



COUNTERING VIOLENT EXTREMISM IN THE PHILIPPINES

AN ECOSYSTEM APPROACH USING WEAK-SIGNAL
ANALYSIS

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PREAMBLE

This report summarizes an empirical ecosystem analysis of violent extremism (VE) in the Philippines using weak-signal analysis. Parts of this analysis have been previously presented to USAID and the USAID Mission in the Philippines during briefings scheduled by USAID on October 14, 2021 and September 23, 2021.

While cross-cutting recommendations are included in section 3 of this report, detailed geographically-targeted interventions specific to the most vulnerable regions are presented in Annex 1. Annex 2 is a description of our methodology and the strengths and limitations associated with the analysis.

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ACRONYMS

ASG	Abu Sayaf Group
BIFF	Bangsamoro Islamist Freedom Fighters
CPP/NPA	Communist Party of the Philippines and New People's Army
CRT	Country Reports on Terrorism
CVE	Countering Violent Extremism
DoS	Department of State
GDP	Gross Domestic Product
GSI	Global Slavery Index
GTI	Global Terrorism Index
IACAT	Inter-Agency Council Against Trafficking
ICMS	Integrated Case Management System
ILO	International Labor Organization
ISIS	ISIS-Philippines
Jl	Jemaah Islamiya
NGOs	Non-governmental Organizations
OFWs	Overseas Filipino Workers
SCP	Situational Crime Prevention
SDG	Sustainable Development Goal
TIP	Trafficking in Persons
UDHR	United Nations Universal Declaration on Human Rights
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States Dollars
VE	Violent Extremism

EXECUTIVE SUMMARY

A wide variety of data can be used to guide decision-making and program development to prevent/counter violent extremism (P/CVE). Expanding beyond traditional data sources and analytical approaches, we apply an ecosystem approach using open data and weak-signal analysis. We apply this methodology to evaluate vulnerability to violent extremism (VE) in the Philippines. The method demonstrates a high predictive capability and reveals underlying causal relationships. It also allows for the development of geographically-targeted interventions which can be used to reduce vulnerability to VE. Our analysis demonstrates that existing, yet largely untapped, data resources, combined with advanced data analytics, are a valuable resource for countering VE (CVE).

Our analysis indicates that there will be a continuation of Islamist and communist-related VE in the Philippines. Our analysis also identifies differing strategies between the two main ideologies of VE groups: a) the Islamist extremist groups, such as Abu Sayaf Group (ASG), Jemaah Islamiya (JI), and ISIS-Philippines (ISIS), and b) the communist groups, such as the Communist Party of the Philippines and the New People's Army (CPP/NPA). Islamist VE activity is concentrated in the Mindanao region and the capital, Manila. The New People's Army events are distributed throughout the Philippines. Events associated with the Islamist extremist groups (ASG, JI, and ISIS etc.) are fewer, but more deadly, in contrast to the more widespread but less deadly VE events by the CPP/NPA. The frequency and geographic distribution of each group's attacks reveals their respective goals and strategies. We find that while communist VE events are widespread throughout the country, VE events carried out by Islamist-based groups are concentrated in the South. The broad distribution of communist VE events is consistent with a strategy of seeking to gain followers and promoting an ideological movement that hopes to become the new system of government for the nation. And conversely, the highly concentrated nature of ISIS and other Islamist faith-based VE events in the south, is consistent with a strategy of focusing on specific territories and becoming entrenched in the communities and their populations to control a limited area and create an independent state.

Within the Philippines, populations most vulnerable to VE are located in poor, underdeveloped and rural communities. These populations have higher income inequality, higher poverty rates, lower development rates, lower education, and lower literacy rates. The most vulnerable populations also tend to have high rates of gender inequality and low rates of female empowerment, as measured by female education metrics, female participation in decision-making at home, access to family planning and spousal violence rates. We also find that in the Philippines, vulnerability to VE is inter-related with vulnerability to labor trafficking in persons (TIP).

While we provide geographically-targeted interventions for the most vulnerable regions [Annex I], several cross-cutting recommendations based on our analysis are included in this summary report. Most notable are the need to: a) tailor CVE programming to the type of VE group operating in a vulnerable area, b) invest in economic and social development in rural and poor communities, c) include as CVE strategy efforts specifically designed to reduce societal gender equality, d) engage indigenous groups, women, and youth in peacebuilding and governance, and e) include countering-TIP programming, particularly labor-trafficking interventions, as a component of CVE.

I. INTRODUCTION

The Philippines is currently ranked 10 out of 162 nations in the 2020 Global Terrorism Index (GTI).¹ The Philippines is also considered to be the country most affected by terrorism in the Asia-Pacific region (IEP, 2021). Since 2002, the Philippines accounts for approximately 41 percent of fatalities from terrorism in Asia-Pacific (IEP, 2021).

The most recent (2019) US State Department annual Country Reports on Terrorism (CRT) raises concerns about continued attacks and recruitment operations of ISIS-Philippines and active affiliates such as the Abu Sayyaf Group (ASG), Bangsamoro Islamist Freedom Fighters (BIFF), Ansar al-Khalifa Philippines, and the Maute Group (U.S. DoS, 2020). The CRT also notes continuing attacks by the Communist Party of the Philippines/New People's Army (CPP/NPA) on security forces, civilians, the Philippines military, and law enforcement (U.S. DoS, 2020).

In this report, we begin with a brief assessment of the Philippines CVE programs, followed by a temporal (time) and spatial (location) analysis of VE events that have occurred since 2000. We then use a large variety and volume of data, and data analytics to assess vulnerability to VE in the Philippines. We take a big-data ecosystem approach based on Situational Crime Prevention (Eck and Clarke, 2019) to identify, through weak-signal analysis, the combination of socioeconomic factors that characterize vulnerability to VE.

As part of our analysis, we present a VE vulnerability map, a vulnerability measure for each region based on our weak-signal analysis, cross-cutting recommendations, and recommendations for geographically-targeted interventions. Our focus is on prevention, with the goal of undertaking proactive measures to reduce vulnerability to VE. The analytical objective is to identify ecosystems where VE is most likely to emerge in the future, and to identify the combination of characteristics associated with those ecosystems. Geographically-targeted interventions can then be used to reduce that vulnerability.

The annexes of this report include a description of the analytical methodology, limitations associated with the analysis, and, for the most vulnerable regions, a region-by-region analysis of VE vulnerabilities and related-metrics with recommendations for potential geographically-targeted interventions.

¹ The GTI is a composite measure comprising (1) incidents, (2) fatalities, (3) injuries and (4) property damage as indicators (IEP, 2021).

II. ANALYSIS

Our analysis of VE in the Philippines is presented in three sections:

1. We begin by assessing the Philippines CVE programs with a dataset we compiled from the US Department of State's annual Country Report on Terrorism (CRT).
2. Next, we analyze a dataset we assembled of approximately 14,000 events from 2015 through 2020. Using the pattern of events, both through time (temporal) and location (spatial), we identify changes that may serve as precursors of future events.
3. Finally, we use millions of data values and weak-signal analysis to identify vulnerability to VE, and the underlying combination of characteristics associated with vulnerability to VE, in the Philippines.

A. ANALYSIS OF CVE PROGRAMS IN THE PHILIPPINES

The analysis of the Philippines CVE programs uses our time-series (2010-2019) dataset. The dataset contains information on the Philippines' CVE programming, collected from the annual US State Department's CRTs. We built our dataset upon an existing dataset covering 2010-2017 (Ambrozik, 2019), and extended it through the most recently available CRT (2019).

The resulting time-series analysis is presented in Figure 1. Since 2010, the Philippines has shown fluctuations in CVE activities and in the level of engagement of religious and community stakeholders. In 2018 and 2019, there is a marked growth in CVE programming with the development of a new National Strategy as well as new prevention and counter-messaging initiatives. The siege of Marawi, Mindanao led to martial law being implemented between May 2017 and the end of 2019 (Conflict Alert, 2020). As reported in the 2019 Country Report on Terrorism (U.S. DoS 2020), "The Philippines finalized a National Action Plan on Preventing and Countering Violent Extremism and developed and implemented CVE training for security forces and civil servants." In July 2020, the Anti-Terrorism Act of 2020 (Republic Act no. 11479) became law, which creates an antiterrorism council with the authority to designate individuals and organizations as terrorists. The analysis shows, however, that the Philippines has not invested in intervention programming that provides assistance to individuals on the path towards radicalization.

Figure 1: CVE Programming in the Philippines as described in the Country Reports on Terrorism

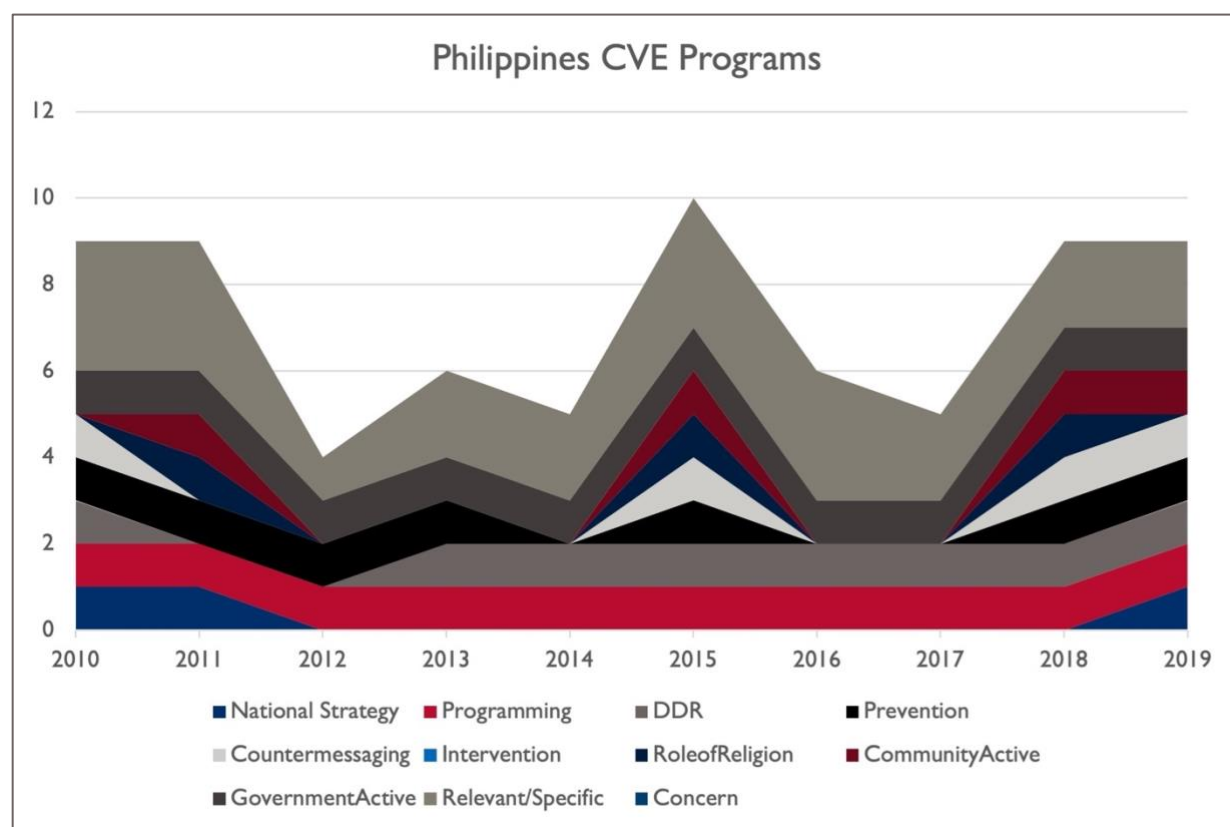


Figure 1 caption: Time-series analysis of CVE programs in the Philippines. The following are definitions of the various program categories (Ambrozik, 2019): **National Strategy** refers to a national CVE strategy or action plan, **Programming** refers to whether a country has implemented any CVE programming. **DDR** or deradicalization, disengagement, and rehabilitation programming consists of programs that target individuals who are already engaged in violent extremism by providing these individuals with assistance in leaving violent extremism behind and/or reintegrating back into society. **Prevention** programming attempts to prevent violent extremism from surfacing by addressing any root causes or perceived root causes of violent extremism. **Countermessaging** refers to efforts that attempt to tackle VE by promoting an alternate viewpoint or perspective. **Intervention** programming refers to programs that provide assistance to individuals who are on the path towards radicalization. **Role of Religion programming** means that (1) the main actors involved in a program come from the religious community, or (2) the programs focus on religion through the content of the program or target population of the program. **Community Active** indicates civil-society participation: any instance where non-government actors are involved in CVE initiatives within a country. **Relevant/Specific** consists of two components: A CVE-specific program refers to a program that meets the following requirements: (1) the program has a primary objective to prevent or counter violent extremism and (2) the program directly addresses a perceived root-cause of violent extremism or threat. A CVE-relevant program refers to a program that meets both of the following requirements: (1) preventing or countering violent extremism is not the primary objective of a program; (2) the program indirectly helps prevent or counter violent extremism. **Concern** is an indicator for whether CVE programs reportedly threaten religious freedom.

B. ANALYSIS OF VE EVENTS IN THE PHILLIPINES

A dataset of approximately 14,000 conflict events from 2015-2020 were assembled from three sources: a) Armed Conflict Location & Event Data Project (ACLED) (Raleigh et al., 2010), b) Uppsala Conflict Data Project (UCDP) Global Event Database v20.1 (Pettersson & Öberg, 2020), and c) Global Terrorism Database (GTD) (START, 2019). The data were cleaned and compiled into a single, integrated event database.

Each event was assigned to one of three categories of affiliation: “Yes,” “Maybe,” and “Other.” “Yes” events are listed as perpetrated by, or affiliated with, a terrorist organization identified by the U.S. Department of State (U.S. DoS, n.d.) or that are identified as part of the Global Jihadist Movement, as defined by Carson and Suppenbach (2017). “Maybe” events are those that are not “Yes” events but are events for which responsibility has been attributed to perpetrators identified by the Global Terrorism Database (START, 2020). “Other” events are those that are associated with actors identified in the Armed Conflict Location and Event Data Project (Raleigh et al., 2010) and/or the Uppsala Conflict Data Project (UCDP) Global Event Database v20.2 (Pettersson & Öberg, 2020).

We analyze these events first as a simple time-series (Figure 2), and then as multiple time-series presented with geographic latitude (Figure 3). In the second analysis (Figure 3), the presentation of events by location according to their geographic latitude allows us to see changes in the pattern of events both in time and in location simultaneously.

Figure 2 presents our analysis of the frequency of events (2015-2020), differentiating with red the combined “Yes” and “Maybe” events (“Yes/Maybe”) from the background in grey of the “Other” events. There can be a continuum between what are considered VE events and what are considered insurgency events. The red bars represent events that we identify with greatest confidence as VE or VE-related, while the grey bars in the background represent events that are more likely insurgency-related.

