN system and partners to advance integrated development solutions in support of the 2030 Agenda. The platform includes raw data sets, simulators and actionable insights, allowing users to both run their own estimation and access relevant analyses to inform policies, programs and advocacy efforts. https://data.undp.org/

- The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies – ICTs. https://www.itu.int/en/ITU-D/Statistics/Pages/IDI/default.aspx

- United Nations Office on Drugs and Crime UNODC database presents data by topic, country profiles, and microdata for drug use and treatment, drug trafficking, international homicide, violence and sexual crime, corruption and economic crime, prison and prisoners, access and functioning justice, firearms trafficking, trafficking in persons, wildlife trafficking, SDGs, COVID-19. https://dataunodc.un.org/

Appendix B: A list of the SDG meta-indicators

The entire list of the SDG Meta-indicators accessed for identifying the socio-economic determinants of GBV in this study are listed below:

Code	SDG	Indicators
sdg1_wpc	1	Poverty headcount ratio at $1.90/day (%)
sdg1_320pov	1	Poverty headcount ratio at $3.20/day (%)
sdg1_oecdpov	1	Poverty rate after taxes and transfers (%)
sdg2_undernsh	2	Prevalence of undernourishment (%)
sdg2_stunting	2	Prevalence of stunting in children under 5 years of age (%)
sdg2_wasting	2	Prevalence of wasting in children under 5 years of age (%)
sdg2_obesity	2	Prevalence of obesity, BMI ≥ 30 (% of adult population)
sdg2_trophic	2	Human Trophic Level (best 2-3 worst)
sdg2_crlyld	2	Cereal yield (tons per hectare of harvested land)
sdg2_snmi	2	Sustainable Nitrogen Management Index (best 0-1.41 worst)
sdg2_yieldgap	2	Yield gap closure (% of potential yield)
sdg2_pestexp	2	Exports of hazardous pesticides (tons per million population)
sdg3_matmort	3	Maternal mortality rate (per 100,000 live births)
sdg3_neonat	3	Neonatal mortality rate (per 1,000 live births)
sdg3_u5mort	3	Mortality rate, under-5 (per 1,000 live births)
sdg3_tb	3	Incidence of tuberculosis (per 100,000 population)
sdg3_hiv	3	New HIV infections (per 1,000 uninfected population)
sdg3_ncds	3	Age-standardized death rate due to cardiovascular disease, cancer, diabetes, or chronic respiratory disease in adults aged 30–70 years (%)
sdg3_pollmort	3	Age-standardized death rate attributable to household air pollution and ambient air pollution (per 100,000 population)
sdg3_traffic	3	Traffic deaths (per 100,000 population)
sdg3_lifee	3	Life expectancy at birth (years)
sdg3_fertility	3	Adolescent fertility rate (births per 1,000 females aged 15 to 19)
sdg3_births	3	Births attended by skilled health personnel (%)
sdg3_vac	3	Surviving infants who received 2 WHO-recommended vaccines (%)
sdg3_uhc	3	Universal health coverage (UHC) index of service coverage (worst 0-100 best)
sdg3_swb	3	Subjective well-being (average ladder score, worst 0-10 best)
sdg3_region	3	Gap in life expectancy at birth among regions (years)
sdg3_incomeg	3	Gap in self-reported health status by income (percentage points)
sdg3_smoke	3	Daily smokers (% of population aged 15 and over)
sdg4_earlyedu	4	Participation rate in pre-primary organized learning (% of children aged 4 to 6)
sdg4_primary	4	Net primary enrollment rate (%)

