

# Trends of Armed Conflict in Kenya from 1997 to 2021: An Exploratory Data Analysis

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**Abstract:** Armed conflict patterns have drastically changed since the post-cold war period. In Sub-Saharan Africa, armed conflict continues to be persistent and on the rise. Kenya has not experienced civil war, but has experienced intra-state conflicts which display themselves as political, natural resources, ethnicity, land, and environmental conflicts. This study aimed to identify patterns and trends of armed conflict in Kenya. Secondary data from Armed Conflict and Location Events Data (ACLED) for the period 15<sup>th</sup> January 1997 to 25<sup>th</sup> February 2021 was used. Exploratory data analysis and generalized additive model were used to identify patterns and trends. For the period studied, 7,437-armed conflict events and 11,071 fatalities were recorded. There was a non-linear trend and a general increase in the number of armed conflict cases in Kenya. The peaks in the non-linear trend were observed during the years 2002, 2007, 2013 and 2017. On the contrary, the number of fatalities from armed conflict decreased over time and had a non-linear trend, with peaks in the years 1998, 2001, 2007, 2013 and, 2017. Similarly, there was a reduction in the number of fatalities per armed conflict over time with 149 fatalities per 100-armed conflict events recorded in the study period. Linear and non-linear trend of armed conflict events was observed at the county levels, with counties like Nairobi and Nakuru having a non-linear trend similar to the overall trend. The number of events of armed conflict for riots and protests event type had a non-linear trend while the rest had a linear trend with a positive slope. Violence Against Civilians (VAC) event type had the highest number of events followed by Riots and Protests. Additionally, VAC had the highest number of fatalities followed by Battles and Riots. In terms of fatalities per armed conflict, Explosions/Remote violence event type had the highest fatality rate followed by Battles and VAC. The peaks in the number of armed conflict cases and fatalities were observed in the years in which general elections were conducted in Kenya.

**Keywords:** Armed Conflict, Violence Against Civilians, GAM

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## 1. Introduction

Armed conflict in developing countries continues to be persistent, despite the fact that there is a lack of financial and material capacity [1]. Poverty and conflict have for long been interlinked with armed conflict. Most developing countries experience a number of armed conflicts that lead to weakened governance and, economic performance. This eventually results in an increased risk of relapse of conflict within or between most of the developing countries [2]. In some instances, countries find themselves locked in the cycle of poverty and under-development courtesy of armed conflicts. In Africa, the increasing trend seems to be getting worrisome with only eight conflicts witnessed in the

continent in 2005 increasing to 25 out of 54 globally in 2019 [3]. In these conflicts, economic inequalities between individuals have also been ruled out as possible risk factors of internal armed conflict. Instead, case and statistical studies have shown that horizontal inequalities due to systematic inequalities that coincide with religious, ethnic, or geographical cleavages do increase the risk of armed conflict between identity groups [4].

Most of these armed conflicts have recently been minimal, with respect to the fatalities relative to the size of the population. However, there is potential for long-lasting and devastating effects [3]. Despite these conflicts being seen to contribute marginally to the fatalities' trend, many of them have the potential of erupting into full wars if unresolved,

which results into casualties of more than 1000 per year [33]. Often, an armed conflict has been defined as a combination of three elements: (i) armed force, (ii) organized actor, and (iii) social harm [5]. Smith [6], on the other hand defines armed conflicts as open, armed clashes between two or more centrally organized parties, with continuity between the clashes, in disputes about power over government and territory. The United Nations (UN) definition of armed conflict is also based on three key characteristics namely; political conflict, involving armed force and at least 1000 people being killed directly by the fighting during the course of the conflict and there are at least 25 combat deaths annually [7]. In this study, we adopt the definition of armed conflict as defined by the Armed Conflict Location & Event Data (ACLED) Project. That is, *"the use of force by a group with a political purpose or motivation"* [8, 9]. It therefore involves events such as protests within and across states. There are however some events that do not involve use of force such as peaceful protests and strategic developments.

In sub-Saharan Africa, armed conflicts are widespread and considered to be slowing down national progress [2]. Conflict patterns today are fundamentally different from patterns in past eras. For instance, a study on the trends of armed conflict post-cold war period (1946 to 2018) indicates that the number of armed conflicts in 2018 was much higher than in 2017 and much higher than ten years ago [3]. In as much as the conflict cases are on the increase, the number of fatalities observed in these conflicts is below average. Recent years (since 2009) reveal another significant increase in non-state actor conflict, with the number of ongoing low-intensity non-state actor conflicts more than doubling since 2010 [3]. This increase, represents a diffusion of non-state actor conflict and an increase in the number of specific instances of non-state actor conflict in certain countries, including Kenya.

While Kenya has not experienced large-scale rebellion or civil war since independence, it has experienced a high number of more localized ethnic conflicts which at times have resulted in high death tolls [10, 11]. State response to some of the observed armed conflicts in Kenya has notably been violent resulting in multiple deaths. Subsequent riot and protest events involved localised grievances over development, police conduct, and payment [4]. Nevertheless, armed conflict in Kenya could also be driven by political tension that is associated with the general elections, with concerns over institutional impartiality. Globally, armed conflict has been associated with many causes which include, but not limited to poor economic conditions, inequalities among social groups, repressive political systems especially in periods of transition, degradation of renewable resources, and ethnic diversity [12]. Induced mass movements of populations have also contributed to the spread of conflicts, as witnessed in Central and West Africa. In Kenya, political developments during colonial rule, and following independence have meant that ethnic identity is often activated and mobilized over resources and political power [13, 14]. Often, most clashes/conflicts in Kenya display themselves as economic, political, and environmental as well

as natural resources conflicts, land and ethnic conflicts, and recently terrorism [15].