Figure 2: Frequency of VE and VE-Related Events Against Insurgency-Related Events

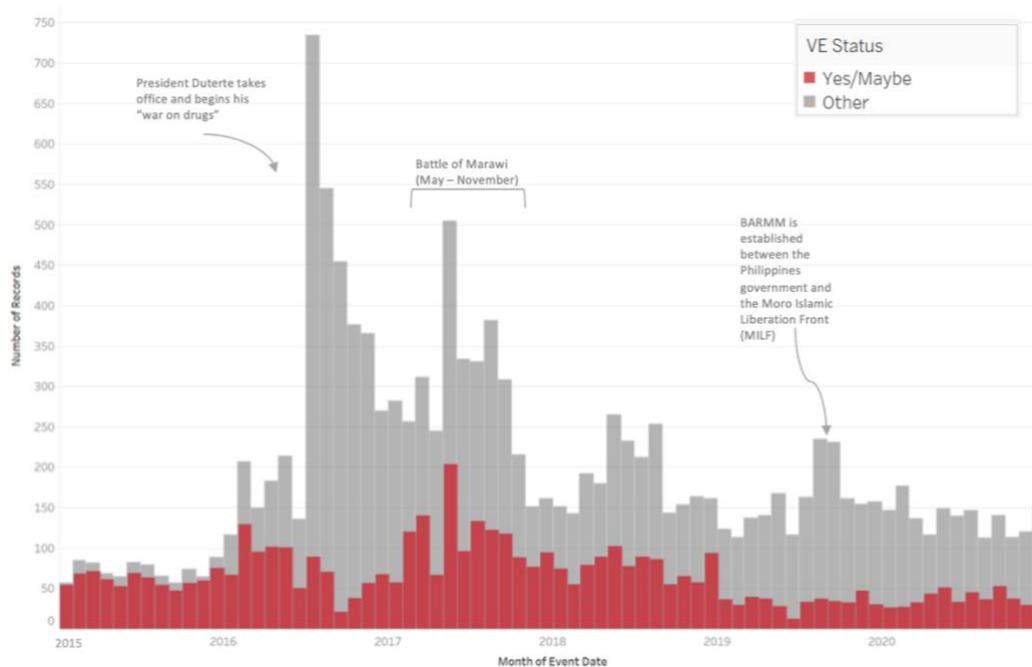


Figure 2 caption: Time-series of VE events by category 2015-2020. Events characterized as “Yes” or “Maybe” are plotted in red against the grey background of “Other” events. Significant political events, relevant violent extremist group developments, and major attacks are annotated on the time-series.

As illustrated in Figure 2, the number of VE “Yes/Maybe” events were about equal to the “Other” events in 2015, up until early 2016. At this point, the number of “Other” events increased exponentially reaching a peak of over 740 events per month in mid-2016. This increase coincides with President

Duterte’s “war on drugs” campaign. There were few VE “Yes/Maybe” events during this time. We see another rise in both “Other” and VE “Yes/Maybe” events coinciding with the Battle of Marawi from May to November 2017. VE events have generally tracked overall conflict events from 2017 through late 2018. But since then, the VE “Yes/Maybe” events appear to be more independent of “Other” events. The levels of both “Other” and VE “Yes/Maybe” activity appear to be constant in 2020. As such, our analysis of the time-series suggests a continuation of VE in the Philippines, notwithstanding the decrease in VE “Yes/Maybe” events following imposition of martial law between May 2017 and end 2019 (Conflict Alert, 2020), and the establishment of BARMM as a semi-autonomous region.² Future elections and political instability could raise the probability of VE. Our analysis of the event time-series data are consistent with the concern that new Islamic State (ISIS) cells may be re-emerging (Beech and Gutierrez, 2019).

The two main ideologies of VE groups in the Philippines: a) the Islamist extremist groups, such as ASG, JI, ISIS-Philippines (ISIS), etc., and b) the communist groups, Communist Party of the Philippines and New People’s Army (CPP/NPA), have different goals and strategies. These different goals and strategies can be identified in our analysis of the frequency of events, number of deaths per event, and in the spatial distribution of the attacks (Figure 3).

Figure 3 presents a time-series from 2015-2020 of events by the Islamist extremist groups (yellow) and by communist groups (blue). The number of deaths associated with each event is represented by the size of the data point. The horizontal axis is time, as with the previous plot (Figure 2). The vertical axis, however, is now latitude. adding a spatial perspective to the temporal distribution. For reference, the northern tip of Mindanao lies near 10°N on the vertical axis. South of 10°N on the vertical axis (south of Mindanao), is where most Islamist (yellow) VE events occur. In contrast, communist VE events can be seen as distributed up and down the vertical axis, indicating that they occur throughout the country.

² Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) was established in early 2019 to end the decades-long negotiation between the Philippines government and the Moro Islamist Liberation Front (MILF).

Figure 3: VE Events carried out by Islamist and Communist VE entities from 2015-2020

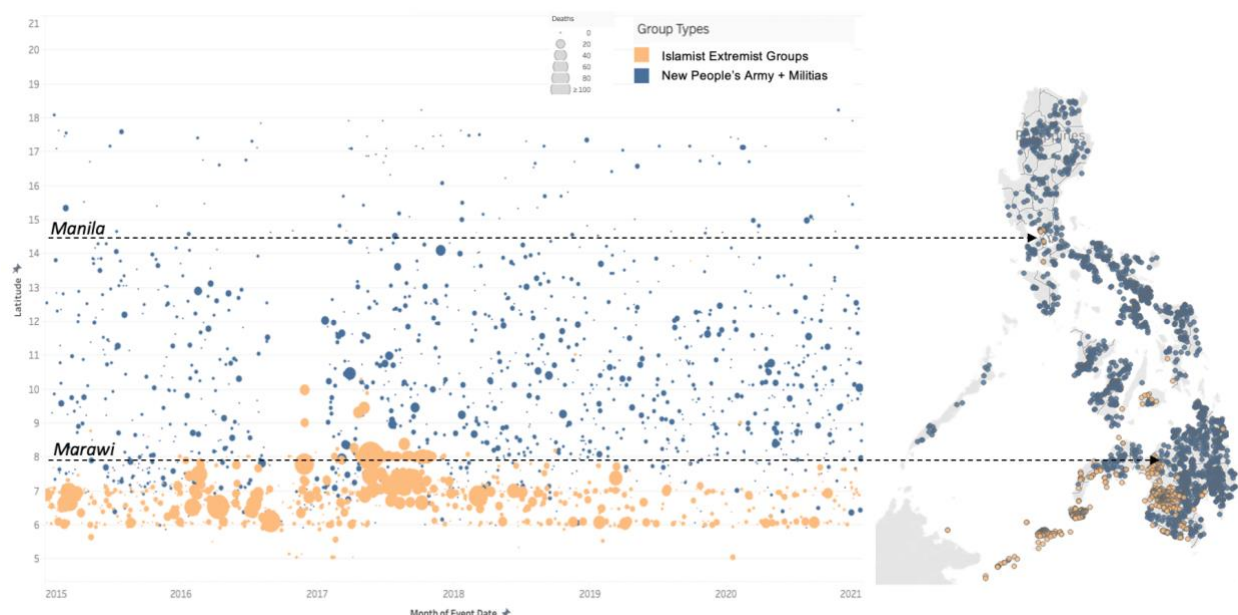


Figure 3 caption: Time-series of violent extremist events showing the difference between the two main groups (ASG / JI / ISIS, etc.) and NPA. Time-series is plotted by latitude to provide a spatial component to the time-series. The size of the dot corresponds to the number of deaths at that event. The color of the dot shows the ideology of the perpetrating group: yellow for communist VE, blue for Islamist VE.

In the five-year period ending in December 2020, our analysis shows that VE events associated with the Islamist extremist groups (ASG, JI, and ISIS) make up 41 percent of events. Despite being fewer in number, the Islamist VE events are more deadly than communist VE events. The average number of deaths per Islamist VE event is 2.79, compared to 0.78 for communist VE events. In terms of where they occur, Islamist VE events tend to occur in more densely populated areas than communist VE events.³

As denoted by the yellow dots in Figure 3, events associated with the Islamist extremist groups (ASG, JI, and ISIS etc.) are concentrated in the Mindanao region. Islamist VE events are fewer in number compared to communist VE events, but are more deadly, suggesting the continued presence of seasoned members of transnational organizations supported by entities outside the Philippines. Islamist groups seek to gain control of the southern Mindanao region, becoming ingrained in the societal landscape, and establishing a permanent presence, possibly as an extension of the Islamic State (Brown et al, 2020).

On the other hand, events north of Mindanao are almost exclusively related to the communist movement (NPA) and have fewer deaths per event. These are shown by the blue dots in Figure 3. The NPA is the armed wing of the Communist Movement of the Philippines and are based primarily in the countryside. Their goal is to wage protracted guerilla war, while establishing themselves throughout the country. NPA's strategy is consistent with promoting civil unrest and a change in governance. Their events are smaller and more distributed throughout the country.

³ The average ambient population, the average number of people within an area of approximately 1 km², pixel in which an Islamist extremist event occurs is 6,220 compared to 2,975 for communist VE events.

C. WEAK-SIGNAL ANALYSIS OF VULNERABILITY TO VE IN THE PHILIPPINES

From an analytical perspective vulnerability to VE can be classified as a “wicked problem” – the type of problem that is characterized by a myriad of dynamically interconnected variables and that defies a single solution.⁴ Causal relationships are seldom direct, and the circumstances that foster the problem vary from location to location. Even when causes appear similar, solutions that work in one location seldom work in another location, owing to the vast array of varying sociocultural and economic conditions.

While “wicked problems” may defy single, linear, and universal solutions, they can be addressed through an ecosystem approach. In using such an analytical approach, we parameterize the socioeconomic ecosystem in which VE exists to reveal, through weak-signal analysis, the combinations of characteristics that allow VE to occur. Once identified, we can formulate geographically-targeted interventions to disrupt that support system and proactively mitigate VE.

Our ecosystem approach is grounded in the criminology theory of Situational Crime Prevention (SCP). SCP has helped law-enforcement organizations realize significant reductions in the occurrence of crime and in the number of people who have experienced crime (Eck and Clarke, 2019; Clarke, 1995). SCP focuses on the criminal setting and begins with an examination of the circumstances (the “ecosystems”) that allow for particular types of crime. By gaining an understanding of these ecosystems, mechanisms are then introduced to change the relevant ecosystems and reduce the opportunities for particular crimes. The SCP paradigm is increasingly accepted among practitioners who work on preventing and countering violent extremism (P/CVE). It is also consistent with the growing emphasis on preventative measures which some have previously defined as “efforts to influence individual and/or environmental factors that are suggested to create the conditions in which VE can flourish, using social or educational, rather than explicitly security-driven measures” (Stephens et al., 2021).

Coincident with the growing emphasis on prevention is an increased availability of open data. These datasets include not only traditional sources such as survey and census data, but also data from both formal and informal media sources, as well as geospatial data from earth observation technology. While datasets may be of varying quality and completeness, each has the potential of carrying information that reflects characteristics of a population, either by itself or through combination with other datasets.

To characterize the ecosystem of VE in the Philippines, we began by compiling millions of data values for socioeconomic indicators, or attributes, from diverse datasets. These data are then cleaned, standardized, normalized, and vectorized through a series of statistical algorithms, subdividing populations into smaller units for which distinct attributes can be measured. For the Philippines, we developed over half a million measures covering over 2,000 attributes for each region. High-resolution geospatial and Earth-observation data, such as land cover and climatic variables, were converted into tabular data for analysis. Depending on the data type, values were summed, e.g., to determine population, or statistical measures of the value’s distribution were used, e.g., average travel distance to a road, market, or urban area.

Using our collection of over 2,000 indicators, we identified through weak-signal analysis a VE vulnerability measure composed of 12 weighted indicators (Table I). Our VE vulnerability measure has a

⁴ The original use of the term ‘wicked problem’ is attributed to design theorist Horst Rittel.

high predictive value for vulnerability to VE in the Philippines, as confirmed by reported VE events from ACLED, GTD, and UCDP.

Table 1: Indicators and Weightings for VE Vulnerability Measure

Percent of women age 15-19 who have had a live birth ^A	0.0296
Gini coefficient at the regional level ^A	0.0166
Total fertility rate for women aged 15-49 ^A	0.0131
Percent of women whose husband decides how the wife's cash is used ^A	0.0132
Percent of women whose highest level of schooling is primary completion ^A	0.0339
Number of recorded languages ^D	0.0203
Percent of married females 15-49 with an unmet need for family planning ^C	0.0199
Percent of women who have experienced emotional spousal violence ^A	0.0103
Percent of Pantawid Pamilyang (4P) units that are solo male parents ^E	0.0071
Economic activity rate of working children aged 5-14 ^B	0.0057
Labor TIP Victims per 100,000 population ^G	0.0128
Percent of household agriculture workers who are female ^F	0.0041

Sources: ^A Philippine Statistics Authority (PSA) and ICF (2018), ^B PSA (2018), ^C PSA (2013b), ^D Translators without Borders (2020), ^E OCHA Philippines and PSA (2015), ^F Crop Statistics Division, PSA (2020b), ^G Inter-Agency Council for Anti-Trafficking (IACAT) (2021)

A detailed technical summary of weak-signal analysis is included in Annex 2. In mathematical terms, we use singular-value decomposition, combined with varimax rotation and squared-factor loadings as an unsupervised self-learning algorithm to identify key attributes and their relative weightings (OECD, 2008). In non-mathematical terms, we begin with a wide range of socioeconomic indicators (in this case, over 2,000) to capture the full spectrum of factors that are associated with a population. The algorithm then identifies the optimal combinations of these indicators (in this case, 12) that are predictive of VE, while eliminating the combinations that are neither conducive nor preventative. The higher the value of the composite vulnerability measure, the higher the vulnerability for VE activity.

An additional advantage of weak-signal analysis is that the analysis is agnostic. We do not pre-select and combine indicators that we think are related to VE, nor do we limit our analysis to any single survey or type of data. We allow the weak-signal analysis to reveal the combinations of indicators and their relative weightings that are most characteristic of ecosystems where VE occurs. We then apply the measures and their relative weightings using data values for each location. Previously hypothesized relationships are often confirmed, but the discovery of unexpected relationships is just as common. And it is the discovery of the unexpected relationships that lead to a more sophisticated understanding of VE, and in turn, offers new opportunities for more nuanced and effective interventions.

Although the final vulnerability measure is composed of a relatively small subset of indicators that represent the optimal combination characteristic of the VE ecosystem, the analysis reflects the full sociocultural-economic ecosystem. Indicators that were excluded from the final measure are indicators that: a) do not have significant associations with VE, either in a positive or negative capacity, or b) that correlate so strongly with those in the final measure that their inclusion would be redundant. We do not assume the indicators are necessarily direct causes of vulnerability, rather we assume they are proxy measures that reflect societal characteristics that are difficult to measure directly. For example, we cannot directly measure gender inequality. Certain manifestations of gender inequality – high female child marriage rates and violence towards women, however, can be measured. For each location, we

interpret the causes of vulnerability using the specific indicator values for that location and our interpretation of those indicators.

We confirm our analysis through “hind-casting,” which consists of testing the model against known events in the past. The purpose of hind-casting is to see if the model correctly predicts areas of known VE when the parameters for those areas are used as input for the model. When the VE vulnerability measure is hind-casted with reported VE events, we see that the vulnerability measure is a strong, statistically significant predictor of VE.⁵ When our VE vulnerability measure is hind-casted, it correctly identifies among the top eight regions, the five regions with the highest VE prevalence. The probability of this occurring by random chance is less than 1 in 100.

In addition, we developed a geospatial visualization (a “map”) of VE vulnerability in the Philippines (Figure 4). The geospatial presentation applies the vulnerability measure (Table 2) to 2019 ambient population values and can be used to predict the number of people within a population that are likely to experience VE events over a given timeframe. The VE vulnerability map is analogous to the vulnerability maps that are used for natural hazards and should be interpreted in a similar fashion. First-generation hazard vulnerability maps simply used the locations of known past events to predict future vulnerability. As the understanding of the ecosystem in which natural hazards occur improved, scientists were able to identify vulnerability in locations where events were previously unknown. Over time, these projections were validated with new events, and the number of hazard victims was dramatically reduced by proactive measures to reduce vulnerability. The vulnerability analysis for VE in the Philippines follows the same developmental logic. By analyzing the ecosystem in which VE is occurring, we can assess the potential of other locations to support VE activity and reduce VE activity through proactive measures.