sdg4_second	4	Lower secondary completion rate (%)
sdg4_literacy	4	Literacy rate (% of population aged 15 to 24)
Code	**SDG**	**Indicators**
sdg4_tertiary	4	Tertiary educational attainment (% of population aged 25 to 34)
sdg4_pisa	4	PISA score (worst 0-600 best)
sdg4_socioec	4	Variation in science performance explained by socio-economic status (%)
sdg4_science	4	Underachievers in science (% of 15-year-olds)
sdg5_familypl	5	Demand for family planning satisfied by modern methods (% of females aged 15 to 49)
sdg5_edat	5	Ratio of female-to-male mean years of education received (%)
sdg5_lfpr	5	Ratio of female-to-male labor force participation rate (%)
sdg5_parl	5	Seats held by women in national parliament (%)
sdg5_paygap	5	Gender wage gap (% of male median wage)
sdg6_water	6	Population using at least basic drinking water services (%)
sdg6_sanita	6	Population using at least basic sanitation services (%)
sdg6_freshwat	6	Freshwater withdrawal (% of available freshwater resources)
sdg6_wastewat	6	Anthropogenic wastewater that receives treatment (%)
sdg6_scarcew	6	Scarce water consumption embodied in imports (m3 H2O eq/capita)
sdg6_safewat	6	Population using safely managed water services (%)
sdg6_safesan	6	Population using safely managed sanitation services (%)
sdg7_elecac	7	Population with access to electricity (%)
sdg7_cleanfuel	7	Population with access to clean fuels and technology for cooking (%)
sdg7_co2twh	7	CO_2 emissions from fuel combustion per total electricity output (MtCO$_2$/TWh)
sdg7_ren	7	Share of renewable energy in total primary energy supply (%)
sdg8_adjgrowth	8	Adjusted GDP growth (%)
sdg8_slavery	8	Victims of modern slavery (per 1,000 population)
sdg8_accounts	8	Adults with an account at a bank or other financial institution or with a mobile-money-service provider (% of population aged 15 or over)
sdg8_unemp	8	Unemployment rate (% of total labor force, ages 15+)
sdg8_rights	8	Fundamental labor rights are effectively guaranteed (worst 0–1 best)
sdg8_impacc	8	Fatal work-related accidents embodied in imports (per 100,000 population)
sdg8_empop	8	Employment-to-population ratio (%)
sdg8_yneet	8	Youth not in employment, education or training (NEET) (% of population aged 15 to 29)
sdg9_intuse	9	Population using the internet (%)
sdg9_mobuse	9	Mobile broadband subscriptions (per 100 population)

Code	SDG	Indicators
sdg9_lpi	9	Logistics Performance Index: Quality of trade and transport-related infrastructure (worst 1-5 best)
sdg9_uni	9	The Times Higher Education Universities Ranking: Average score of top 3 universities (worst 0-100 best)
sdg9_articles	9	Articles published in academic journals (per 1,000 population)
sdg9_rdex	9	Expenditure on research and development (% of GDP)
sdg9_rdres	9	Researchers (per 1,000 employed population)
sdg9_patents	9	Triadic patent families filed (per million population)
sdg9_netacc	9	Gap in internet access by income (percentage points)
Code	**SDG**	**Indicators**
sdg9_womensci	9	Female share of graduates from STEM fields at the tertiary level (%)
sdg10_gini	10	Gini coefficient
sdg10_palma	10	Palma ratio
sdg10_elder	10	Elderly poverty rate (% of population aged 66 or over)
sdg11_slums	11	Proportion of urban population living in slums (%)
sdg11_pm25	11	Annual mean concentration of particulate matter of less than 2.5 microns in diameter (PM2.5) ($\mu g/m^3$)
sdg11_pipedwat	11	Access to improved water source, piped (% of urban population)
sdg11_transport	11	Satisfaction with public transport (%)
sdg11_rentover	11	Population with rent overburden (%)
sdg12_msw	12	Municipal solid waste (kg/capita/day)
sdg12_ewaste	12	Electronic waste (kg/capita)
sdg12_so2prod	12	Production-based SO_2 emissions (kg/capita)
sdg12_so2import	12	SO_2 emissions embodied in imports (kg/capita)
sdg12_nprod	12	Production-based nitrogen emissions (kg/capita)
sdg12_nimport	12	Nitrogen emissions embodied in imports (kg/capita)
sdg12_explastic	12	Exports of plastic waste (kg/capita)
sdg12_mswrecycl	12	Non-recycled municipal solid waste (kg/capita/day)
sdg13_co2gcp	13	CO_2 emissions from fossil fuel combustion and cement production (tCO2/capita)
sdg13_co2import	13	CO_2 emissions embodied in imports (tCO$_2$/capita)
sdg13_co2export	13	CO_2 emissions embodied in fossil fuel exports (kg/capita)
sdg13_ecr	13	Carbon Pricing Score at EUR60/tCO$_2$ (%, worst 0-100 best)
sdg14_cpma	14	Mean area that is protected in marine sites important to biodiversity (%)
sdg14_cleanwat	14	Ocean Health Index: Clean Waters score (worst 0-100 best)
sdg14_fishstocks	14	Fish caught from overexploited or collapsed stocks (% of total catch)
sdg14_trawl	14	Fish caught by trawling or dredging (%)
sdg14_discard	14	Fish caught that are then discarded (%)
sdg14_biomar	14	Marine biodiversity threats embodied in imports (per million population)