Trends and patterns of armed conflict over the years has proved to be essential in informing peace-building efforts and understanding the activities involved in armed conflict research. With this in mind, and noting that Kenya is one of the major contributors to peacekeeping troops in Africa it would be of utmost importance to explore the trends and patterns of armed conflict within Kenya over time. This would give an indication on whether there exists a pattern in the armed conflict cases and possibly identify the major activities that are involved in armed conflict. This study therefore explored the general trend of armed conflict and fatalities in Kenya from 1997 to 2021. Further, trends of armed conflict for different event types and administrative boundaries were examined.

## 2. Data Source

This study utilized data obtained from the ACLED database [16]. ACLED is a comprehensive public collection of events designed for analysis of disaggregated conflict [17]. It mainly aims to collect data on forms, agents, and locations of both political violence and protests as they occur. Moreover, data emanates from a variety of sources including news, reports, humanitarian and government agencies, security alerts and published research amongst others [18]. Information coded in ACLED include dates, actors, geolocations, fatalities and types of all reported events such as political or protests across the major parts of the world [17]. Generally, the ACLED project captures a range of violent and non-violent actions by political agents including governments, rebel groups, militias, communal groups, political parties, rioters, protesters and civilians. Preliminary analysis has been carried out on the dataset, and made available for use by the public [19]. The data is updated on a weekly basis at the start of every week through to Friday. Access to the data is only through a data export tool that requires an authorization/access code. The period of coverage may vary depending on the country and region [17]. With the cleaning, reviews and checks carried out on the event data, ACLED is seen to be unique and also compatible with other datasets [16].

## 3. Methodology

### 3.1. Data

ACLED data for Kenya for the period 15<sup>th</sup> January 1997 to 25<sup>th</sup> February 2021 was considered. The selection of period to be studied was determined by the availability of data, with no data available for events earlier than 15<sup>th</sup> January 1997. The data contained information on event type, location and date among other characteristics. ACLED data recorded events as the unit of observation. An event was defined as one which satisfies the following conditions; 1) had an actor (that is state forces or non-state forces) 2) it occurred at a specific location

which is identified by geographical coordinates and, 3) occurred on a specific day [17]. Data cleaning included removing duplicate events that had all the variables the same

except the event actors. Table 1, summarizes the classification of events in the ACLED data.

**Table 1.** Classification of ACLED events by type.

All events		
Violent Events	Demonstrations	Non-violent events
1. <i>Battles</i> Armed Clash Non-State Actor overtakes territory	4. <i>Protests</i> Protest with intervention Peaceful protest Excessive Force against Protests	6. <i>Strategic Development</i> Agreement Arrests Change to group/activity
2. <i>Explosions/Remote Violence</i> Suicide bombs Air/drone attack Land mine Improvised explosive devices Grenade	5. <i>Riots</i> Violent demonstrations Mob violence	
3. <i>Violence Against Civilians</i> Sexual violence Abduction Forced Disappearance Attack		

Based on ACLED classification, battles were events that had a violent interaction between two or more politically organized armed groups at a particular location and time. Explosions/Remote Violence were events classified as the one which had one sided violence with the tool for engagement-explosive devices - being one sided with the target group having no ability to respond. This targeted either civilians or armed agents. Violence against civilians was categorized as an event in which violent events by organized armed groups deliberately inflicted on unarmed non-combatants. Civilians were classified as unarmed and cannot engage in political violence. Such violence was perpetrated by actors such as state forces or their affiliates, rebels, militias and other forces. Attempts at inflicting harms such as rape, torture, mutilation, beating, shooting and forcibly disappearing on civilian actors by armed organized actors was classified too as violence against civilians. Protests on the other hand were events which were public demonstrations in which there was no engagement. Moreover, riots were violent events in which the demonstrators engaged in disruption such as property destruction or throwing rocks targeting a group of people, individuals, businesses or armed actors. Finally, strategic developments were classified as events in which contextually important information on violent groups may have had an influence in triggering future events or even had a contribution in political dynamics.

### 3.2. Exploratory Data Analysis

Exploratory data analysis involved visualizing the main characteristics of events and fatalities in the data. Line graphs were primarily used to show the change in events and fatalities over time. Armed conflict cases and fatalities were analyzed year-wise and visualized using line graphs to show changes in the number of armed conflicts year after year. Armed conflict events were used as a stratifying factor in analyzing armed conflict fatalities and events, which were also visualized year-wise. To have a standard reporting of armed conflict fatalities per armed conflict event, an arbitrary value of fatalities per 100-armed conflict events was used. This enabled comparison

of fatalities per armed conflict events year-wise and also across different armed conflict event types.

### 3.3. Generalized Additive Model (GAM)

GAM is a semi-parametric regression technique that is not necessarily restricted by the linear relationships, and flexible with respect to the statistical distribution of the data [20]. This model is composed of a sum of smooth functions of covariates which can take on a number of forms. A general form of generalized additive model [21] can be expressed as:

$$gE(Y)=\beta_0 + f_1(x_1) + f_2(x_2) + \dots + f_p(x_p) \quad (1)$$

where  $E(Y)$  is the expected value of response variable  $Y$ . The term "generalized" means the response distribution does not have to be normal, only that the observations are drawn from a member of the exponential family of distributions; that is,  $Y \sim EF(\mu, \phi)$  with mean  $\mu$  and scale parameter  $\phi$ . The operator  $g$  is a smooth monotonic link function, mapping the mean of the distribution function to the scale of the linear predictor.  $\beta_0$  is the model intercept.  $f_1, f_2, \dots, f_p$  are smooth functions of the covariates  $x_1, x_2, \dots, x_p$ . The linear predictor incorporates smooth functions of some or all covariates, represented as  $f(X)$ , and this allows for nonlinear relationships between the covariates and the response variable  $Y$ . The immediate advantage of the GAM is that there is not restriction to the shapes of trends. The shape of the fitted trend is estimated from the data itself.

For univariate smoothing, a model containing one function of one covariate given by equation (2)

$$y_i = f(x_i) + \epsilon_i \quad (2)$$

where  $y_i$  is the response variable,  $x_i$  is a covariate,  $f$  is a smoothing function and  $\epsilon_i \sim N(0, \sigma^2)$ .