The scale in Figure 4 is a relative ranking with areas that are most vulnerable to VE shown in red, and areas that have the lowest vulnerability shown in blue. Two messages are conveyed by the plot simultaneously. The color shade indicates the vulnerability measure of the location. The density of color indicates the sizes of vulnerable populations.

⁵ The VE vulnerability measure has an R-squared value = 0.54 with VE events per 100,000 population, and the p-value is less than 0.05, allowing us to reject the null hypothesis that the relationship occurred by chance.

Figure 4: VE Vulnerability Map for the Philippines

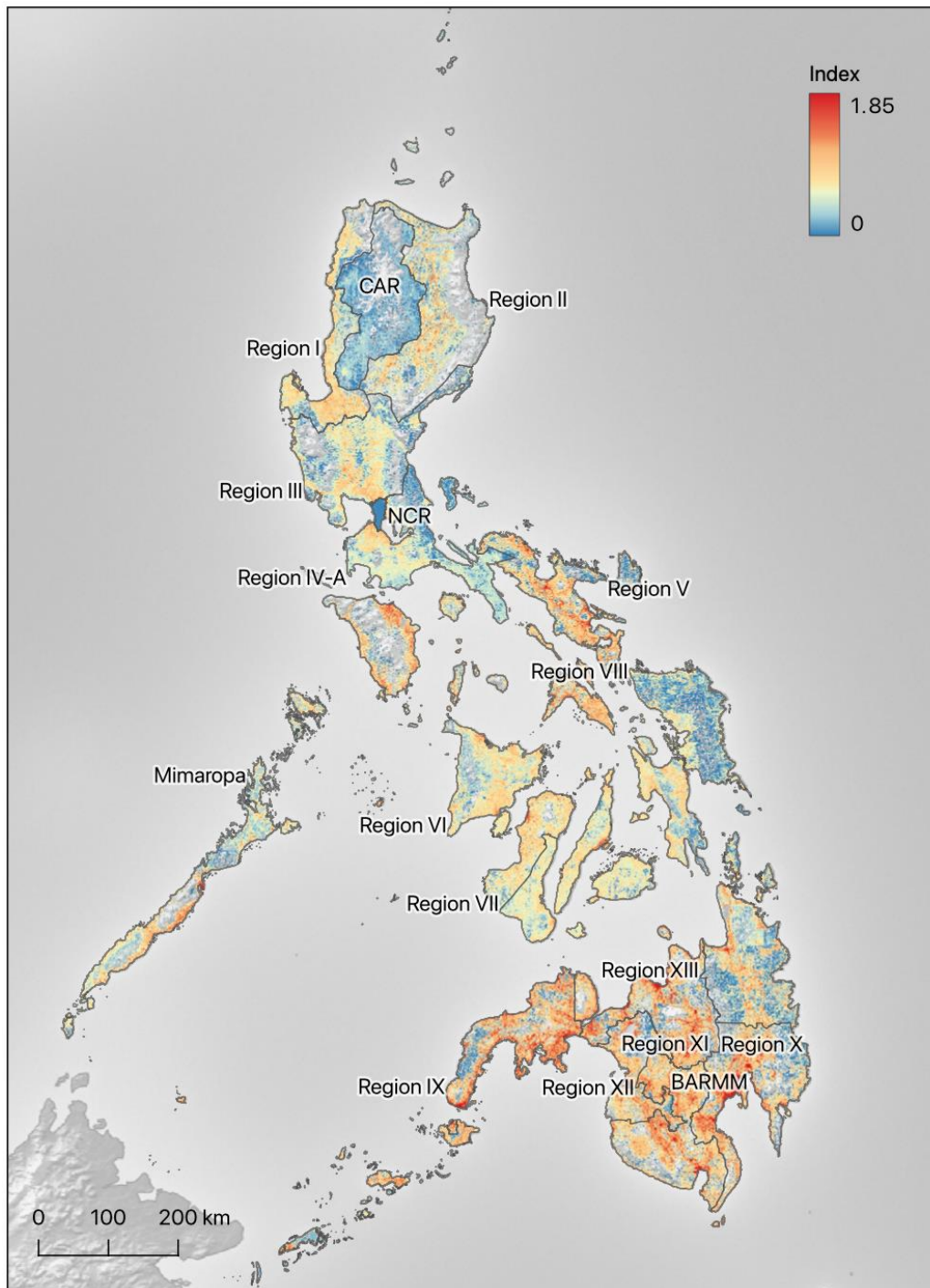


Figure 4 caption: Geospatial presentation of vulnerability to VE, applying a composite measure to values at the region level and to ambient population estimates at the scale of approximately 1km² (Rose et al., 2020). The map is composed of 345,550 discrete values. Region boundaries are shown in grey and labeled (NAMRIA and PSA, 2020). Topographic base map is from Natural Earth (2020).

Table 2: VE Vulnerability by Region

Region	Vulnerability Measure	Population	Ranking
Region IX (Zamboanga Peninsula)	0.405	3,629,783	1
Region X (Northern Mindanao)	0.369	4,689,302	2
Region XI (Davao Region)	0.365	4,893,318	3
Region XII (Soccsksargen)	0.352	4,545,276	4
Region V (Bicol Region)	0.326	5,796,989	5
BARMM (Bangsamoro Autonomous Region in Muslim Mindanao)	0.332	3,781,387	6
Mimaropa (Southwestern Tagalog)	0.326	2,963,360	7
Region XIII (Caraga)	0.312	2,596,709	8
Region VI (Western Visayas)	0.243	7,536,383	9
Region II (Cagayan Valley)	0.254	3,451,410	10
Region VIII (Eastern Visayas)	0.245	4,440,150	11
Region VII (Central Visayas)	0.223	7,396,898	12
Region I (Ilocos Region)	0.226	5,026,128	13
Region III (Central Luzon)	0.202	11,218,177	14
Region IV-A (Calabarzon)	0.174	14,414,774	15
CAR (Cordillera Administrative Region)	0.097	1,722,006	16
NCR (NCR)	0.007	12,877,253	17

Table 2 caption: Corresponding VE vulnerability rankings for the regions. The rankings were determined by multiplying the vulnerability measure produced through weak-signal analysis by the log of the population for each region to better account for the areas with high populations, wherein there are more vulnerable individuals. The ranking color corresponds to the predominant pixel color in the map.

Our analysis indicates that the top five regions that are vulnerable to VE are 1) Region IX – Zamboanga Peninsula, 2) Region X – Northern Mindanao, 3) Region XI – Davao Region, 4) Region XII – Soccsksargen and 5) Region V (Bicol Region). With the exception of Region V (Bicol), all the other regions are located in the Mindanao region, which is an area with historical Islamist VE activity, some of which is connected to the independence movement of the indigenous Moro people, who are also Muslim. These regions all have vulnerable communities with characteristics identified in our analysis: rural populations with high poverty levels involved in basic subsistence agriculture. These populations are characterized by higher income inequality, higher poverty rates, lower development rates, lower education, and lower literacy rates. In addition, child labor and gender inequality are represented in these communities with high levels of children (aged 5-14) working and disproportionate numbers of females participating in agricultural labor.

Our analysis indicates that within the Philippines, populations most vulnerable to VE are located in poor, underdeveloped and rural communities. These populations have higher income inequality, higher poverty rates, lower development rates, lower education, and lower literacy rates. Our analysis recognizes these populations through indicators in our vulnerability measure such as the a) total fertility rate, b) Pantawid Pamilyang (4P) units that are solo male parents, c) Gini coefficient, and d) percentage of women whose highest education is primary.

The most vulnerable populations also tend to have high rates of gender inequality and low rates of female empowerment, as measured by female education metrics, female participation in decision-making at home, access to family planning and spousal violence rates. Our analysis recognizes these populations through indicators in the vulnerability measure such as: a) percentage of women age 15-19 who have

had a live birth, b) person who decides how the wife's cash is used: mainly husband, c) percentage of female household population (age 6 and above) by highest level of schooling: completed primary, d) unmet need for family planning (percentage of married females 15-49), e) percentage of women who have experienced spousal violence (emotional), and f) 4P units that are solo male parents.

Not only is VE vulnerability positively correlated with the labor TIP victims per 100,000 population indicator. Prevalence of labor TIP is one of the 12 indicators (from over 2,000) that was identified as diagnostic of VE vulnerability by our weak-signal analysis. We interpret this as evidence that VE and labor TIP share a common ecosystem.

Wealth inequality, as revealed in our analysis by the Gini coefficient, is a contributing factor to VE vulnerability. While one could reasonably counter-argue that many of the indicators revealed through our analysis are fundamentally measures of economic level, it is noteworthy that the more straightforward economic measures such as wealth, GDP per capita, and unemployment do not appear as prime factors with predictive capability regarding vulnerability to VE. Wealth inequality also reflects rural areas and the lack of access to opportunities in these areas. It correlates negatively with urban population and is positively correlated with poverty rate, lower educational attainment, and several indicators that reflect gender inequality such as women experiencing spousal violence, and lack of access to contraception. This combination of indicators highlights vulnerability in areas that are not only poor, but more significantly, are unequal in their spread of power, resources, and opportunities.

The number of 4P units that are solo male parents is also an indicator of VE vulnerability.⁶ This indicator is a reflection of more isolated, impoverished populations where social services and healthcare are lacking. 4P grant-receiving solo male parent rates are highest in BARMM and the rest of Mindanao, and correlates with the percentage of population whose religion is Islam, as well as a lack of antenatal care or skilled birth deliveries, consistent with high maternal mortality rates. It is noteworthy that the indicator is for solo male parents participating in this system, which corresponds to several studies which show that a lack of economic opportunity for men is a driving force for radicalization (Bhatia and Ghanem, 2017; Brown et al., 2020). In addition, this indicator reflects a presence of gender inequality and a traditional patriarchal society where male parents may struggle economically and socially because a woman would typically be relied upon to do most of the housework and childcare.

Lack of female empowerment and gender inequality are major factors in areas with high vulnerability to VE. At the individual level, lack of female empowerment is also recognized in our analysis through the indicator measuring the proportion of females who obtain at most a primary education. Societal gender inequality is revealed through the following indicators: a) the percentage of women whose husbands control their earnings, b) percentage of women who have experienced spousal emotional violence, c) percentage of women aged 15-19 who have had a live birth, women with unmet family planning needs, and d) the total fertility rate. Teenage pregnancy in the Philippines is an indicator of gender inequality because these pregnancies “may be a result of coercion and unequal power relations between girls and older men.” (UNFPA, 2020). This is evidenced by the fact only 3 percent of children born by mothers aged 15-19 had fathers from the same age group (PSA, 2017). Despite anti-Violence Against Women (VAW) campaigns, Filipino women are still highly impacted by gender-based violence and domestic abuse (CFE-DM, 2018). These indicators reflect patriarchal characteristics in society where women are

⁶ As previously mentioned, the Pantawid Pamilyang Pilipino Program (4P) aims to improve maternal healthcare and reduce child mortality through a conditional cash transfer (health and education grant) and community services.

undervalued, deemed inferior to men, and treated unequally. In fact, VE narratives in the Philippines sustain gender stereotypes (Brown et al., 2020).⁷ Promoting the inclusion of women in governance, leadership, education, and the economy can help challenge and discredit VE narratives, while improving the status of women in society.

In the Philippines, lack of economic opportunity, especially for Filipino men who have been traditionally viewed as the providers in families, has threatened their masculinity as well as removed a traditional path to adulthood (Yea, 2015). This causes economically vulnerable men to become more open to radicalization, as VE groups offer them a path to reclaim their masculinity and to attain manhood through militarized action (Duriesmith, 2020). This trend is also observed in other patriarchal societies: a study in eight Arab nations found that, while higher education makes it less likely that an individual supports violent extremism, “education coupled with unemployment or underemployment is associated with greater radicalization.” (Bhatia and Ghanem, 2017).

Several studies across nations suggest that perceived “threats to masculinity” or transgression of entrenched norms may also incite violence against women (e.g., Duvvury et al, 2002). In addition, it has been found in patriarchal societies that if women are given or perceived to have access to opportunities that are not available to men, it can foster resentment and exacerbate violence against women (Rahman, 2020). This highlights the need to support the expansion of economic opportunities for men, together with women, in order to reduce VE vulnerability.

In looking at future interventions, it may be important to differentiate female empowerment from gender equality. The United Nation’s Sustainable Development Goal (SDG) 5, to “achieve gender equality and empower women and girls”, links the concepts of female empowerment and gender equality (United Nations, 2015). Female empowerment and gender equality share a sociocultural ecosystem, with historically little differentiation between them in the goals set by development organizations. Analyzing the two concepts as separate entities, however, may be helpful in understanding better how various societal factors affect the achievements and conversely, the subjugation of females. Intuitively, interventions would need to address societal norms that propagate traditional male and female responsibilities and include young males in female-focused development initiatives before age 10, when gender roles and expectations begin to be imprinted (Blum et al., 2017).

VE vulnerability is also greater in areas characterized with different indigenous groups and traditional cultures. This is shown in our analysis through the VE vulnerability through the indicator of languages spoken. Such areas, like Muslim Mindanao which has 13 ethnic groups, are characterized by traditional power structures and clans.⁸ With a more ethnically diverse group of peoples, inclusive governance is needed to prevent feelings of marginalization and dissatisfaction with the government and society

⁷ Women are also portrayed as rewards in extremist narratives, for example, a religious song called *The Brothers of Marawi* has a line in the chorus offering fighters: “Diamonds and pearls and palaces awaiting the men of Tawhid; Virgins and wine, never ending time and gardens with rivers beneath.” (Brown et al., 2020)

⁸ Muslim Mindanao has thirteen ethnic groups: the Badjao, Iranun, Jama Mapun, Kalagan, Kalibugan, Maguindanao, Palawanon, Maranao, Molbog, Sama, Sangil, Tausug, and Yakan (Franco, 2020).

III. RECOMMENDATIONS AND CONCLUSIONS

Detailed geographically-targeted recommendations specific to the most vulnerable regions are presented in Annex I. The following consist of cross-cutting and more general recommendations based on the findings of our analysis:

1) Tailor CVE programming to the type of VE group operating in the area

Our analysis of the frequency and distribution of VE events reveals that VE events by Islamist-based groups are fewer in number compared to communist VE events, but are more deadly and focused in the South. Our interpretation of this analysis is that it provides evidence for the continued presence of seasoned members of transnational organizations supported by entities outside the Philippines, and that they seek to gain control of the southern Mindanao region as an extension of the Islamic State. Additionally, our analysis reveals that VE events related to the communist movement have fewer deaths per event, are more broadly distributed, and are based primarily in the countryside. Our interpretation of the frequency and distribution of communist VE events is that it provides evidence for the goal of a protracted guerrilla war, establishing themselves throughout the country to promote civil unrest and a change in governance.

2) Invest in economic and social development in rural and poor communities

Our analysis reveals wealth inequality, as measured by the Gini coefficient, is a strong contributing factor to VE vulnerability in the Philippines. Our analysis shows that wealth inequality is statistically related to poverty and rural areas where, in the Philippines, there is a lack of access to economic opportunity. Investing in growth sectors and developing programs to train workers for skilled industries, especially in the Mindanao region, is a logical response to this finding.

3) Differentiate female empowerment from societal gender equality, and include young males in addressing societal gender inequality

Our analysis reveals that gender inequality is a strong contributing factor to VE vulnerability in the Philippines. Our analysis also shows that in areas where attempts have been made to improve female empowerment through efforts such as female education and opportunities for females to pursue income-producing activities, societal gender inequality can still prevail. The societal gender inequality is manifested through the acceptance of violence towards women, barriers to women participating in public life and the economy, and women being married and giving birth at a young age with husbands who are older, all of which are indicators in our vulnerability measure. It is logical that efforts to reduce societal gender inequality should encourage males to revise patriarchal attitudes and views of masculinity and address societal norms that propagate traditional male and female responsibilities. It is evident that such efforts, by necessity, should include young males.