Code	SDG	Indicators
sdg15_cpta	15	Mean area that is protected in terrestrial sites important to biodiversity (%)
sdg15_cpfa	15	Mean area that is protected in freshwater sites important to biodiversity (%)
sdg15_redlist	15	Red List Index of species survival (worst 0-1 best)
sdg15_forchg	15	Permanent deforestation (% of forest area, 3-year average)
sdg15_biofrwter	15	Terrestrial and freshwater biodiversity threats embodied in imports (per million population)
sdg16_homicides	16	Homicides (per 100,000 population)
sdg16_detain	16	Unsentenced detainees (% of prison population)
sdg16_safe	16	Population who feels safe walking alone at night in the city or area where they live (%)
sdg16_prs	16	Property Rights (worst 1-7 best)
sdg16_u5reg	16	Birth registrations with civil authority (% of children under age 5)
sdg16_cpi	16	Corruption Perceptions Index (worst 0-100 best)
Code	**SDG**	**Indicators**
sdg16_clabor	16	Children involved in child labor (% of population aged 5 to 14)
sdg16_weaponsexp	16	Exports of major conventional weapons (TIV constant million USD per 100,000 population)
sdg16_rsf	16	Press Freedom Index (best 0-100 worst)
sdg16_justice	16	Access to and affordability of justice (worst 0–1 best)
sdg16_prison	16	Persons held in prison (per 100,000 population)
sdg17_govex	17	Government spending on health and education (% of GDP)
sdg17_oda	17	For high-income and all OECD DAC countries: International concessional public finance, including official development assistance (% of GNI)
sdg17_govrev	17	Other countries: Government revenue excluding grants (% of GDP)
sdg17_cohaven	17	Corporate Tax Haven Score (best 0-100 worst)
sdg17_secrecy	17	Financial Secrecy Score (best 0-100 worst)
sdg17_sprofits	17	Shifted profits of multinationals (US$ billion)
sdg17_statperf	17	Statistical Performance Index (worst 0-100 best)

Appendix C: Prioritized set of variables/indicators used for this study.