The smooth functions represent a flexible non-linear representation of covariates on response by choosing an appropriate basis, which defines the space of functions of which  $f$  is an element. This smooth function is composed by the sum of basis functions and their corresponding coefficients  $\beta$ . That is

$$f(x) = \sum_{j=1}^k b_j(x)\beta_j \quad (3)$$

where  $k$  is the basis dimension of the smooth function,  $b_j(x)$  is the  $j^{th}$  such basis function, then  $f$  is the assumed representation, for some values of the unknown parameters,  $\beta_j$ .

In this study the number of conflicts is allowed to depend on time. The number of armed conflict events is assumed to follow a Poisson distribution as shown in equation (4).

$$Y_t \sim \text{Poisson}(\mu_t) \quad (4)$$

$Y_t$  denotes the number of armed conflicts at time  $t$  and  $\mu_t$  is the expected value of the number of armed conflict. For the general trend of number of armed conflict cases and fatalities we fit the model as in equation (5)

$$\log(\mu_t) = \alpha + f(\text{time}) \quad (5)$$

Where  $\alpha$  is the intercept and  $f(\text{time})$  is a smooth function of time in terms of months. The months were calculated arbitrarily by subtracting the study start date from the recorded date of armed conflict occurrence to obtain days, this value was then divided by thirty (the number of days in a month). Moreover, the type of event and administrative counties were incorporated separately as variables associated with the number of armed conflicts over time. This way, trends of armed conflict for distinct event types and different counties were established, using equation (6).

$$\log(\mu_t) = \alpha + f(\text{time}) + \beta(x) \quad (6)$$

The model was implemented in R software version 4.0.5 [22] using the *mgcv* package [23]. An optimal smoothing parameter was chosen by calculating generalized cross-validation (GCV) score at each iteration. The smaller the GCV score the better the model fit.

## 4. Results

### 4.1. Exploratory Data Analysis

This study analyzed armed conflict events in Kenya occurring from the period 15<sup>th</sup> January 1997 to 25<sup>th</sup> February 2021. During this period, 7,437 armed conflict events were recorded with 11,071 fatalities. Overall, a fatality rate of 149 deaths per 100 events was recorded in the study period.

#### Armed Conflict Cases Year Wise

Generally, there was an increase in the number of armed conflict cases recorded from the year 1997 to the last year 2021. As shown in Table 4, years that recorded the highest number of armed conflict cases were 2017 ( $n=943$ , 12.68%), 2013 ( $n=661$ , 8.89%), 2018 ( $n=535$ , 7.19%), 2014 ( $n=465$ , 6.25) and 2008 ( $n=452$ , 6.07%). In Figure 1, there were four peaks of armed conflict cases observed which were in the year 2002, 2007 & 2008, 2013, and 2017. The peaks were determined as a sudden increase in the number of armed conflict cases in comparison to the proceeding and preceding years.

Figure 1 also shows that while the number of armed conflict cases increased over the period, the number of fatalities per conflict event reduced. From 1997 to 2015, the number of armed conflict events recorded was less than the number of fatalities recorded in the respective years. Consequently, from 2016 to 2018 the number of armed conflict events interchanged and was noted to be higher than the number of fatalities recorded in the respective year. Notably, years that recorded the highest number of fatalities were 2008 ( $n=1,156$ , 10.44%), 2007 ( $n=963$ , 8.70%), 2013 ( $n=771$ , 6.96%), 2017, and 2001 (745,  $n=6.73\%$ ). Six (6) peaks were observed for fatalities from armed conflicts in the year 1998, 2001, 2005, 2007 & 2008, 2013, and 2017.

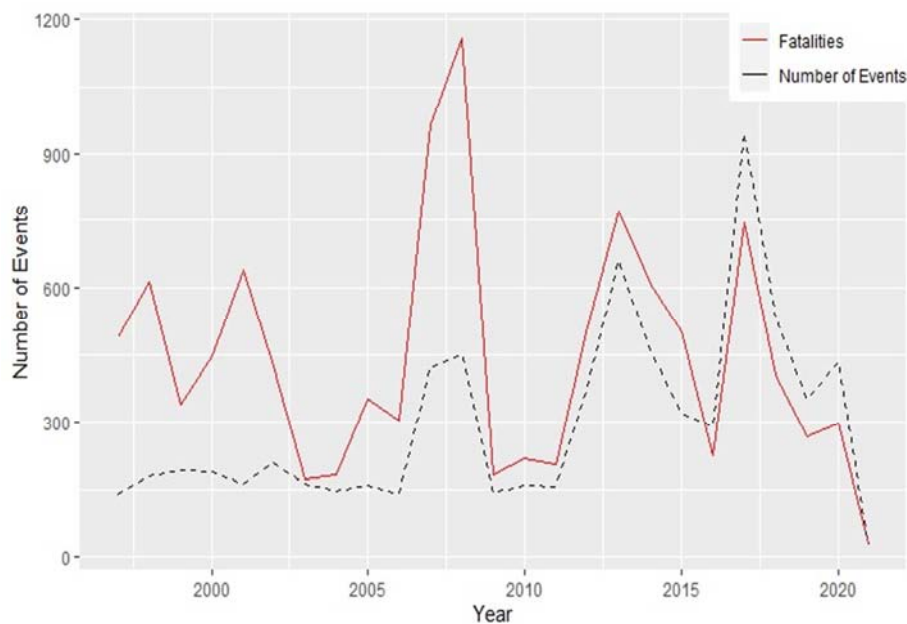
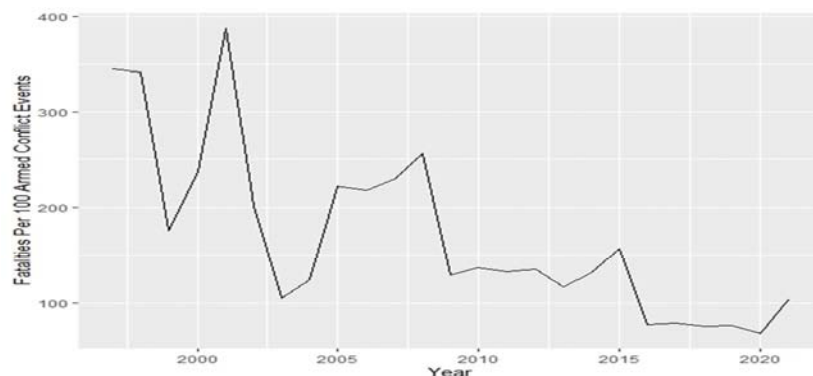


Figure 1. Total Number of Cases and Fatalities Recorded Year Wise.