4) Engage indigenous groups, women, and youth in peacebuilding and governance

Our analysis reveals that VE vulnerability is greater in areas characterized with different indigenous groups and traditional cultures. This is reflected in our vulnerability measure through the indicator of the number of languages spoken. These areas that preserve traditional cultures also preserve traditional power structures. Engaging indigenous groups, women and youth in governance and peacebuilding is therefore needed to promote interfaith tolerance.

5) Include CTIP as a component of CVE

In our analysis, the prevalence of labor TIP is an indicator of vulnerability to VE. Vulnerability to VE and vulnerability to labor TIP share a common ecosystem. Populations can be made more resilient to both VE and labor TIP through investments that address common causal factors.

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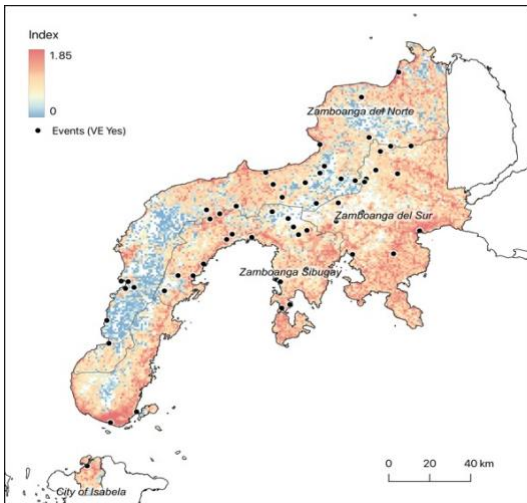
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ANNEX I. GEOGRAPHICALLY-TARGETED INTERVENTIONS BY REGION

CONTENTS

1. Region IX (Zamboanga Peninsula)
2. Region X (Northern Mindanao)
3. Region XI (Davao Region)
4. Region XII (Soccsksargen)
5. Region V (Bicol Region)
6. BARMM (Bangsamoro Autonomous Region in Muslim Mindanao)
7. Region IV-B (MIMAROPA)
8. Region XIII (Caraga)
9. Region VI (Western Visayas)
10. Region II (Cagayan Valley)

Region IX (Zamboanga Peninsula)



VE Organizations

The main VE groups in the area are the New People's Army (NPA), ISIS, Jemaah Islamiyah (JI), Abu Sayyaf Group (ASG), Waning Abdulsalam Group (WAG), and Bangsamoro Islamic Freedom Movement (BIFM). ISIS, ASG, and NPA were the active groups in 2019 and 2020.

VE Vulnerability Score

0.007 (lowest) **0.405** .405 (highest) Rank: 1 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	37	54	47	50	11	33	232

Socio-Economic Measures

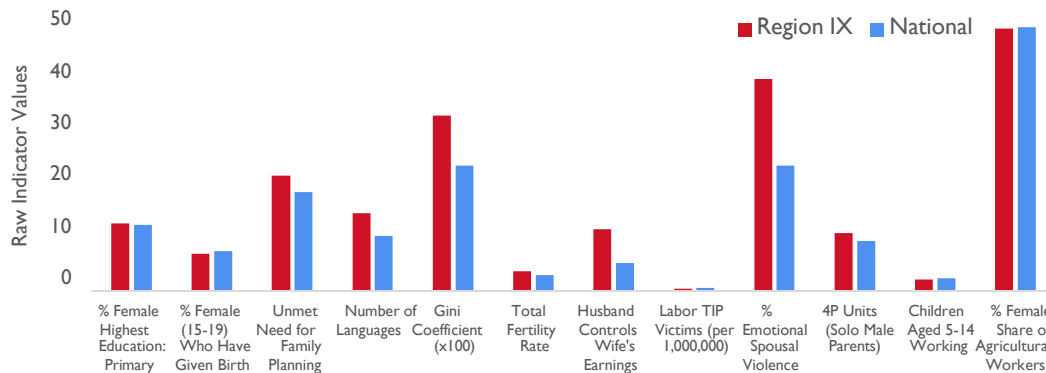
Population: 3,629,783 (#13)
 Percent Urban: 33.9% (#9)
 Poverty Incidence: 39.4% (#2)
 Female Secondary School Attendance: 10.8% (#16)
 Households with Electricity: 78% (#17)
 GDP per Capita (thousands of USD): 49.4 (#11)
 Percent Muslim: 16.6% (#3)

Human Development Index: 0.531 (#16)
 Percent of women who feel a husband is justified in beating his wife: 24.5% (#2)
 TIP: 1.488 victims per 100,000 population (#14)
 Female Internet Usage: 56.9% (#15)
 VE events since 2010: 232 (#8)
 Violence against women: 19.7% (#6)

VE Event History

Region IX has experienced a high volume of VE acts (#8) in the past five years, carried out by a diverse array of Islamic extremist and political groups. The VE prevalence per 100,000 is 6.392 (#5). In late 2020 and early 2021, Zamboanga City raised its terror alert to the highest level due to threats that included bombing and kidnappings by members of ASG. The police killed a leader of ASG. Most events have taken place on the outskirts of densely populated areas, especially along the borders of the three provinces. In August 2021, the Philippine Army declared Zamboanga del Sibugay and Sur communist (NPA) insurgency-free. Now, the military has turned to Zamboanga del Norte, where the NPA continue to operate

VE Vulnerability Index for Region & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region IX is located in south-central Mindanao and contains three provinces: Zamboanga del Norte, Zamboanga del Sur, and Zamboanga Sibugay. It also has four major cities: Dapitan, Dipolog, Isabela, and Pagadian.
- The primary economic industries are agriculture and fishing. The main commodities are rice, corn, coffee, and rubber.
- There are also large lumber and mining companies in the region.
- Nearly 40 percent of the population is living in poverty. Low measures of electricity, HDI, and female secondary school completion, and female internet usage indicates limited access to services and limited economic mobility.
- Gender inequality is high. Spousal violence against women and women who justify violence against women are both high.
- Region IX has a long history with both Islamic and communist insurgencies. In 2013, members of the Moro National Liberation Front (MILF) seized hostages in Zamboanga city and occupied of parts of the city for several days.
- Zamboanga city has several sardine factories and is the sixth-most populous city in the Philippines. There is a large port near the city which has several shipping lanes and annual passenger numbers over 5.5 million.

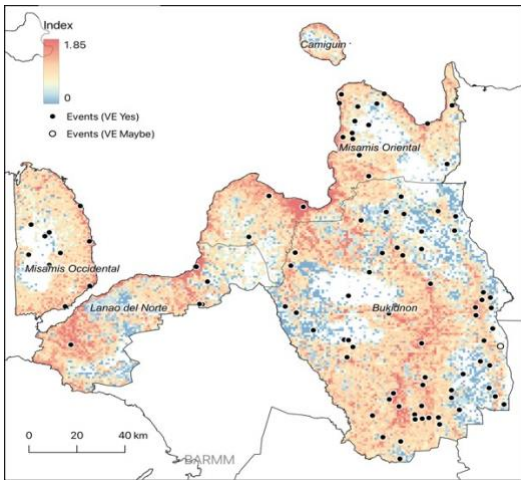
Geographically-Targeted Interventions

In Region IX, high-priority interventions include implementing programming in areas where communist insurgencies have been displaced to improve rule of law, increase female empowerment, and reduce gender inequality. In mid-2021, the military announced that Zamboanga del Sibugay and Zamboanga del Sur were communist insurgency-free after a months-long campaign against the NPA in the region. While this the campaign was important to remove a destabilizing organization, it has also left a power vacuum in areas that the NPA had occupied for years. Local governments in these areas should be given direct support to reinstate Philippines government control and increase rule of law. NGOs and other organizations should focus on promoting nationalism to encourage unity and pro-democracy movements. This time will be vital for rebuilding communities and organizations should partner and assist with legal, health, and social government services to help build trust in local governments and reduce the traditional power structures of clans.

Female empowerment and violence against women: Region IX has very low female empowerment measures, including low female attendance and completion of secondary school and low internet usage among females. Programming should encourage the education of young girls and support female leadership. Interventions could be entrepreneurial and employment training programs that include programs for career development. Programs for female empowerment through leadership and decision-making trainings should be implemented within the school curriculum. Such training programs should also include males, especially boys (age 5-10), so as not to create resentment and inadvertently exacerbate gender inequality.

Region IX also has high gender inequality, including high violence against women, both physical and emotional, and one of the highest rates of females who believe that spousal violence is justified. Communities should implement women's groups and health trainings for women on how to manage finances and receive education on spousal abuse and how to report. These trainings should include men, especially young men, and they should be encouraged to participate in changing harmful social norms. Local law enforcement should increase the standing of female law enforcement officials and receive training on child and spousal abuse for greater understanding of the damage abuse can have.

Region X (Northern Mindanao)



VE Vulnerability Score

0.007 (lowest) **0.369** .405 (highest) Rank: 2 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	32	33	53	75	45	52	290

Socio-Economic Measures

Population: 4,689,302 (#9)	Human Development Index: 0.553 (#13)
Percent Urban: 41% (#7)	Percent of women who feel a husband is justified in beating his wife: 8.3% (#13)
Poverty Incidence: 26% (#7)	TIP: 3.327 victims per 100,000 population (#5)
Female Secondary School Attendance: 18% (#5)	Female Internet Usage: 63.9% (#8)
Households with Electricity: 84.8% (#14)	VE events since 2010: 290 (#6)
GDP per Capita (thousands of USD): 73.6 (#7)	Violence against women: 13.4% (#13)
Percent Muslim: 8.1% (#4)	

VE Organizations

The main VE groups in the area are the New People's Army (NPA), Bangsamoro Islamic Freedom Movement (BIFM), Communist Party of the Philippines (CPP), Moro Islamic Liberation Movement (MILF), Maute Group, and several small militias. In 2019 and 2020 the active group were BIFM, MILF, CPP, NPA, and a few small militias.

VE Event History

Region X has experienced a high volume of VE acts (#6) in the past five years, carried out by a diverse array of Islamic extremist and political groups. The VE prevalence per 100,000 is 6.18 (#6). In early 2020, a group of soldiers were ambushed in Lanao del Norte, three of whom were killed by ISIS affiliates in the area. This was the first attack in years on military personnel in the province. There have been many small clashes with NPA in rural areas throughout the region.

VE Vulnerability Index for Region X & National Average Value



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region X is located in northern Mindanao and contains five provinces: Bukidnon, Camiguin, Misamis Occidental, Misamis Oriental, and Lanao del Norte. The regional capital is Cagayan de Oro, and the other major city is Iligan, both of which are growing rapidly.
- Lanao del Norte has a large industrial sector. The Agus-IV to VII Hydroelectric Plants supply most of the electrical power to Mindanao.
- Region X is mainly an agricultural economy with some industry. The primary crops include rice, corn, and coconuts, along with fishing.
- Wealth measures in the region are fairly average for the country, but low HDI, low electricity access, and a high percentage of females who have given birth before the age of 19 suggest a lack of infrastructure and health services.
- The regional capital of Cagayan de Oro is a fast-growing and quickly urbanizing city. It has a domestic airport, Laguidigan Airport, and has become a domestic and foreign tourist destination.
- Region X borders BARMM and is close to where the Siege of Marawi took place in 2016. It is reported that several criminal networks reportedly work out of this area due to the high transit options available.
- Region X has high female empowerment indicators and female school attendance is high. However, spousal violence against women is high for the country, as well as prevalence of husbands controlling their wife's income, which is indicative of societal gender inequality.

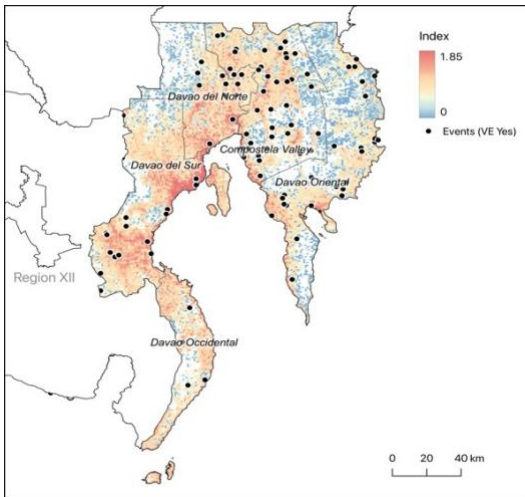
Geographically-Targeted Interventions

In Region X, high-priority interventions include implementing programming in areas where communist insurgencies have been displaced to improve rule of law, increasing awareness of VE group movements and strongholds to community leaders and law enforcement, and reducing gender inequality. Due to its proximity to BARMM, Region X has many Islamic groups that operate in or near the surrounding area. While the NPA is active in the rural areas of the region, most attacks occurred in more populated areas by MILF and BIFM. Many rural communities in Mindanao experience "rido," the retaliation of violence against another clans. National identity should be encouraged to help combat these perceived traditional divisions. Local governments in these areas should be given direct support to reinstate Filipino government control and increase rule of law. NGOs and other organizations should focus on promoting nationalism to encourage unity and pro-democracy movements. This time will be vital for rebuilding communities, and organizations should partner and assist with legal, health, and social government services to help build trust in local governments and reduce the traditional power structures of clans.

Efforts should be made to provide education for community leaders and social services and stronger resources for children from difficult home situations or children attempting to escape abusive parents or spouses, such as women and children's homes in the area. Without discouraging access to medical treatment and preventative care, health workers should be trained to screen, recognize, and offer resources to victims of TIP or abuse as part of their medical mission. Schools in the area should provide trainings on how to recognize abuse and how to safely use the internet and messaging systems. While many young females are getting a full education, this is not translating changes in patriarchal societal norms, as measured by early pregnancy, female inclusion, and autonomy in decision-making. Gender equality trainings should also take place and include young men, especially those age 5-10.

Region X is an important transit route in Mindanao as it connects the land routes of traffickers in the north (Surigao City, Butuan City) with those in the northwest (Dapitan City, Zamboanga City). The city has high domestic and smaller amounts of international transit through the airport and several ports. Local law enforcement should be educated on how to identify VE activity or persons and on the correct way to report suspicions to the military or correct authority.

Region XI (Davao Region)



VE Vulnerability Score

0.007 (lowest) **0.365** .405 (highest) Rank: 3 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	79	75	107	75	11	21	368

Socio-Economic Measures

Population: 4,893,318 (#8) Human Development Index: 0.558 (#12)
 Percent Urban: 59% (#3) Percent of women who feel a husband is justified in beating his wife: 13.3% (#6)
 Poverty Incidence: 25% (#8) TIP: 3.45 victims per 100,000 population (#4)
 Female Secondary School Completion: 14.3% (#14) Female Internet Usage: 63.6% (#9)
 Households with Electricity: 79% (#16) VE events since 2010: 368 (#3)
 GDP per Capita (thousands of USD): 81.9 (#4) Violence against women: 23.1% (#4)
 Percent Muslim: 3.4% (#5)

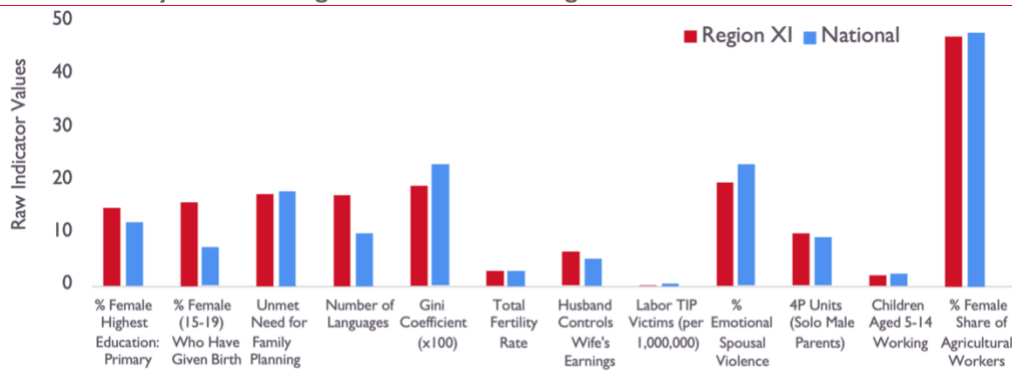
VE Event History

Region XI has experienced a high volume of VE acts (#3) in the past five years, carried out by a diverse array of Islamic extremist and political groups. However, in the last two years, VE events have been dominated by the NPA. Attacks peaked in 2017 and have decreased in the last two years. In 2016, there was a bombing at a night market that killed 14 people and caused 70 injuries. ASG originally took credit for the attack, but then denied the responsibility and claimed their ally, the Daulat-ul-Islamiya, was actually responsible. Most events have taken place in Compostela Valley and Davao del Norte.