GENDER INEQUALITY INDEX [GII-2021] INDICATORS	
SDG3.1 (2021)	Maternal mortality ratio-(deaths per 100,000 live births)
SDG3.7 (2021)	Adolescent birth rate-(births per 1,000 women ages 15−19)
SDG4.4-Female (2021)	Population with at least some secondary education-(% ages 25 and older)
SDG4.4-Male (2021)	Population with at least some secondary education-(% ages 25 and older)
SDG5.5 (2021)	Share of seats in parliament-(% held by women)
SDG 8 FEMALE (2021)	Female Labour force participation rate-(% ages 15 and older)
SDG 8 MALE (2021)	Male Labour force participation rate-(% ages 15 and older)

GENDER DEVELOPMENT INDEX [GDI-2021] INDICATORS	
GDI	OVERALL SCORE: By Country and Global Regions
HDI	Human Development Index: By Gender (Male, Female)
SDG 3	Life expectancy at birth: By Gender [Male, Female]
SDG4.3	Expected years of schooling: By Gender [Male, Female]
SDG4.4	Mean years of schooling: By Gender [Male, Female]
SDG8.5	Estimated gross national income per capita: By Gender [Male, Female]

ICT PROGRESS	
INTERNET USAGE	Individuals using the Internet (from any location), by gender ownership, and urban/rural location (%)
MOBILE SUBSCRIPTIONS	Mobile Subscriptions by gender, ownership, broadband connectivity, atleast 3G integration (%)

Appendix D: UNFPA's research support and a country specific GBV analysis of Mexico

UNFPA

02 June 2022

Dear Ms. Daniel,

Congratulations on choosing Mexico for your PhD research proposal on Gender Based Violence.

As per your request, I am happy to confirm that the UNFPA Mexico Country Office is in a position to provide limited in-kind support to facilitate the gathering of data and/or other information from national programmes in the country to help you establish your data sets.

We wish you success in your PhD programme and are confident that the results will strengthen the knowledge base on global health, gender equality and human rights.

Sincerely yours,

Alanna Armitage
UNFPA Representative in Mexico
and Director for Cuba and Dominican
Republic

C. Pauline Daniel, Ph.D.
Doctorate Program
[Public Health- Health Policy & Management],
New York Medical College
Valhalla, New York

Country-Specific Analysis: Mexico's GBV landscape

Phase-I.(a)

PRELIMINARY ANALYSIS

DESK-REVIEW & ANALYSIS

Selection of the geographical regions with the highest prevalence of GBV-teenage pregnancies.

Prioritizing Component 6 of ENAPEA's system of indicators.

PURPOSE:

Mapping the key contributing factors:

-PSA: Population Situaltion Analysis

-WELL-BEING: Socieconomic determinants of health and impact of gender inequalities.

-ENVIRONMENTAL ENABLERS-Risk behaviors , type of population in GBV hotspots

-POLICIES and FRAMEWORKS:'

Alignment with ENAPEA and the National Development Plan.

-COMMODITIES: Access and availability of sexual and reproductive health services and commodities

-SOCIAL DYNAMICS: Identifying social norms and attitudes of service providers in educational system, hospitals, law enforcement and justice systems.

-COVID impact

-Comprehensive empowerment programs for boys, girls and adolescents 10-19 years [victims and perpetrators].

-SDG ANALYSIS: SDGs 3.7.2 (Adolescent birth rates) and SDG 5.2 (GBV) for geographical GBV hotspots

Phase-I(b)

FIELD-WORK & DATA COLLECTION

INTERVIEWS AND FOCUS GROUP DISCUSSIONS

Key informant interviews with 10 institutions in Mexico which have integrated ENAPEA in GBV hotspots and 10 from other zones with lesser GBV rates.

• Focus Group Interviews (in-person) with selected institutions, CBOs to collect sensitive information-data from the perspective of the victims and the perpetrators.

• Interviews with policy makers.

• **PURPOSE:**

• In-person data collection on sensitive GBV related topics.

• To elicit information and close the gaps causing teenage pregnancies.

• In-person gathering at the UNFPA office for focus group /one of one interviews with one translator . Interviews with the -heads of CBOs and zoom meetings with ENAPEA policy makers.