During the study period, there was a reduction in the number of fatalities per armed conflict event. It was observed that the number of fatalities were above 100 per 100 conflict events. The highest fatalities per 100 armed conflict events

were observed in the years, 2001, 1997 and 1998. In addition, it was observed that from 2016, the number of fatalities per 100 armed conflicts was less than 100, as shown in Figure 2.



**Figure 2.** Fatalities per 100 Armed Conflict Events Year- Wise.

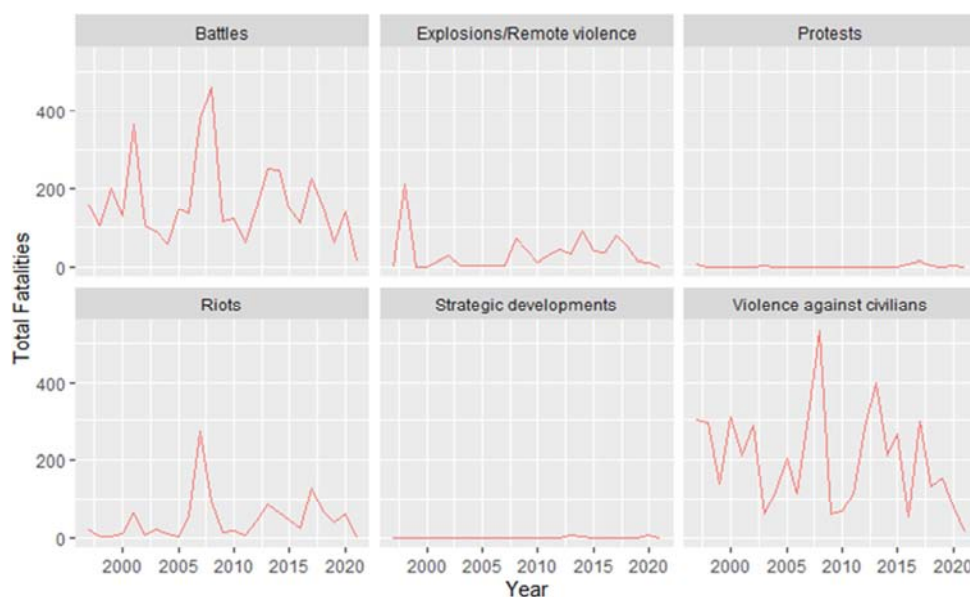
#### Armed Conflict and Fatalities by Event Type

Table 2 displays a breakdown of the armed conflict cases by event type. From the table, it was observed that four out of six event types contributed to slightly above 93.74% of the total armed conflict cases reported in Kenya. The events include; violence against civilians (VAC) (n=1924, 25.88%), riots (1885, 25.35%), protest (1722, 23.15%) and battles (n=1440, 19.36%).

VAC event type had the highest number of fatalities (n=5,001, 45.17%) accounting for nearly half of all fatalities, followed by battles (n=4,129, 37.30%) and riots (n=1,137, 10.27%). These three event types combined accounted for 92.74%. Strategic Developments (n=10, 0.09%), Protests (n=42, 0.38) and Explosions/Remote Violence (n=752, 6.79%) had the lowest number of fatalities. However, despite Explosions/Remote Violence accounting for only 6.79% of

the total number of fatalities, it had the highest fatality rate of 311 deaths per 100 events recorded in the study period. This was followed closely by battles with a fatality rate of 287 per 100 events and VAC with a fatality rate of 260 per 100 events recorded.

Figure 3 shows the distribution of Armed Conflict events by event type year-wise. Except for Explosions/Remote Violence and Strategic Development, all the events show a similar peak pattern. Battles and VAC event types almost follow a similar pattern in distribution throughout the years with several small peaks. Explosions/Remote Violence and Protests had two main peaks each in 2014 and 2017. Riots had two main peaks and an inflection point, the first peak is seen roughly in 2007/2008, and an increasing inflection point in 2013, and the second peak in 2017. For strategic developments, two peaks were observed in 2012 and 2017.



**Figure 3.** A Line Graph of Armed Conflict Events Type Year-Wise.



**Table 2.** Armed Conflict event and fatalities by event type.

Conflict Event Type	Total Number of Events (%)	Total fatalities (%)	Fatalities Per 100-Armed Conflict Events
Battles	1440 (19.36)	4,129 (37.30)	287
Explosions/Remote Violence	242 (3.25)	752 (6.79)	311
Protests	1,722 (23.15)	42 (0.38)	2
Riots	1,885 (25.35)	1,137 (10.27)	60
Strategic Developments	224 (3.01)	10 (0.09)	4
Violence Against Civilians	1,924 (25.88)	5,001 (45.17)	260
Total	7,437 (100)	11,071 (100)	149