VE Organizations

The main VE groups in the area are the New People's Army (NPA), Communist Party of the Philippines (CPP), Maute Group, ISIS, ASG, and small independent militias. In 2019 and 2020, nearly all terrorist events were perpetrated by the NPA.

VE Vulnerability Index for Region XI & National Average Value



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region XI is the southeastern portion of Mindanao and contains five provinces: Davao de Oro, Davao del Sur, Davao de Norte, Davao Oriental, and Davao Occidental. The regional capital is Davao City, which is the largest city on Mindanao and the third most-populous city in the country. Davao City also is home to large groups of Chinese and Japanese immigrants.
- The primary industry is agriculture, but the city is home also to growing agro-industrial businesses, trade, and tourism.
- Davao City has several national and international ports and the third-busiest international airport in the country.
- One-fourth of the population lives in poverty. Low measures of electricity, HDI, and female secondary school completion rates indicate limited access to services and limited economic mobility.
- Gender inequality is high. Spousal violence against women and women who justify violence against women are both high.
- The female labor participation rate is 35.1 percent and the male participation rate is 64.9 percent. Women work more in managerial positions and in the service industry.
- Women are twice as likely to be a college graduate than men. However, Region XI still has a high rate of births before the age of 19 and a high percentage of husbands that control their spouses' earnings, suggesting the society is still traditionally patriarchal.

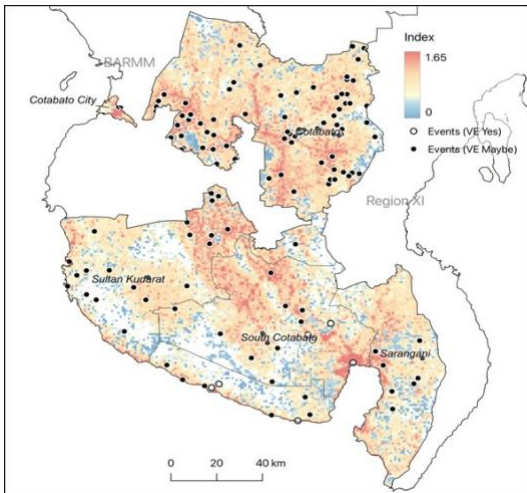
Geographically-Targeted Interventions

In Region XI, high priority interventions include improving rule of law, combating VE recruitment strategies using online propaganda and social media, and reducing gender inequality. Efforts should focus on rule of law and promoting nationalism to encourage unity. Local governments and community centers should hold programming within the community to foster inter-faith acceptance and reduce the traditional power structures of clans. Many rural communities in Mindanao experience "rido," which is the retaliation of violence against another clans. National identity should be encouraged to help combat these traditional divisions.

Many groups, including ISIS, ASG, and the NPA rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within the schools.

Region XI has a low female labor participation rate compared to males. However, the high overall employment rate suggests that if a woman was looking for a job, she would have a high chance of becoming employed. The gender gap in labor participation is therefore most likely the result of societal gender inequality. In Region XI, the gender wage gap is large between workers of the same occupation, even within female-dominated industries. Interventions should also include supporting female leadership, and entrepreneurial and employment training programs that include programs for career development. Programs for female empowerment, such as leadership and decision-making trainings, should be implemented within school curricula. Training programs should also include males, especially boys (age 5-10), so as not to create resentment and inadvertently exacerbate gender inequality.

Region XII (SOCCSKSARGEN)



VE Vulnerability Score

0.007 (lowest) **0.312** .405 (highest) Rank: 4 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	99	91	134	114	30	29	497

Socio-Economic Measures

Population: 4,545,276 (#10)	Human Development Index: 0.561 (#11)
Percent Urban: 47% (#5)	Percent of women who feel a husband is justified in beating his wife: 14.1% (#5)
Poverty Incidence: 29.6% (#5)	TIP: 1.65 victims per 100,000 population (#12)
Female Secondary School Attendance: 16.6% (#9)	Female Internet Usage: 54.3% (#16)
Households with Electricity: 85.4% (#13)	VE events since 2010: 497 (#2)
GDP per Capita (thousands of USD): 54.3 (#9)	Violence against women: 17.8% (#8)
Percent Muslim: 22.7% (#2)	

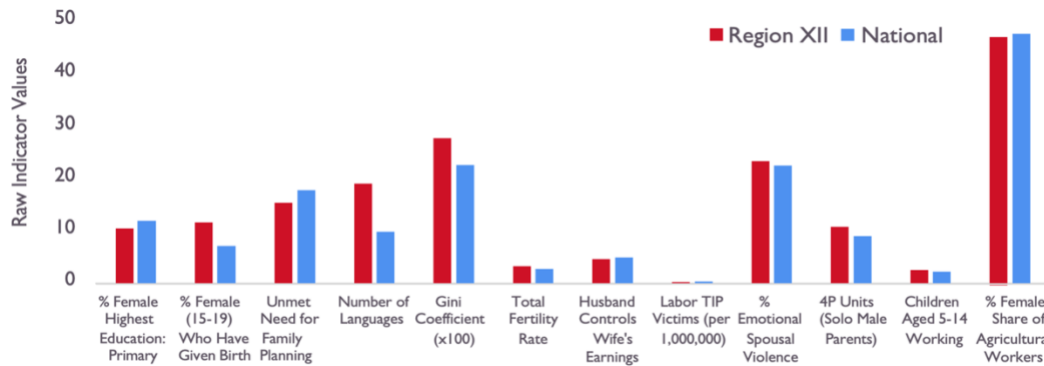
VE Organizations

The main VE groups in the area are the New People's Army (NPA), Maute Group, ISIS, ASG, BIFM, Al-Khobar, and Ansar Al-Khalifa. Most of these groups were very active in the mid-2010s and have since gone silent, except for the BIFM and NPA, which remain active in 2019 and 2020.

VE Event History

Region XII has experienced a high volume of VE acts (#2) in the past five years, carried out by a diverse array of Islamic extremist and political groups. The VE prevalence per 100,000 is 10.93 (#3). In the last two years, the only two groups with VE events were the NPA and BIFM. In April 2021, the SOCCSKSARGEN police arrested the fifth-most wanted man in central Mindanao, a leader of the BIFF who was responsible for at least two bombings in the area in 2018. In September 2021, two members of an ISIS-affiliated group were killed in South Cotabato. Most VE acts have taken place in Cotabato, most likely due to its proximity to BARMM.

VE Vulnerability Index for Region & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region XII is located in south-central Mindanao and contains four provinces: South Cotabato, Cotabato, Sultan Kudarat, and Sarangani. The regional capital is Koronadal, but the most-populous city and the commercial and industrial center is General Santos.
- The primary economic industries are agriculture and fishing, specifically tuna.
- General Santos is the shopping center for Region XII. General Santos International Airport is the second busiest in Mindanao.
- Nearly 30 percent of the population is living in poverty. Low measures of electricity, the HDI, and female secondary school completion indicate limited access to services and limited economic mobility. A higher-than-average amount of recipients of the 4Ps program suggest that these are areas with the poorest communities and lowest health standards.
- Gender inequality is high. Spousal violence against women and women who justify violence against women are both high.
- The female labor force participation rate is 44.5 percent and the male labor force participation rate is 78 percent. This suggests that females are still expected to conform to patriarchal norms.
- The Gini coefficient reveals high levels of income inequality, especially when comparing urban to rural areas and indigenous peoples to Filipinos.

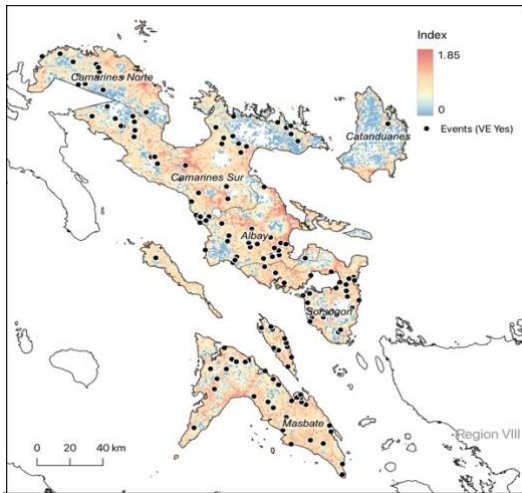
Geographically-Targeted Interventions

In Region XII, high priority interventions include improving rule of law, combating VE recruitment strategies using online propaganda and social media, promoting female labor force participation, and reducing gender inequality. Region XII has several indigenous communities and groups practicing Islam. Efforts should focus on increasing rule of law and promoting nationalism to encourage unity. Local governments, community centers, and universities should hold programming within the community to foster inter-faith acceptance and reduce the traditional power structures of clans. Many rural communities in Mindanao experience "rido," the retaliation of violence against another clan. National identity should be encouraged to help combat these perceived traditional divisions.

Many groups, including ISIS, BIFM and the NPA, rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. The NPA recruits heavily from schools and universities: in late 2020, NPA members in Region XII revealed that the NPA targeted student groups at universities and recruited from rural areas. The NPA also would take "taxes" from a rural village for "protection" through local companies and mining operations. Programming for anti-radicalization should be implemented within the schools. It should be mandatory for regional governments to assess local governments during the year and train local community leaders on effective programming and democratic ideals.

Region XII has a low female labor participation rate compared to males. The gender gap in labor participation is most likely the result of societal gender inequality. In Region XII, the gender wage gap is large between workers in the same occupation, even within female-dominated industries. Interventions should include supporting female leadership, and entrepreneurial and employment training programs that include career development programs. Programs for female empowerment, such as leadership and decision-making trainings, should be implemented within school curricula. Such training programs should also include males, especially boys (age 5-10), so as not to create resentment and inadvertently exacerbate gender inequality.

Region V (Bicol Region)



VE Vulnerability Score

0.007 (lowest) **0.326** .405 (highest) Rank: 5 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	87	54	71	59	18	35	325

Socio-Economic Measures

Population: 5,796,989 (#6)
 Percent Urban: 15% (#13)
 Poverty Incidence: 27.1% (#6)
 Female Secondary School Completion: 15.3% (#12)
 Households with Electricity: 87% (#11)
 GDP per Capita (thousands of USD): 32.36 (#16)
 Percent Muslim: 0.12% (#16)

Human Development Index: 0.579 (#9)
 Percent of women who feel a husband is justified in beating his wife: 9.5% (#12)
 TIP: 1.794 victims per 100,000 population (#11)
 Female Internet Usage: 62.5% (#10)
 VE events since 2010: 324 (#4)
 Violence against women: 29% (#1)

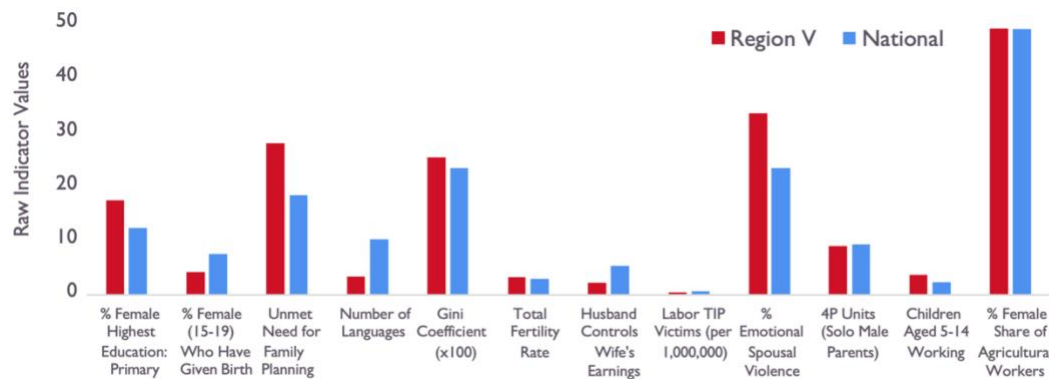
VE Organizations

The main VE groups in the area are the New People's Army (NPA), Communist Party of the Philippines (CPP), the National Democratic Front (NDF), and small, independent militias. In 2019 and 2020, all terrorist events were perpetrated by the NPA, and events took place throughout the entire region.

VE Event History

Region V has experienced a high volume of VE acts (#4) in the past five years, carried out by mainly political groups and small civilian groups. Attacks have decreased in the last two years, with attacks peaking in 2015 and 2017.

VE Vulnerability Index for Region V & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region V is at the southern end of Luzon and contains six provinces: Albay, Camarines Norte, Camarines Sur, Sorsogon, Catanduanes, and Masbate. The regional capital is Legazpi City.
- The primary economic industries are agriculture and commercial fishing, with a significant amount of mining as well. Tourism is a new and growing market in the area, with several large resorts being built and a new Bicol International Airport in Legazpi City under construction.
- Over one-fourth of the population is living in poverty. Low measures of electricity, HDI, and female secondary school completion indicate limited access to services and limited economic mobility.
- Gender inequality is high. Region V has the highest prevalence of spousal violence against women, although the percentage of women who justify violence against women is below average, which suggests that women are receiving more gender equality messaging than men in the region.
- Female empowerment measures are low in the region, with high percentages of women whose highest education is primary school and high unmet needs for family planning.

Geographically-Targeted Interventions

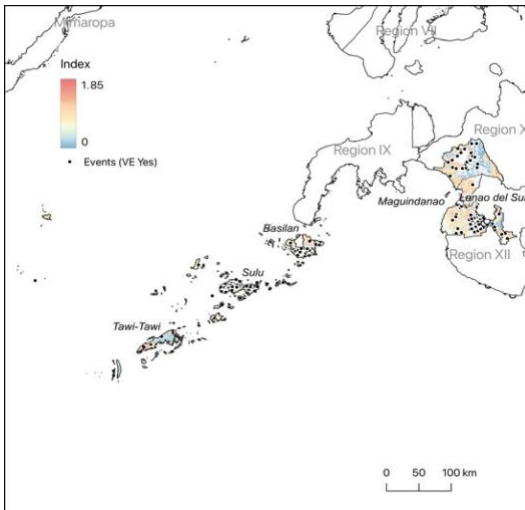
In Region V, high priority interventions include combating VE recruitment strategies using online propaganda and social media and continuing and expanding rural development projects to include reducing gender inequality programming.

The NPA rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within schools.

Region V has seen semi-successful armed responses to the NPA. In early 2021, several groups of NPA members began surrendering after several raids of their areas. These armed operations also included sustained community support programs. Many of these community support programs are aimed at rural areas with the goal of eradicating poverty. Gender equality trainings should be implemented in these areas as part of the community support programs, especially in rural areas. Schools in the area should provide trainings on how to recognize abuse and how to safely use the internet and messaging systems. Gender equality trainings should take place that include young men, especially those age 5-10.

Region V also has the highest rates of violence against women, and women in the region lack strong female empowerment indicators. In one example, a member of the NPA surrendered after being raped by a fellow member. Programming on non-violent communication and medical services for victims of sexual or gender-based assault should be implemented and provided to those surrendering and attempting to rehabilitate from the NPA.

Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)



VE Vulnerability Score

0.007 (lowest) **0.332** .405 (highest) Rank: 6 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	218	369	544	215	110	90	1546

Socio-Economic Measures

Population: 3,781,387 (#12)	Human Development Index: 0.434 (#17)
Percent Urban: 4% (#17)	Percent of women who feel a husband is justified in beating his wife: 33% (#1)
Poverty Incidence: 61.3% (#1)	TIP: 0.899 victims per 100,000 population (#16)
Female Secondary School Completion: 10% (#17)	Female Internet Usage: 23.2% (#17)
Households with Electricity: 82.3% (#15)	VE events since 2010: 1,546 (#1)
GDP per Capita (thousands of USD): 15.48 (#17)	Violence against women: 4.9% (#17)
Percent Muslim: 91.3% (#1)	

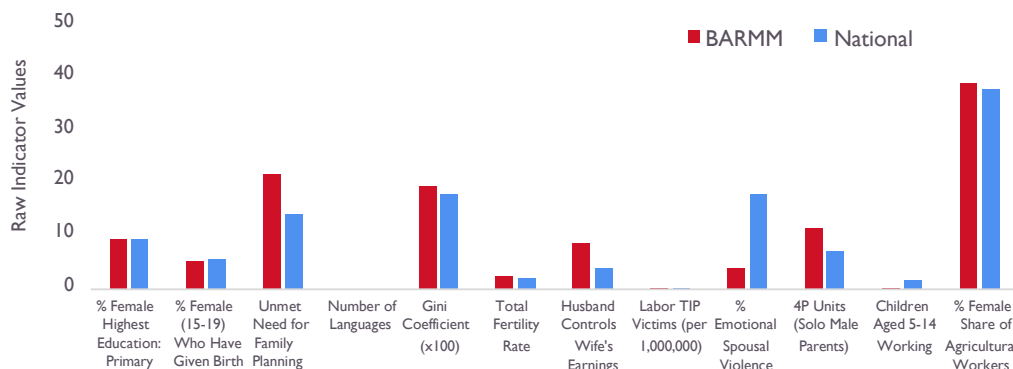
VE Organizations

The main VE groups in the area are the New People's Army (NPA), Communist Party of the Philippines (CPP), Abu Sayyaf Group (ASG), ISIS, Moro National Liberation Front (MNFL), Ansar Al-Khilafa, Bangsamoro Islamic Freedom Movement (BIFM/BIFF), al-Harakat al-Islamiyah, Maute group, Islamic State of Iraq and the Levant (ISIL), Jundul Khilafah, Kilafah Islamic Movement, and small militias.

VE Event History

BARMM has experienced the highest volume of VE acts (#1) in the past five years, carried out by mainly Islamic extremist groups and political separatist movements. Attacks have decreased in the last two years, with a peak of attacks happening in 2017. The siege of Marawi was a five-month long conflict that started in March 2017. The siege was perpetrated by ASG, ISIS, and Maute Group, who attempted to hold the city and claim territory in Lanao del Sur. The siege ended in October 2017 with the deaths of two leaders of the Islamic groups. The number of VE events have since decreased to their lowest level in the five years, but BARMM still remains an epicenter of VE events in the Philippines.

VE Vulnerability Index for Region & National Average Value



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- BARMM is in the southwestern part of Mindanao and the Sulu peninsula. BARMM was formally established in early 2019 as part of a peace agreement to end nearly five decades of conflict between Filipino government and Moro secessionists.
- BARMM contains five provinces: Basilan (excluding Isabela city), Lanao del Sur, Maguindanao, Sulu, and Tawi-Tawi. Cotabato City is the main component city.
- BARMM has the highest poverty rate (60 percent) and the smallest urban population, female secondary school attendance, GDP per capita, and HDI.
- Interestingly, BARMM has the highest percentage of women who feel a husband is justified in beating his wife, but the lowest percentage of women who were abused by their husbands. This may be due to the private nature of marriage and home life in the Muslim community.
- The main economic industry is agriculture. Cotabato City is expected to encourage finance and further business investment.
- BARMM is the process of implementing its new governmental system, which was delayed by the COVID-19 pandemic.
- While the MILF and BIFF have both vowed to put down their weapons, other Moro separatist and Islamic extremist groups continue to operate in the area and call for full autonomy.

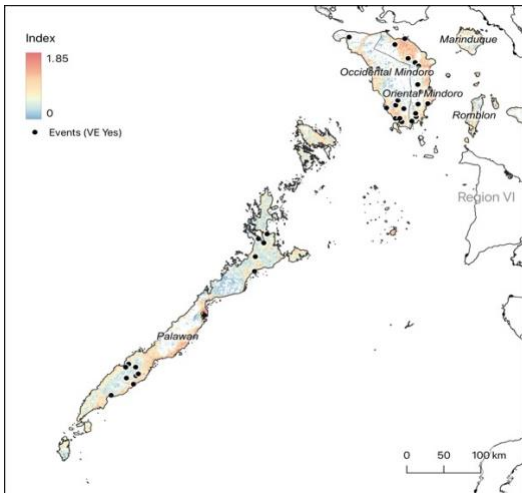
Geographically-Targeted Interventions

In BARMM, high-priority interventions include improving rule of law, combating VE recruitment strategies using online propaganda and social media, improving health and education infrastructure, and reducing gender inequality. Efforts should focus on increasing rule of law and promoting nationalism to encourage unity. Local governments and community centers should hold programming within the community to foster inter-faith acceptance and reduce the traditional power structures of clans. Many rural communities in Mindanao experience "rido," the retaliation of violence against another clan. National identity should be encouraged to help combat these perceived traditional divisions.

Many groups, including ISIS, ASG, and the NPA rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within schools.

BARMM is a unique region in the Philippines due to its history of Islamic separatists since the 1970s. Now that the autonomous region has been negotiated and is being implemented, it is important to provide programming and infrastructure for health and education services. Insurgents that surrender should be provided with additional assistance in rehabilitation and non-conflict communication. Many community support programs should include community education trainings on improved agricultural practices and basic education, such as financial trainings, especially for women. Gender equality trainings should be implemented in these areas as part of the community support programs. Schools in the area should provide trainings on how to recognize abuse and how to safely use the internet and messaging systems. Gender equality trainings should take place that include young men, especially those age 5-10.

Region IV-B (MIMAROPA)



VE Vulnerability Score

0.007 (lowest) **0.326** .405 (highest) Rank: 7 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	2	5	24	10	13	12	66

Socio-Economic Measures

Population: 2,963,360 (#15) Human Development Index: 0.601 (#6)
 Percent Urban: 22% (#12) Percent of women who feel a husband is justified in beating his wife: 14.2% (#4)
 Poverty Incidence: 18% (#10) TIP: 0.844 victims per 100,000 population (#17)
 Female Secondary School Completion: 15.4% (#11) Female Internet Usage: 57.8% (#14)
 Households with Electricity: 86.1% (#12) VE events since 2010: 66 (#16)
 GDP per Capita (thousands of USD): 48.39 (#12) Violence against women: 17.6% (#9)
 Percent Muslim: 3.4% (#6)

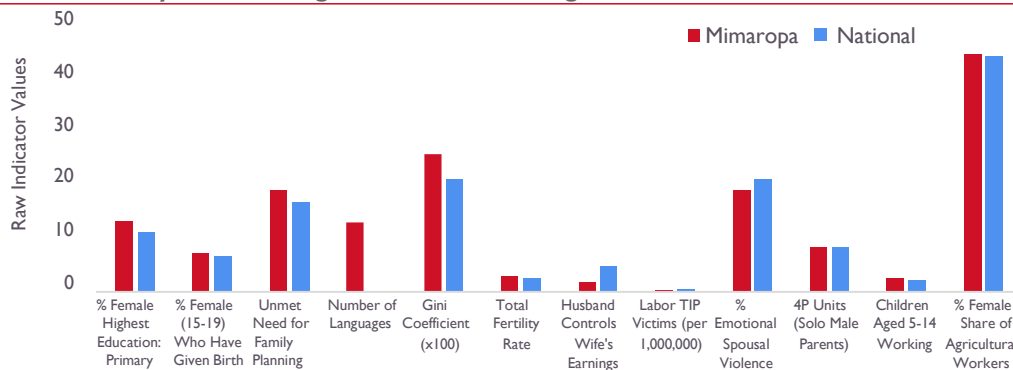
VE Organizations

The only VE group in the area is the New People's Army (NPA). In the last two years (2019-2020), they have perpetrated events throughout the region with a total of 24 deaths.

VE Event History

Region IV-B has experienced a low volume of VE acts (#16) in the past five years, carried out entirely by the NPA. Attacks have decreased in the last two years, but not to pre-2017 levels. The Filipino army stated they had made strong gains against the NPA insurgency in late 2019 when they had several successful captures of supplies and members; this is reflected in lower number of events in 2020.

VE Vulnerability Index for Region & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 of above).

Summary Description

- Region IV-B is the southeastern portion of Mindanao and contains five provinces: Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan. It has two main cities, Puerto Princesa and the regional capital of Calapan, but most government offices are on Luzon island (Quezon City).
- The primary economic industries are agriculture and fishing, followed by industry.
- One-fifth of the population lives in poverty. Low levels of electricity and female secondary school completion indicate limited access to services and limited economic mobility.
- Gender inequality is high. Spousal violence against women and women who justify violence against women are both high.
- Palawan is home to several indigenous people and is a unique environment due to its distance from the main islands. The area between Region VI-B and Luzon is considered the country's center of marine biodiversity and has created an ecotourism industry.

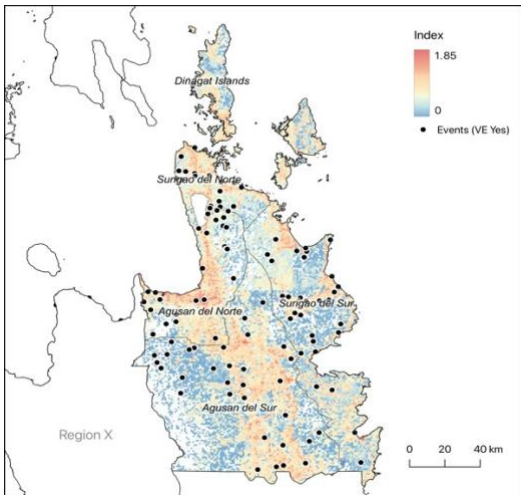
Geographically-Targeted Interventions

In Region IV-B, high-priority interventions include improving rule of law, combating VE recruitment strategies using online propaganda and social media, and reducing gender inequality. Region IV-B is home to many indigenous peoples and several languages, and because of its rural population, governmental presence has been limited in the area. This has allowed for NPA insurgents to remain in the region with little response from the Philippines government or law enforcement. In early 2021, the Filipino military and local law enforcement raided several NPA camps and caches in the area. Several Mangyan tribesmen who had rebelled surrendered and pledged loyalty to the government. Along with forceful efforts to break up the established patterns and resources of groups like the NPA, community programs should be immediately initiated to fill the power vacuum left behind. Efforts should focus on increasing rule of law and promoting nationalism to encourage unity. Local governments and community centers should hold programming within the community to foster inter-faith acceptance and reduce the traditional power structures of clans. Many rural communities in the region experience "rido," the retaliation of violence against another clan. National identity should be encouraged to help combat these perceived traditional divisions.

Community programs should focus on improving the agricultural output of the region through educational trainings and improved infrastructure, such as roads and irrigation systems. Programming on gender equality, healthy communication, and conflict resolution should be an important aspect of these community programs. Encouraging further education for all, especially young women, should be a priority in order to decrease the number of women that give birth before the age of 19. All efforts related to gender equality and female empowerment should actively include men. When men are engaged in fighting gender equality, societal changes can be more rapid.

The NPA rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within schools.

Region XIII (Caraga)



VE Vulnerability Score

0.007 (lowest) .405 (highest) Rank: 8 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	53	34	67	57	32	62	305

Socio-Economic Measures

Population: 2,596,709 (#16)
 Percent Urban: 28% (#10)
 Poverty Incidence: 31.3% (#4)
 Female Secondary School Completion: 17% (#7)
 Households with Electricity: 90.3% (#9)
 GDP per Capita (thousands of USD): 40.73 (#15)
 Percent Muslim: 0.48% (#8)

Human Development Index: 0.542 (#15)
 Percent of women who feel a husband is justified in beating his wife: 9.8% (#10)
 TIP: 8.819 victims per 100,000 population (#1)
 Female Internet Usage: 65.3% (#7)
 VE events since 2010: 305 (#5)
 Violence against women: 27.6% (#2)

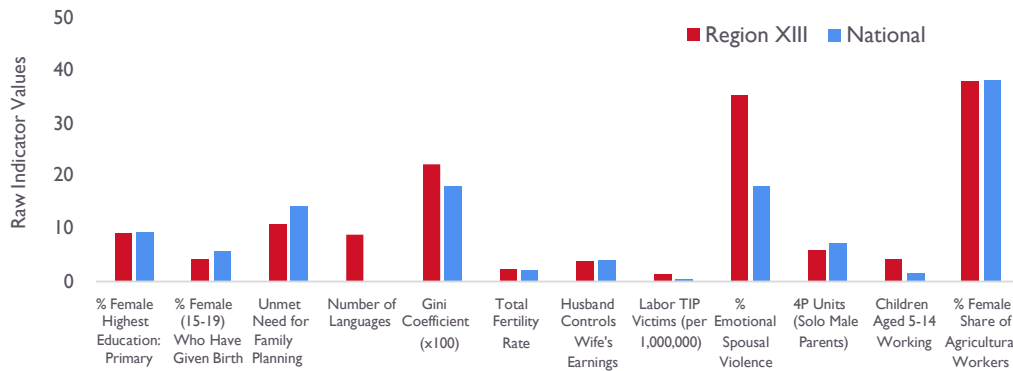
VE Organizations

The main VE groups in the area are the New People's Army (NPA) and Abu Sayyaf Group (ASG). Both were active in the last two years, with a total of 96 deaths. The most active group in the area is the NPA, who are said to control several large rural areas in the region.

VE Event History

Region XIII has experienced a low volume of VE acts (#5) in the past five years, carried out by Islamic extremist and political groups. Events in the area have remained high for the region. Most events take place on the outskirts of urban areas. In the summer of 2021, police in Caraga sent out a notice to residents in rural areas that the NPA had threatened to attack police in their homes. Drugs and weapons were seized at several NPA camps as part of police raids. Over 300 suspects were arrested during the raids and accused of a variety of crimes, including eight NPA militants and several armed suspects.

VE Vulnerability Index for Region & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region XIII is the northeastern portion of Mindanao and contains five provinces: Agusan del Norte, Agusan del Sur, Dinagat Islands, Surigao del Norte, and Surigao del Sur. Butuan is the most populous city and the administrative center.
- Butuan has many important roads linking it to other major cities in Mindanao, including Davao and Cagayan del Oro. It is home to the Bancasi Airport, the Nasipit International Port, and Masa Port, all three of which have seen increased traffic recently.
- Almost one-third of the population lives in poverty.
- Gender inequality is high. Spousal violence against women and women who justify violence against women are both high.
- The main economic activity of the region is agriculture and industry. The main crops are corn, coconut, banana, rubber, oil palm, and milkfish.
- The region has seen a drop in crime in the last two years but continues to have a high murder crime rate compared to the overall country.