• Designing integrated methods to address the gaps in hotlines and the support systems to strengthen the ENAPEA

Phase-II

DATA ANALYSIS AND PUBLICATION OF BEST PRACTICES

RESULTS-ANALYSIS

Indicator specific results analysis [SDG 3.7.2 and SDG 5.2] Analysis of the contributing factors obtained from the results /outcome of the selected GBV interventions [both victims and perpetrators]

PURPOSE:

• To focus on the indicators relevant to GBV reporting system and preventing school drop outs.

• To organize empowerment workshops that will result in an increase in knowledge and access to sexual and reproductive healthcare services, SRH commodities.

• To highlight the response rate and effectiveness of the different systems of care in Mexico.

• Collecting the data-trend for ENAPEA's program specific results for Strategic Plan 2013-2018 ; QI plan recommendations

• Publication of best practices of Mexico: English and Spanish.

• Dashboard: Developing a dashboard of time-sensitive data obtained as a result of this study

• Documentary: Featuring the best practices of ENAPEA in reducing teenage pregnancies.

Phase-I(a)

Approach:

Population Situation Analysis

Gap Analysis

SDG Analysis

Goal:

To obtain the socio-demographics of GBV hotspots in comparison with other zones.

To identify the GBV related contributing factors that has led to an increase in teenage pregnancies in 2013-2018 PND.

Phase-I (b)

Approach:

Comprehensive approach gathering the voices of GBV experts, institutional leaders, policy makers, victims and perpetrators.

Focus group discussions and key informant interviews

Goal:

To identify best practices integration.

To integrate best practices and strategies into ENAPEA's empowerment programs

Phase-II

Approach:

Results Based Management of GBV programs

Evidence based grading of ENAPEA programs and articles.

Goal: To maximize results

To reduce teenage pregnancies by 50% and pregnancies among 10-14 year olds to zero.

Case-Study: Interview Schedule

1. What strategy would you consider as the best approach to reduce GBV from your experience?

2. Based on your experience, which system would you rate as the most effective in addressing and responding to GBV?
    [multiple choice-rate each system of care]
    a. Healthcare system- 5-point scale
    b. Law Enforcement system
    c. Judicial System
    d. Community-based support system
    e. International organizations (initiatives)
    f. Educational System
    g. Any others: please specify:

3. Do you think there is a need to enhance the economic empowerment of the victims? [Yes/No]; If yes, how has this been implemented (list of programs).

4. Based on your work experience, what is the earliest sign of identifying GBV in the Mexican community?
5. Do you confirm based on factual evidence that GBV is usually related to mental health? disorders?
    [No, About 5%, about 10%]
6. Do you think improving the quality of GBV interventions for the perpetrators and creating GBV peer-educators might reduce reoffence/reduce GBV in the long run.

    1. Strongly agree 2. Agree 3. Somewhat Agree 4. Neutral 5. Disagree
        6.Strongly disagree 7. Neither agree nor disagree

7. What is the success rate of reducing recidivism because of GBV interventions?
8. Social norms: What would you consider as the best method to change social norms attached to GBV? [some options are given below to guide the conversation]
    o   empowering students
    o   inculcating norms through empowerment of staff within FBOs, CBOs, PTAs (schools) and gov agencies.
    o   does not work via empowerment programs.
    o   requires a Policy level intervention with strong mandates.
    o   org/institutions to create pathways that address the socio-economic determinants of health -employment opportunities for GBV victims.
    o   Any other response: please specify.

9. To what extent has cyber violence [Technology Facilitated Violence] against women been reported [pre COVID, during COVID]? [to a great extent, to some extent, no difference]

10. Have electronic companies /any private sector engaged in helping women who report any one or more of the following: frequent stalking on cell phones, phone-cloning, phone or Wi-Fi/internet-restrictions, lap-top manipulations?

11. Please share datasets that you would consider as the predominant predictor variables in reducing digital violence (Technology Facilitated GBV) and sexual violence (teenage pregnancies/ Adolescent Birth Rates).