#### Fatalities by Event Type and Year Wise

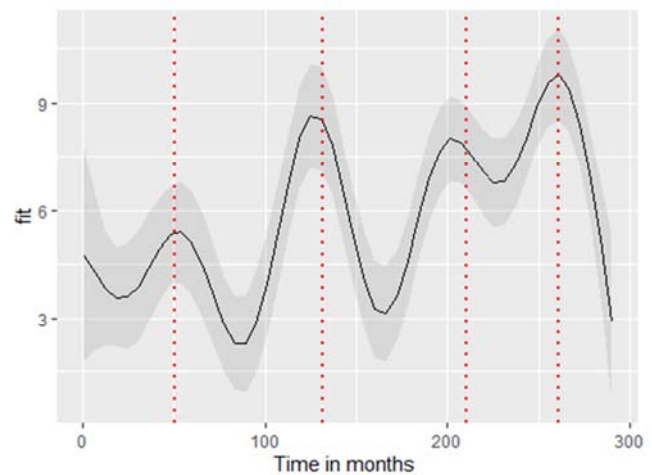
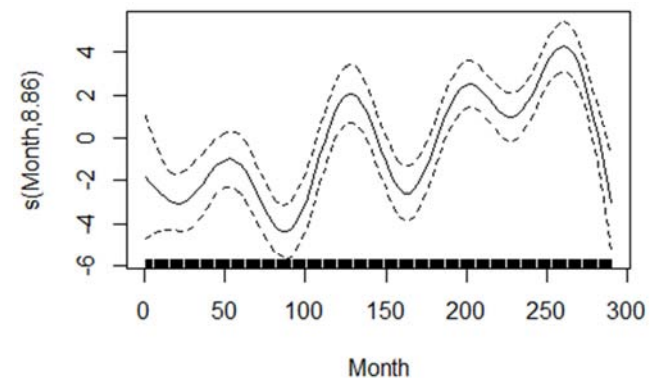
Over the study period, the overall fatality rate was 149 deaths per 100 armed conflict events recorded. Battles fatality rate was 287 deaths per 100 armed conflict events with the highest fatality rate observed in the year 2008 (454 deaths per 100 events), 2006 (412 deaths per 100 events), and 2001 (387 deaths per 100 events). Explosions/Remote Violence fatality rate was overall 311 deaths per 100 events recorded with the highest fatality rates recorded in 1998 (10,650 deaths per 100 events), 2008 (3,550 deaths per 100 events), and 2002 (700 deaths per 100 events). Protest had the lowest overall fatality rate at 2 deaths per 100 events recorded. However, for individual years, the highest fatality rate was recorded in 1997 (67 deaths per 100 events recorded), 2003 (8 deaths per 100 events recorded), and 2016 (7 deaths per 100 events recorded). This generally shows a reducing trend in terms of fatalities from protests.

Riots on the other hand had 60 deaths per 100 events recorded with the highest fatality rate observed in the year 2001 (427 deaths per 100 events recorded), 2007 (246 deaths per events recorded), and 2006 (239 deaths per 100 events recorded). With VAC being the third highest fatality rate over the study period at 260 deaths per 100 events recorded, the majority of the fatalities were recorded in 2015 (682 deaths per 100 events), 1997 (612 deaths per 100 events), and 1998 (516 deaths per 100).

#### 4.2. Generalized Additive Model (GAM)

Since the results from the exploratory analysis indicate a non-linear trend in the number of armed conflict events, and fatalities over time, a GAM model was fitted to help in relating the response variable to the predictor variable. In the GAM model, number of fatalities and the number of armed conflict events were related to time in months. Further, the type of event was incorporated as a factor associated with the number of these conflicts over time. In addition, the administrative counties were considered to be a factor in the number of conflicts observed over time.

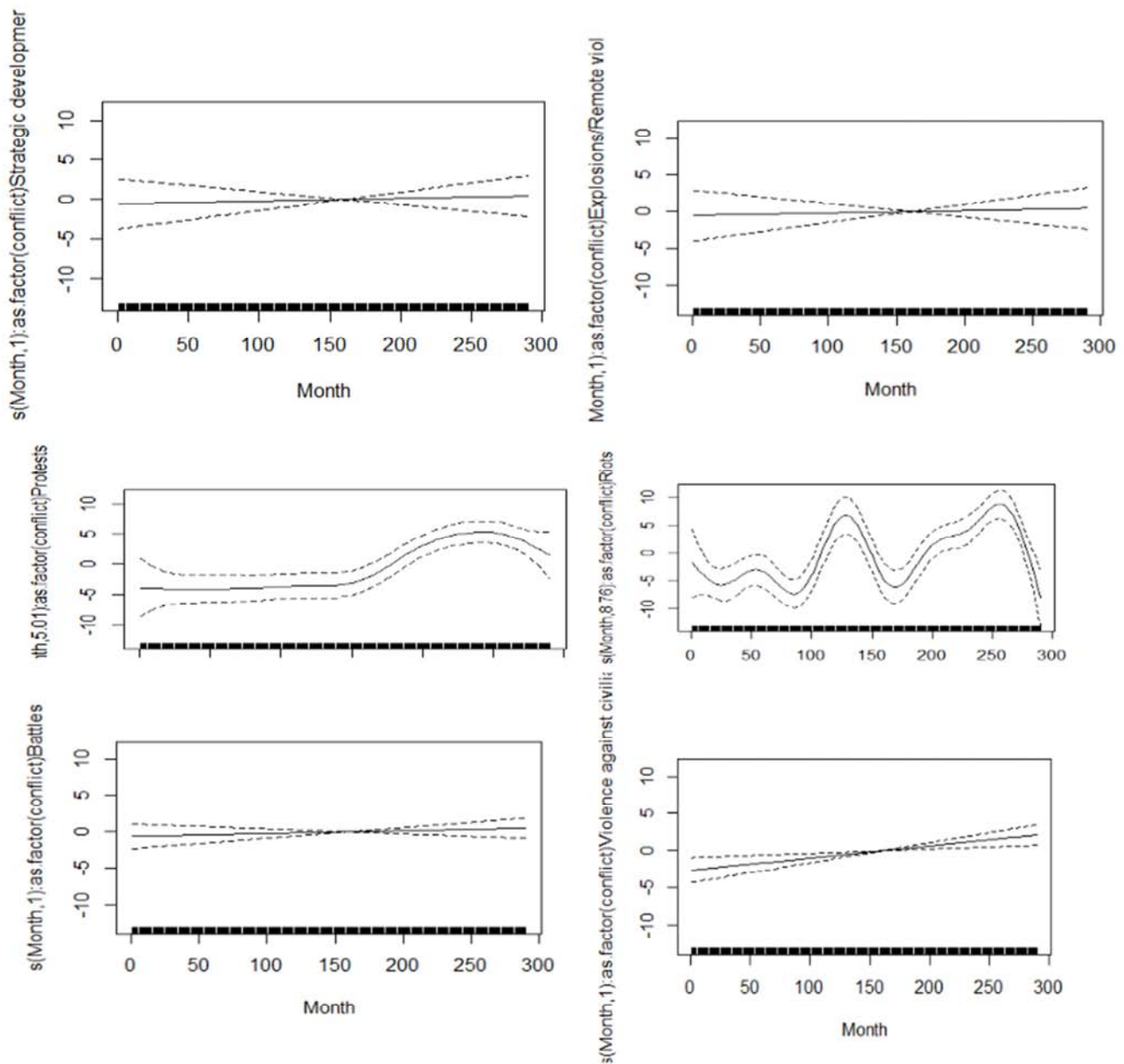
Figure 4 shows the resulting smooth curve for the number of conflicts over time with vertical lines indicating the time with highest number of events. In terms of the conflicts over time, the curve indicates that there has been a rise in the number of conflict events over time. Peaks were observed at some time points, particularly corresponding to the years, 2001, 2008, 2013 and 2017.