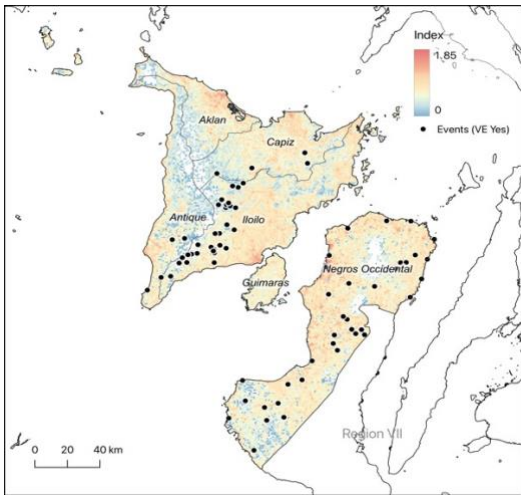
Geographically-Targeted Interventions

In Region XIII, high-priority interventions include improving rule of law, combating VE recruitment strategies using online propaganda and social media, increasing awareness of VE group strongholds by community leaders and law enforcement, and reducing gender inequality. Efforts should focus on increasing rule of law and promoting nationalism to encourage unity. Local governments, community centers, and universities should hold programming within the community to foster inter-faith acceptance and reduce the traditional power structures of clans. Many rural communities in Mindanao experience "rido," the retaliation of violence against another clan. National identity should be encouraged to help combat these perceived traditional divisions.

Many groups, including ISIS, ASG, and the NPA, rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within schools.

Region XIII has high measures of gender inequality. When law enforcement removes insurgents from certain areas, community programs should be established. Community programs should focus on improving the agricultural output of the region through educational trainings and improved infrastructure, such as roads and irrigation systems. Programming on gender equality, healthy communication, and conflict resolution should be an important aspect of these community programs. Programs for female empowerment, such as leadership and decision-making trainings, should be implemented within school curricula. These training programs should also include males, especially boys (age 5-10), so as not to create resentment and inadvertently exacerbate gender inequality.

Region VI (Western Visayas)



VE Vulnerability Score

0.007 (lowest) **0.243** .405 (highest) Rank: 9 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	27	20	50	60	42	34	233

Socio-Economic Measures

Population: 7,536,383 (#4)	Human Development Index: 0.598 (#7)
Percent Urban: 34.7% (#8)	Percent of women who feel a husband is justified in beating his wife: 19.4% (#3)
Poverty Incidence: 17.3% (#8)	TIP: 2.3 victims per 100,000 population (#9)
Female Secondary School Completion: 16.8% (#8)	Female Internet Usage: 61.2% (#12)
Households with Electricity: 93.4% (#7)	VE events since 2010: 233 (#7)
GDP per Capita (thousands of USD): 49.48 (#10)	Violence against women: 21.6% (#5)
Percent Muslim: 0.11% (#17)	

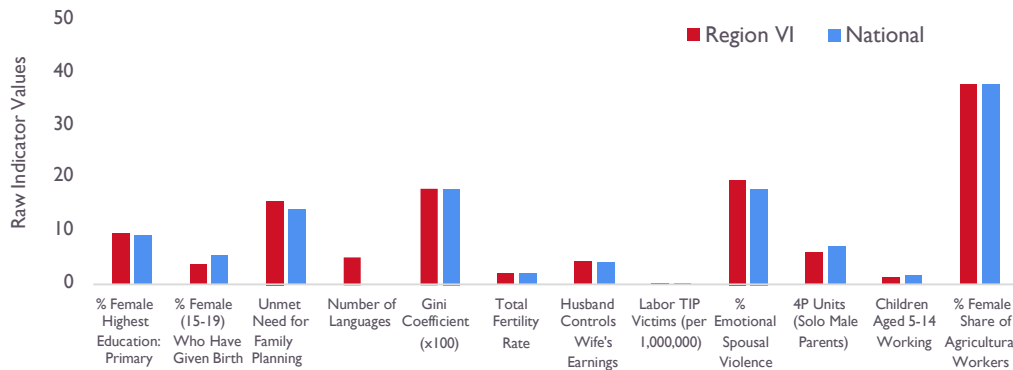
VE Organizations

The main VE groups in the area are the New People's Army (NPA), Communist Party of the Philippines (CPP), Alex Boncayao Brigade (ABB), Revolutionary Proletarian Army-Alex Boncayao Brigade (RPA-ABB). NPA and RPA-ABB were active in the last two years, with the NPA being by far the most active and most deadly group in the area.

VE Event History

Region VI has experienced a high volume of VE acts (#7) in the past five years, carried out by entirely by political communist groups. Attacks have decreased but remain relatively high for the time period. There was a spike in events in 2018, showing a slight disconnect from the large wave of VE that happened country-wide in 2016-17. In early 2020, CPP-NPA members ambushed local police using a small explosive device on a rural road near Janiway Town. NPA is reported to have camps in the southwestern mountains of Iloilo.

VE Vulnerability Index for Region & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region VI is a central region north of Mindanao that consists of six provinces: Aklan, Antique, Capiz, Guimaras, Iloilo, and Negros Occidental. There are two main highly urbanized cities in Region VI: Bacolod and Iloilo City.
- Aklan is famous for Boracay, a resort island that is known for its white sandy beaches and is a major tourist destination in the Philippines.
- Aklan, Iloilo, and Negros Occidental are provinces for seasonal labor migration and trafficking, especially in the sugarcane industry. Negros Occidental alone has 50 percent of the national sugarcane production.
- About one-fifth of women report having experienced spousal violence. About one-fifth of women also believe that a husband is justified in beating his wife. These indicators both suggest that societal gender inequality is high.
- Females have higher educational attainment than men in completing secondary school and holding academic degrees.
- Even though the female labor force participation rate is lower than that of males (49.7 percent to 73.1 percent), those that enter the labor force have a high employment rate (94.4 percent), suggesting that females don't enter the workforce due to societal constraints more than the lack of opportunities.

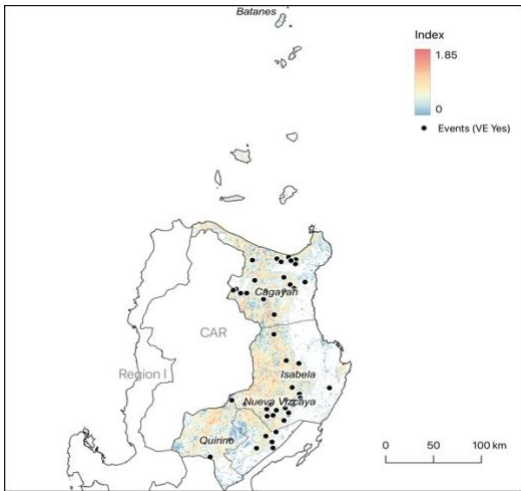
Geographically-Targeted Interventions

In Region VI, high priority interventions include combating VE recruitment strategies using online propaganda and social media, increasing employment opportunities for women, and reducing gender inequality. The main strategy for the NPA can be seen in Region VI: they target rural areas in the region, and it is clear from the map above that there is a large presence in the mountains of Iloilo. Usually, the NPA will take over small rural areas and coerce the citizens there to pay them money or "tax;" this kind of manipulation and intimidation should be combatted with a strong response of force. The NPA did not receive the counter-trafficking response that was triggered due to Marawi because of its usually small, rural targets. However, they pose a threat to the rule of law in the area and democracy when they use violence to advance their political agenda.

The NPA rely especially on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within schools.

Region VI has a low female labor participation rate compared to males. However, the high employment rate suggests that if a woman was looking for a job, they would have a high chance of becoming employed. The gender gap in labor participation is therefore most likely the result of societal gender inequality. In Region VI, the gender wage gap is large between workers in the same occupation, even within female-dominated industries. Interventions should include supporting female leadership, and entrepreneurial and employment training programs that include programs for career development. Programs for female empowerment, such as leadership and decision-making trainings, should be implemented within school curricula. These training programs should also include males, especially boys (age 5-10), so as not to create resentment and inadvertently exacerbate gender inequality.

Region II (Cagayan Valley)



VE Vulnerability Score

0.007 (lowest) **0.254** .405 (highest) Rank: 10 of 17

VE Events Timeline

Year	2015	2016	2017	2018	2019	2020	Total
# of VE Events	6	26	42	26	8	5	113

Socio-Economic Measures

Population: 3,451,410 (#14)
 Percent Urban: 12% (#15)
 Poverty Incidence: 15.6% (#13)
 Female Secondary School Completion: 17.1% (#6)
 Households with Electricity: 96.7% (#3)
 GDP per Capita (thousands of USD): 44.75 (#13)
 Percent Muslim: 0.19% (#14)

Human Development Index: 0.625 (#5)
 Percent of women who feel a husband is justified in beating his wife: 7.1% (#15)
 TIP: 4.32 victims per 100,000 population (#3)
 Female Internet Usage: 57.9% (#13)
 VE events since 2010: 113 (#12)
 Violence against women: 15% (#12)

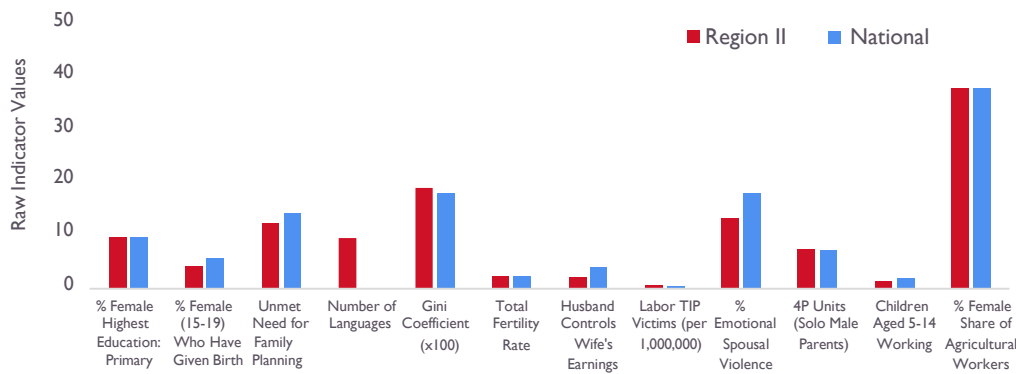
VE Organizations

The only VE group in the area is the New People's Army (NPA). In the last two years (2019-2020) they have perpetrated events only in Isabela and Cagayan, with a total of 13 deaths.

VE Event History

Region II has experienced a low volume of VE acts (#12) in the past five years, carried out entirely by the NPA. Attacks have decreased in the last two years and were the lowest they had ever been in 2020, compared to the 2015-2020 period. The Philippines army stated they had made strong gains against the NPA insurgency in late 2019 when they had several successful captures of supplies and members. This appears to be true, as the number of events in 2020 were very low.

VE Vulnerability Index for Region & National Average Values



Derived from over 2,000 indicators, the region vulnerability measure is composed of the subset of indicators and weightings that represent the optimal combination characteristic of the VE ecosystem. The red bars are the values for the particular region. The blue bars represent the national averages. The statistical interpretation of these indicator combinations, their correlations with other factors, and the phenomena for which they serve as proxy measures, provide insight and evidence for summaries below (see sections 2 and 3 above).

Summary Description

- Region II is located on the northern part of Luzon Island and is comprised of five provinces: Batanes, Cagayan, Isabela, Nueva Vizcaya, and Quirino. Region II is the second-largest region in terms of land area. The region contains a large mountain range and thick forests. There are several small cities in the region, with Santiago in Isabela and Tuguegarao in Cagayan being the largest and most developed.
- The province of Isabela and the city of Santiago are the most progressive and richest areas in the region. The province is considered one of the fastest growing in the country.
- Region II is mostly rural but has relatively high levels of health and education services. Strong transit infrastructure encourages movement and trade along internal roads.
- Region II has stable wealth measures, like a low poverty rate, high rates of both spouses earning incomes, and the majority of the population is middle-income, in the second and third wealth quintiles.
- Region II has relatively rates of high female empowerment, with high female secondary education rates, high rates of females earning the same as their husbands, and a higher-than-average female median age of marriage. Gender equality also appears to be relatively high in the region with low spousal violence and low rates of women who justify husbands beating their wives.

Geographically-Targeted Interventions

In Region II, high priority interventions include combating VE recruitment strategies using online propaganda and social media and continuing rural development projects to improve transportation and the agricultural economy. Within the region, there was a large police and military mission to root out the NPA, which has appeared to make a difference in the number of attacks in the region. Besides a response of force, the regional and provincial governments also implemented programs such as the Farm-to-Market Roads project, irrigation projects, and other agricultural development projects to increase rural development in the area. These programs should continue and expand beyond agriculture to include a gender equality aspect as well. Schools in the area should provide trainings on how to recognize abuse and how to safely use the internet and messaging systems. Gender equality trainings should take place that include young men, especially aged 5-10.

The NPA rely on the internet and social media for distributing propaganda and fundraising. The redirect method should be implemented, which consists of identifying people who are looking for VE content and redirecting them to curated YouTube videos that counter VE ideologies and themes. Another strategy is the use of programs that can recognize a VE picture on one website and then remove it from all locations on the internet. The Philippines should require internet service providers (ISPs) to install filtering software and to report suspicious IP addresses. Programming for anti-radicalization should be implemented within schools.

Another large recruiting pool for NPA is universities. Isabela University removed all books from their library that were connected to the NPA and CPP communist ideology and propaganda for the "protection of their students futures" and to attempt to limit the exposure to CPP and NPA recruiting on their campus. Universities should implement anti-radicalization programming and have staff monitor student clubs that may be at risk of recruitment.

ANNEX 2. TECHNICAL SUMMARY OF METHODOLOGY AND LIMITATIONS ON THE ANALYSIS

TECHNICAL SUMMARY OF METHODOLOGY

Novametrics' weak-signal analysis provides a means for predicting vulnerability and for identifying underlying causal relationships among multiple inter-related variables in a dynamic environment. It was originally developed through a series of research seminars at Princeton University and was supported with a USD 1.2M Small Business Innovation Research Award from the U.S. Secretary of Defense to predict conflict in Sub-Saharan Africa. The analysis received an award for "Innovative Use of Data for Increasing Resilience" from USAID.

Weak-Signal Analysis begins with data fusion through a suite of statistical and regression algorithms for normalization, standardization, and vectorization, which subdivides populations into small units for which distinct attributes can be measured. A raw persistent data-storage layer contains all the raw data in its original form. A virtualized data layer provides an abstraction layer between the physical data sets and the analysis layer. This is where the data are cleaned, standardized, normalized, and vectorized. New indicators are created from the original raw data and stored in logical groupings. Singular-value decomposition is used as an unsupervised self-learning algorithm to identify agnostically key attributes and their relative weightings. The attributes are tested via resampling methods to confirm consistency and sensitivity. The outputs are sets of indicators (weak-signals) that are proxy measures for the underlying causal relationships.

We began with large volumes of data from diverse, mostly open-source datasets from NGOs, media, the U.S. government, and the statistical authorities of local governments. These datasets included detailed national census data, health and educational survey data, remote-sensing data suitable for geospatial analysis, web-scraped data, and data from both formal and informal media sources. The Novametrics Philippines Database contains over half a million socioeconomic indicator values covering over 2,000 measures for 1,647 city municipalities over 20 years, using 345,550 1km² pixels. Using information from hundreds of millions of data values, we developed hundreds of thousands of human-social-cultural-behavioral attributes differentiated down to the municipality level.

We consider all data to be valuable. While datasets may be of varying quality and completeness, each has the potential to carry information that reflects a characteristic of a population, either by itself or, more commonly, through combination with other datasets.

High-resolution geospatial data (typically 1km² for population, but down to 10-meter resolution for imagery) and remote-sensing data are converted into tabular data by determining the number of pixels of each data type within each administrative boundary and multiplying the pixel count by the area of each 30" x 30" pixel (approximately 1km²), totaling 345,550 distinct area-patches for the Philippines. Depending on the data type, either we summed the values, e.g., to determine population, or we took a statistical measure of the values distribution, e.g., average travel distance to a road, market, or urban area. For each pixel, the population was derived from Oak Ridge National Laboratory's LandScan global population data and represents ambient population averaged over 24 hours.