Appendix E: Youth Engagement and development of resource materials

TikTok video on cybercrime:
Subin Pradeep, University of Illinois.
https://drive.google.com/file/d/1uCu-fovbDVqkb-jjmT11yGRHdwYrPtXN/view

Brochure for high school students:
Sherwin D. United Nations Association, SFO

Scientific article by: Shruthi Krishnakumar,
Stuyvesant High School,
United Nations Association, NYC

Appendix F: Artificial Intelligence: the benefits of predictive analytics


Developed by the AEP-DHS team Champion Dr. James Sung (U.S. Department of Homeland

Security), for the international webinar "Making All Spaces Safe", organized by the

United Nations Population Fund on May 4, 2023.

Appendix G: Toolkit-TF GBV Disruptors
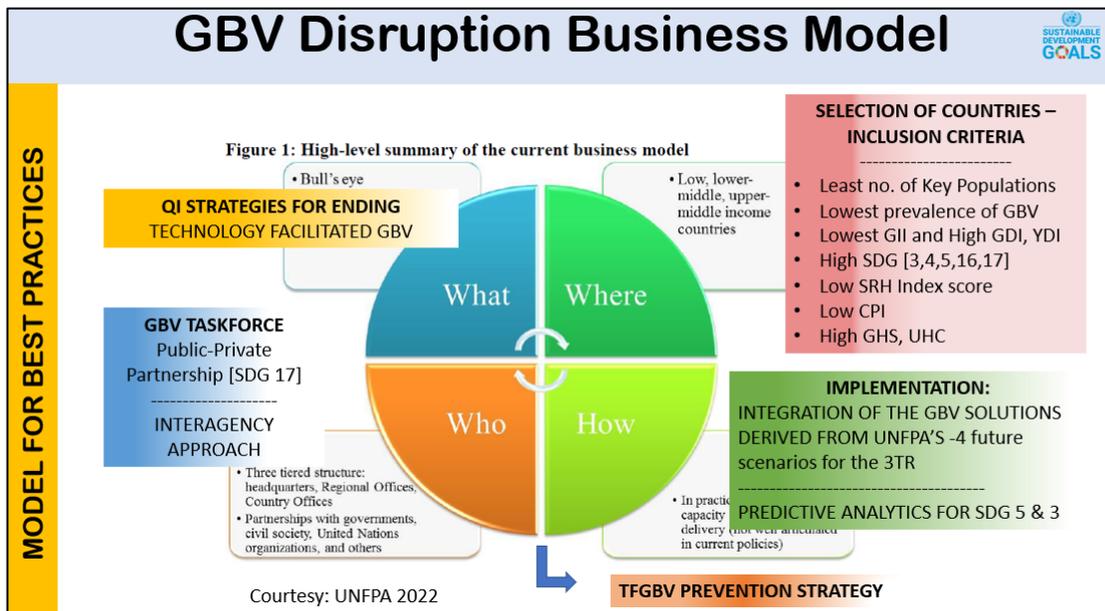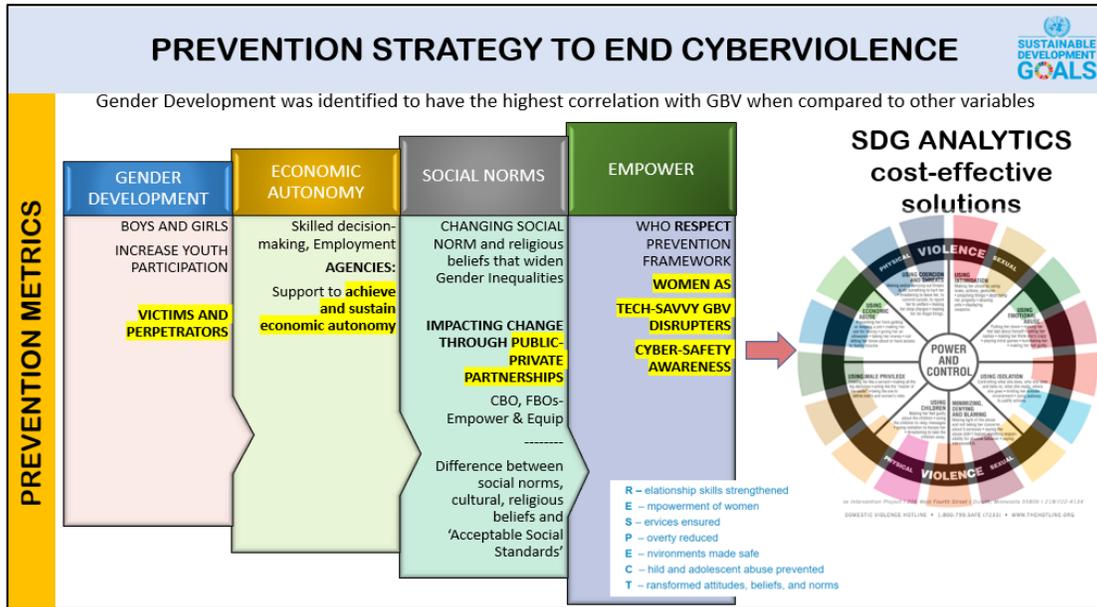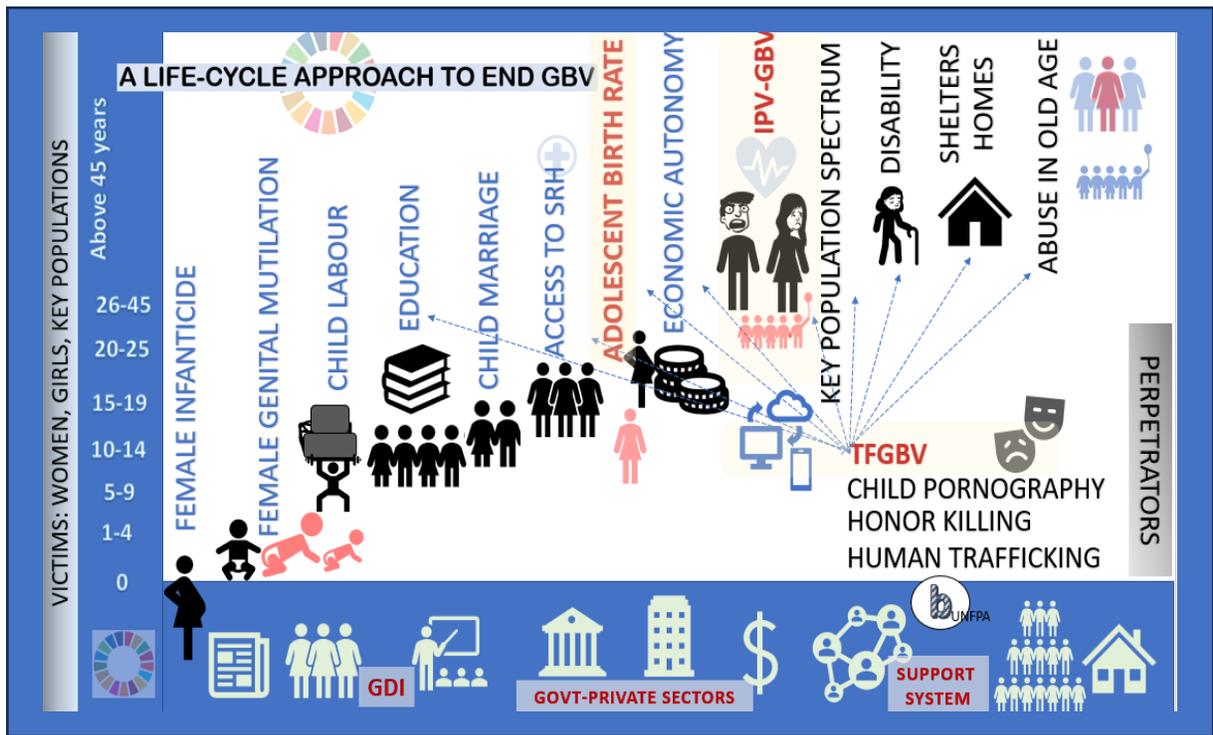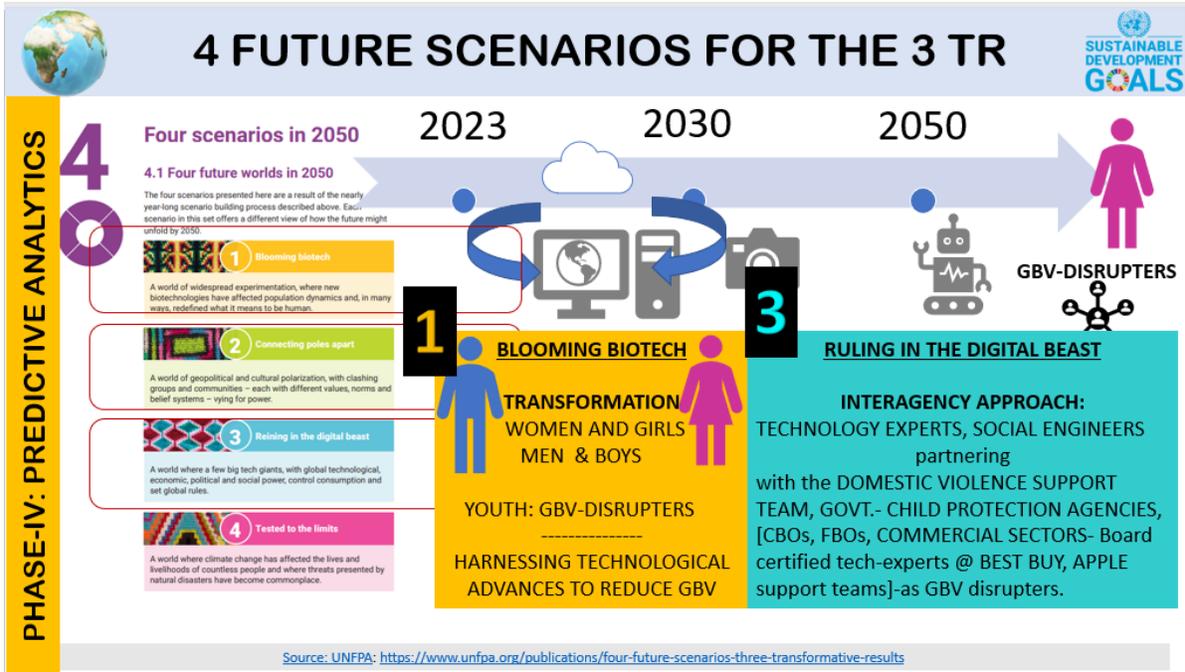
A HOLISTIC INTER-AGENCY APPROACH

Key Findings: A strategic method to disrupt TF GBV

A key finding and recommended intervention emerging from this research investigation focuses

on empowering the vulnerable and marginalized segments of a country's population. In a rapidly

advancing digital world, there is a need to increase the GDI (Gender Development Index) and

GNI (Gross National Income per capita) scores of the female population.

12 POPULATIONS LEFT BEHIND:
Source: UNAIDS. Key Populations: Infographic-Printable version.
https://www.unaids.org/en/resources/infographics/20140716keypopulations

Appendix H: Photographs taken during the study and collaborative research with the United Nations Population Fund.

Courtesy: Photos of United Nations Population Fund

[Research Support-Staff and colleagues at UNFPA]

Meetings, interactions, technical reviews, discussions with the UNFPA-NY, UNFPA-Mexico office, UNFPA-India office for data collection and accurate interpretation of the global GBV landscape