**Figure 4.** Fitted GAM model for the number of conflicts over time in months.**Figure 5.** Smooth fit for conflict after incorporating type of conflict in the model.

Incorporating the different types of conflict event types, the smooth curves obtained are in Figure 5. The observed pattern does not change from what was observed in Figure 4. The Effective Degrees of Freedom (EDF), which is an indicator of the smoothing parameter, remains the same as when the type of conflict was not incorporated. The value of the EDF 8.98, clearly indicates a nonlinear relationship as can be seen by the inflection points.

However, the trend for each event type shown in Figure 6, indicates that observed trends differ by the type of event. The armed conflict events from riots are highly nonlinear followed by protests. Moreover, some of the event types exhibit linear trends (EDF=1). These include battles, strategic development, explosions and remote violence. The observed linear trends for these events had a positive slope, an

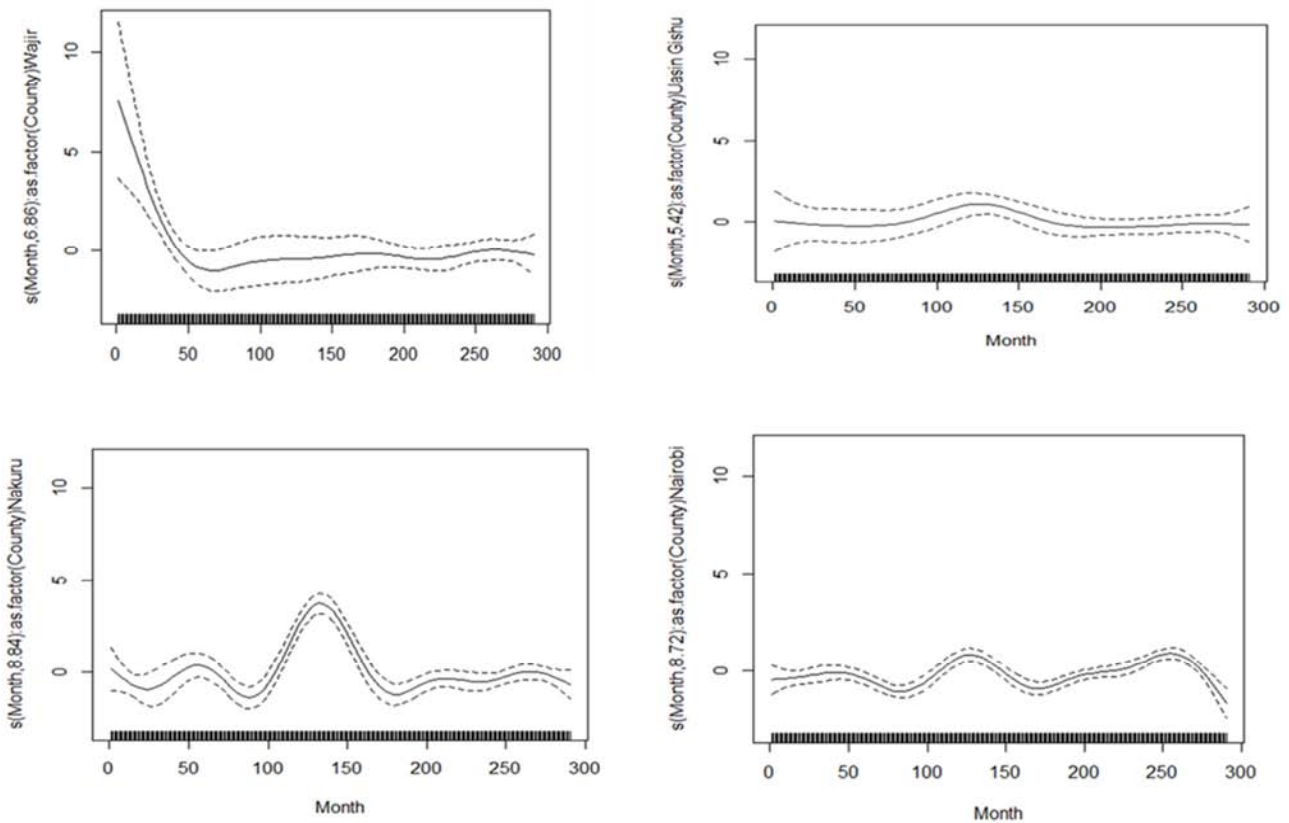
indication of rise in the number of armed conflict over time.