We calculated indicators from raw survey data at the lower administrative levels. We aggregated and compared these indicators to reported values at higher administrative levels to confirm the accuracy of the aggregation. We then translated the responses into indicators based on the nature of the data. For example, we expressed a simple yes/no on whether a mother uses a mosquito net with a single indicator (“Percentage of Mothers Using a Mosquito Net”), whereas we expressed the religion of a household more completely with multiple indicators (“Percentage of Buddhist Households,” “Percentage of Christian Households,” etc.). Other survey questions, such as “How many hours per week did your child attend school?” are aggregated with averages for each administrative unit.

Additional indicators were calculated by Novametrics either by combining two raw indicators in the database, or calculating the raw data into more meaningful indicators. For example, we calculated the percentage of female teachers, a useful indicator of gender equality, from the reported number of female teachers and number of teachers.

Non-numerical data were reformatted into numerical values and processed statistically. For example, a typical Likert scale was used to survey attitudes with responses like “Strongly Agree,” “Agree,” “Neutral,” “Disagree,” and “Strongly Disagree,” with responses centered about zero. For some indicators where the data was a ranked-choice variable, the choices were converted to discrete numbers between -1 and 1, centered on zero.

Missing data were imputed using linear interpolation or a piecewise cubic polynomial that interpolates the given data if derivatives are specified at the interpolation points. If a region was missing so much data that imputation was unreasonable based on examining the distribution, and if there were significant events in the region that would make the data no longer representative, it was rejected from the analysis. Judgment was applied depending on the potential value of the indicator and the availability of alternative “proxy” indicators that might capture comparable phenomena within the socioeconomic ecosystem.

Administrative boundaries were sourced from the Philippines Statistics Authority. Names and boundaries were updated to the most current at the time of data analysis. Duplicate names that refer to different locations were differentiated by appending the name of the next administrative level up. In the USA, this strategy would distinguish two familiar cities named “Springfield” as “Illinois.Springfield” and “Virginia.Springfield.”

Novametrics conducted an extensive data mining mission to pull information about VE in the Philippines from a variety of sources. We developed two datasets which were then integrated into our VE database.

The first is a Conflict Event dataset derived from three main sources of information:

1. Armed Conflict Location & Event Data Project (ACLED)
2. Uppsala Conflict Data Project (UCDP) Global Event Database v20.1
3. Global Terrorism Database (GTD)

We cleaned and integrated the data from these events into a single event database. We then selected a time period of interest, 2010 to 2020, which enabled us to filter our event database and conduct time-series analysis.

Next, we developed a database of groups with their associated VE status: yes, maybe, or other. The VE status classification is based on official terrorist group lists from the State Department and classifications as an actor in a terrorism database like the GTD. This list was sent to USAID PHL on October 7, 2020 to confirm organizational designations. We integrated feedback from USAID PHL before proceeding with our analysis. We then classified the conflict event data by the VE status of the organization who perpetrated the event.

As part of our database development, we used a standard event type classification to classify all events. The event type classification is derived from the ACLED database (Raleigh et al., 2010). ACLED categorizes events by type, including a main event type and a sub-event type. Therefore, in addition to general VE indicators such as number of events per region and number of deaths per region, we have created several VE metrics based on event type and VE status of the perpetrating group:

- Violent Events (with VE Status of Yes and Maybe)
- Demonstrations (with VE Status of Yes and Maybe)
- Strategic Developments (with VE Status of Yes and Maybe)
- VE Both
- VE Yes
- VE Maybe

VE Both consists of all VE sub-types, riots, and all strategic developments for actors with a VE Status of both “Yes” and “Maybe.” *VE Yes* consists of all VE sub-types, riots, and all strategic developments for actors with a VE Status of only “Yes.” *VE Maybe* consists of all VE sub-types, riots, and all strategic developments for actors with a VE Status of only “Maybe.”

The resulting VE database was then used to generate metrics such as VE-related events or VE-related deaths per 100,000 population. These metrics were subsequently used in calibrating our weak-signal analysis.

Bibliography for VE event databases:

- Raleigh, Clionadh, Andrew Linke, Håvard Hegre and Joakim Karlsen. (2010). “Introducing ACLED-Armed Conflict Location and Event Data.” *Journal of Peace Research* 47(5) 651-660.
- Pettersson, Therese & Magnus Öberg (2020) Organized violence, 1989-2019. *Journal of Peace Research* 57(4).
- National Consortium for the Study of Terrorism and Responses to Terrorism (START), University of Maryland. (2019). The Global Terrorism™ Database.

Bibliography for VE status determination:

- Carson, J. V., & Suppenbach, M. (2017). The Global Jihadist Movement: The Most Lethal Ideology?: *Homicide Studies*. <https://doi.org/10.1177/1088767917733783>
- National Consortium for the Study of Terrorism and Responses to Terrorism (START), University of Maryland. (2019). The Global Terrorism™ Database.
- Pettersson, Therese & Magnus Öberg (2020) Organized violence, 1989-2019. *Journal of Peace Research* 57(4).

- United States Department of State. (n.d.). *Foreign Terrorist Organizations—United States Department of State*. Retrieved April 28, 2021, from <https://www.state.gov/foreign-terrorist-organizations/>

Data Preprocessing: Weak Signal Analysis requires preprocessing the data for each indicator used in the analysis. If the indicator distribution resembled a Gaussian distribution, we typically subtracted the mean and normalized by the standard deviation. If the indicator distribution was Log-normal or Chi-squared, we used the logarithm or square-root, respectively. If the data distribution showed clustering asymptotically near an upper limit (e.g., percentages that concentrate near 100 percent), we subtracted the indicator values from this limit and computed the logarithm or square-root of the differences. We term this transform a “reverse-log” or a “reverse-sqrt.” Given limit value X_L and indicator data X_i , we compute scaled values X'_i as:

$$\text{Reverse-Log: } X'_i = -\log_{10}(X_L - X_i + e)$$

$$\text{Reverse-Sqrt: } X'_i = -\sqrt{X_L - X_i + e}$$

Where e is a small adjustable parameter to avoid singularities at $X_i - X_L = 0$, and the minus sign preserves the ordering of indicator values from smallest to largest. In each case, the rescaling preserved the size-ordering of data values, so that relative comparisons were maintained, and the data distribution met the requirement for the statistical analysis.

If data sets had outliers, we winsorized the data to reduce the influence of outsized data values in statistical correlations and regressions. We typically set the outlier values to three standard deviations from the mean, so that they exert strong, but not extreme, influence on statistical computations in the analysis. In some cases, where some data remained skewed in linear, \log_{10} and square-root scaling, with a substantial group (>3 percent) of indicators beyond 3-sigma, the Z-threshold for winsorizing was set to four to preserve the extreme values. Exceptions were applied to indicators whose values clustered in the neighborhood of an upper bound (e.g., literacy rates, which tend to cluster near 100 percent, but have tails of values downward toward zero percent). In such cases, a reverse-log and a reverse square-root transformation were applied.

Development of the Vulnerability Index: Once the data were cleaned, the indicators were run through a Pearson Correlation Matrix by category for quality assurance and to identify redundant indicators that were highly correlated and did not exhibit sufficient statistical independence to contribute information to the full data set. Singular-value decomposition and varimax rotations were subsequently used as unsupervised self-learning algorithms to identify key attributes and their relative weightings. Thus, the algorithm pares down a large dataset into a smaller one comprised of the most defining and statistically important components. Running the analysis within specific subregions of the nation enables the identification of combinations of characteristics predictive of VE while eliminating the combinations of characteristics that are neither conducive nor preventative. Attributes and attribute-combinations that are prominent in both areas of known high- and low-level VE are thus deemed as inconclusive to VE vulnerability. The attributes are then tested via resampling methods, in which the algorithm is run on different subsections of regions, to confirm consistency and sensitivity. As we want to explain as much of the variance in the data as possible, but also avoid having an overly complicated measure, various threshold values for indicator weightings are used to identify the optimal subset of indicators. The

weighted values of the selected indicators are then used as input to the composite measure to generate vulnerability measures for each region.

Development of the Projected Prevalence: The goal of this step is to rescale the prevalence rates to reflect their distributions more accurately. The vulnerability score is obtained from the indicator matrix, within which many of the indicators have been scaled logarithmically to decrease small values. When we transform from the indicator matrix into prevalence estimates, we reapply the scaling. In particular, prevalence estimates are typically lognormal in the indicator matrix because they range by many orders of magnitude. Therefore, exponentiating the vulnerability index enables a proper scaling for our inferring region by region prevalence estimates.

LIMITATIONS ON THE ANALYSIS

Whenever possible, we have attempted to describe the uncertainties associated with Weak-Signal Analysis in the presentation of our analytical results in the main report. When presenting the vulnerability index, we have also presented an evaluation of the “null hypotheses” that geographical fluctuations of indicator values, and their projections onto our vulnerability index, have occurred by random. We use 95 percent confidence for non-randomness as our threshold for statistical significance, though often the data relationships greatly exceed this threshold.

Although our statistical arguments can be presented in probabilistic terms with associated confidence levels, there are many additional uncertainties due to the nature of our analysis and what we are trying to evaluate. The major limitations are associated with the nature of VE itself.

Although our analysis can compute estimates of vulnerability down to a 1 km² area, such precision is an untrustworthy artifact of the mathematics. Vulnerabilities are probabilistic in nature, expressing likelihoods of VE activity within a location. If the ecosystem is conducive to VE, but no activity has been reported, the activity may be unreported or else the VE may not have yet occurred.

An analogy with earthquake hazards is useful. Maps of predicted earthquake motion are used to develop building codes, establish insurance rates, allocate resources, and guide development. Even in an area of high probability, no earthquake may occur for several years. Alternatively, a single earthquake can cause damage that exceeds the probabilistic values for multiple years. Despite the lack of precision, earthquake hazard maps have been extremely effective in dramatically reducing the impact of earthquakes by informing policymakers, insurers, architects, planners, and responders on where to prioritize strategies to reduce vulnerability. The VE vulnerability index should be used in the same manner, focusing policymaker attention on building resilience in the most vulnerable locations, while maintaining baseline programs in areas with lower vulnerability.

Below are limitations associated with the analytical results. They are listed in a hierarchy based on our assessment of their impact.

I) Ambiguity in what we are trying to measure

Analysis of VE is clouded by differing designations and definitions. There is overlap between VE and other forms of crime and political violence, such as insurgency, hate crime, and organized crime (START,

2017). Affiliations are often fluid and strengthen or weaken over time. Links between the groups span a continuum.

In general, VE refers to advocating, engaging in, preparing, or otherwise supporting ideologically motivated violence to further social, economic, political, or religious objectives (USAID, April, 2020). Insurgency, on the other hand, is the organized use of subversion and violence to seize, nullify, or challenge political control of a region. VE and insurgency can overlap (USAID, 2011). Even when cases are considered VE, there are “degrees.” In some cases, perpetrators have pledged their allegiance to ISIS formally, so that the attacks can be considered ISIS-core. In other cases, the perpetrators are ISIS-affiliated, have some level of coordination or approval by ISIS, or are ISIS-inspired and occur with no direct communication (Carson and Suppenbach, 2017).

2) Use of data analysis in social science

Social science and international development research have been evolving from site visits and case studies to more data-based analysis. Identifying relationships in complex, dynamic systems requires statistical models. The results of the statistical models are expressed in probabilistic terms, for which there is debate over required levels of certainty. In our analysis, we quantify probability as the likelihood that a particular result might have occurred by random chance. We reject the “null hypotheses,” the probability that the result occurred by chance, when the confidence level exceeds 95 percent. In other words, the probability of the result occurring by chance is less than one in twenty.

Quantifying probability in this manner requires assumptions about the statistical distributions of data sets. To the greatest extent possible, our analysis pre-processes raw data into data indicators whose statistical distributions are approximately Gaussian. We reference our uncertainties to Gaussian statistical models, using tools such as chi-squared and F variance-ratio distributions, singular-value decompositions, and bootstrap resampling techniques, depending on the application.

A common criticism of data analysis is that “correlation does not imply causation.” For example, deworming children may correlate with increased school attendance. Does this prove that deworming children was the cause of increased school attendance? It is extremely difficult to prove causal relationships in complex systems.

While a statistical relationship may not be proof of a causal relationship, it is evidence for a causal relationship. Without a statistical correlation, there cannot be causation. In fact, one powerful feature of correlation estimates is that they can be used to disprove causal assumptions that seem reasonable but are not supported by the data. Lack of correlation argues that a causal relationship between social indicators is unlikely. More importantly, however, statistical relationships that are opposite to that expected, e.g., a positive correlation when looking for a negative one, can lead to a re-assessment of prior assumptions.

We do not assume in our analysis that correlation implies causation – also known as the fallacy “cum hoc ergo propter hoc” (“with this, therefore because of this”). As an example, we do not assume that a correlation between conflict frequency and male/female literacy rates implies that conflict is caused by a disparity in literacy rates between genders. We assume the indicators we can measure are proxies for sociocultural phenomena that we are unable to measure directly or perhaps even understand. In the

example above, lower female literacy rate relative to male literacy rates may indicate gender inequality, religious tenets, shortages of resources (requiring the girls to spend their time collecting water, firewood, etc.), or economic change requiring girls to access markets for alternative income producing activities. Even when we categorize these events as measures of a population's vulnerability, we both recognize and account for the fact that the indicators we are using may not be unique or even directly related to the categories in which they have been assigned. As an example, consider two population characteristics "A" and "B" that correlate with significant statistical confidence. There are at least five options:

Option 1: The correlation is the result of random coincidence and does not reveal any causal relationships between A and B.

Option 2: A is "causing" B, with the independent variable A causing the change in the dependent variable B.

Option 3: B is "causing" A, with the independent variable B causing the change in the dependent variable A.

Option 4: A and B are both dependent variables, following an independent population characteristic C that has not been measured.

Option 5: A and B are part of a larger correlated system with no unique causal factor, that is, no independent variable.

Option 5 is characteristic of "coupled systems," in which "causality" resides in the linkages between variables. In a fully coupled "holistic" system, no variable is truly independent. Such systems are common in natural ecosystems, and we assume they are also common in socioeconomic ecosystems. For example, in atmosphere-ocean interactions that lead to the El Niño and La Niña climate events, there are no dependent versus independent variables. Atmospheric pressure highs and lows induce winds that push surface seawater, and warm and cool patches of the sea surface induce variations in atmospheric pressure. Neither the atmosphere nor the ocean operates independently of the other. Neither can be taken as the independent variable in a causal relationship. Yet the relationship is unambiguous and allows us to predict both the atmospheric and oceanic effects with high degrees of certainty.

An ecosystem approach to complex, dynamic, and multi-variable problems such as human trafficking, child marriage, and VE treats them as coupled systems that lack true independent variables, but nevertheless offer situations where we can predict outcomes and intervene to effect change. The big-data ecosystem approach finds inter-relationships among many variables, not only two. With many variables and many distinct populations, there may be multiple independent correlation patterns. The different patterns indicate the problem has multiple causes, and the causes vary for different places. In an ecosystem approach, the correlations among population attributes are treated as a coupled system that can be influenced at several points, rather than as a cause-effect process that can be modified only through its dependent variable. The advantage of an ecosystems approach is that it allows us to achieve our objectives by identifying the characteristics to be modified, therefore allowing us to identify options for the interventions that will provide the greatest return on investment.

3) Extrapolations

In any given dataset, the number of data values are generally small, and extrapolations from small numbers have significant uncertainty.

4) Reporting accuracy

Reports are not necessarily accurate and VE events are not always independently verified.

5) Human-based data collection

Survey data are compiled by human analysts who may not faithfully follow the design of the database or record responses accurately.

6) Definitions

International definitions are not consistent with national definitions and the local customs and laws of a particular country. Opposition parties may be labeled as terrorists for political benefit.

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