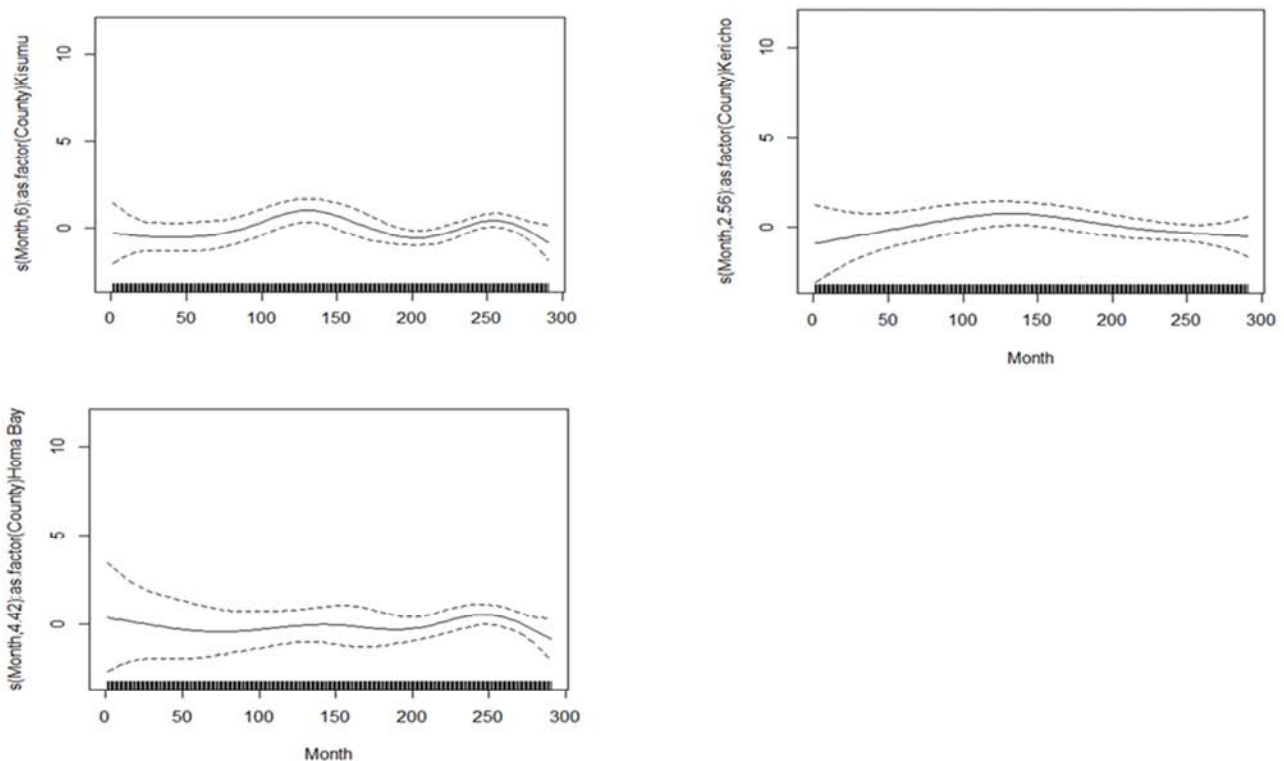
**Figure 6.** Smooth fit armed conflict over time after incorporating type of conflict.

Figure 7 and Figure 8 illustrates the smooth fits by different administrative counties for seven selected countries, namely, Wajir, Uasin Gishu, Nakuru, Nairobi, Kisumu, Kericho and Homa-Bay. From the figures, it was observed that trend in number of armed conflicts over time, differed

across the counties. While many of the counties exhibited highly nonlinear patterns ( $EDF > 2$ ), Kericho had a weakly non-linear relationship with an  $EDF = 2.56$ . Nairobi and Nakuru Counties had a pattern closer to the overall trend with an  $EDF$  of 8.7 and 8.84 respectively.



**Figure 7.** Smooth fit of conflict per County (Wajir, Uasin Gishu, Nakuru and Nairobi).



**Figure 8.** Smooth fit of conflict per County (Kisumu, Kericho and Homa-Bay).

### Fatalities

Figure 9 shows the result of the model for number of fatalities over time in months. The trend indicates a decrease

in the number of fatalities over time with peaks observed at particular time points. Contrary to the observation of six peaks shown in Figure 1, only two major peaks are observed



from the fitted GAM. These two peaks correspond to the years, 2008 and 2013.

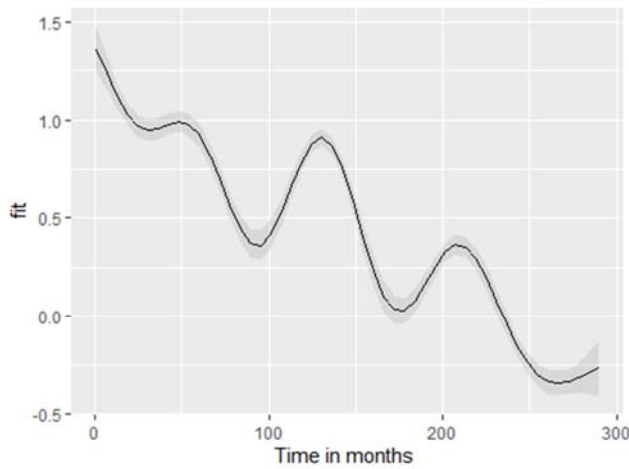


Figure 9. Smooth fit for the number of fatalities over time.

## 5. Discussion

This study sought to analyse armed conflict records sourced from ACLED dataset [16] for Kenya for the period 15<sup>th</sup> January 1997 to 25<sup>th</sup> February 2021. From the results, the number of armed conflict cases increased from the year 1997 onwards, with several peaks. This was also observed in the GAM with a non-linear pattern of armed conflict events that increased over time. This increase in the number of armed conflict events can be attributed to the following possibilities.

First, the number of armed conflict cases have generally increased over time in the study period. Secondly, the advancement of technology has enabled extensive and ease of capturing data that may have resulted in more cases of armed conflict cases being recorded, while the actual number of armed conflict cases had remained the same or decreased. Finally, the interaction of advancement in technology and increase in the number of armed conflict cases may also have contributed to the increase of armed conflict events.

Four out of the six event types contributed 93.74% of the total number of armed conflict events. These event types included VAC, protest, riots and battles. Over time, VAC and Protest continuously increased in comparison to other event types. VAC accounted for nearly half of the fatalities recorded despite accounting for quarter of the total events recorded. The years 2017, 2013 and 2018 recorded the highest number of armed conflict events. There were four peaks of armed conflict cases, in the years 2002, 2007 & 2008, 2013 and 2017. With an exception of 2008, all these years had general elections. From 2002, the number of events in each peak continuously increased. The size of the peaks continuously increased from the 2002.

The observed number of fatalities reduced over time both in the EDA and GAM. The years 2008, 2007 and 2013, had the highest number of fatalities, with battles and VAC being the major event type contributors in all the years. Based on

the events recorded, the 2007 and 2008 fatalities were attributed to the 2007 general elections [24], while 2013 fatalities were majorly attributed to Al-shabaab terror attacks [27].

There were six peaks of fatalities witnessed in the years 2001, 1998, 2005, 2007 & 2008, 2013, and 2017. The fatalities' peaks are attributed to Explosions/Remote Violence, for instance the 1998 Peak; ethnic militia fighting, riots and violence against civilians [28]. Noteworthy, three out of the six peaks of fatalities were observed in years which general elections were held and one peak in the year 2005 where a referendum poll was conducted.

There was a general reduction in the number of fatalities per armed conflict. This is in line with the key findings of the report on prospects for violence in Africa to 2023 [29]. The reduction in fatalities per armed conflict can be attributed to the following possibilities: Firstly, the number of recorded armed conflict was higher than the number of fatalities recorded. Previously, the lack of advancement in technology to record armed conflict events, may have resulted in only armed conflict events that were severe or fatal being recorded, but as technology advanced less severe and non-fatal armed conflict events were also recorded as seen in the recent past [29]. Secondly, the actual number of the fatalities from armed conflict events, have reduced resulting in reduction of fatalities per armed conflict. Thirdly, an interaction between the number of fatalities reducing and the number of armed conflict events increasing.

Table 3. Armed Conflict Cases Year Wise.

Year	Total fatalities	Total Events	Fatalities Per Events
1997	489	149	3.44
1998	614	180	3.41
1999	339	193	1.76
2000	449	190	2.36
2001	639	165	3.87
2002	426	211	2.02
2003	173	165	1.05
2004	184	148	1.24
2005	354	160	2.2
2006	304	140	2.17
2007	963	421	2.29
2008	1156	452	2.56
2009	185	143	1.29
2010	219	160	1.37
2011	207	156	1.33
2012	512	380	1.38
2013	771	661	1.17
2014	611	465	1.32
2015	503	322	1.56
2016	226	291	0.78
2017	745	943	0.79
2018	407	535	0.76
2019	269	352	0.76
2020	297	434	0.68
2021	29	28	1.04

From 1997 to 2015 fatalities recorded were more than armed conflict cases recorded in each year. However from 2016, the number of armed conflict events were higher than fatalities recorded in each year. An exception is the first two

months of 2021 which had more fatalities than armed conflict cases recorded. The years 2001, 1997, 1998, 2008 and 2000 recorded the highest number of fatalities per armed conflict. Similar patterns have been reported in the study of van Weezel [29], where they indicated that Africa experienced an average of eight fatalities per armed conflict event from 2001 to 2003. But in 2015, the average declined to three fatalities per armed conflict event.

The variance in the number of fatalities in each event type can be attributed to the classification by ACLED of the event type. That is, battles were classified as events that had a violent interaction between two or more politically organized groups whereas Protests were classified as events involving public demonstrations in which there was no violent engagement. By this classification of events, battles will have more fatalities than protests [16, 17].

The number of armed conflict events evolved differently for the different administrative counties. It was noted that not all counties exhibited a non-linear trend on the number of conflicts as was observed in the overall trend. For instance, Nakuru and Nairobi counties displayed a pattern similar to the overall trend of armed conflict cases over time. The two number of armed conflicts in 2008. This could be attributed to the post-election violence witnessed in early 2008 [25].

Similarly, not all conflict event types had a non-linear trend over time as the general trend depicts. Riots exhibited a pattern close to the overall trend while protests were largely low at the beginning of the study and started rising from the year 2010. This could largely be attributed to the fact that Kenya has embraced democracy in its constitution allowing every citizen lawful expression of speech and raising grievances. Moreover, increase in the number of mobile phone subscribers in Kenya, may have also contributed to this rise as it facilitates mobilization of various actors [29, 32]. While the Kenyan constitution provides for peaceful and unarmed freedom to assemble [26], it is unfortunate that some of the demonstrations turn violent. The other types of conflict events generally show a linear pattern with VAC steadily increasing over time. The rise in the VAC could be associated to the fact that the government agencies have to deal with the rising protests from the citizens. The first reaction to counter protests is through force hence the rise in VAC.

This study has some limitations. First, ACLED relies on media sources of data and mainly the classification of the armed conflicts is biased towards politically motivated events. This implies that the trends may not be presumed to accurately reflect reality since some of the events may have been omitted. Secondly, GAM was used to smooth the trend of armed conflict events and fatalities. However, the smoothing process may have masked sudden shifts in the number of conflict events and fatalities. This may also have produced conservative estimates.

## 6. Conclusion

This paper explores the trends of armed conflict in Kenya for the period January 1997 to February 2021. Some of the

key findings include; There was a slight increase in the number of armed conflict cases over time and the trend was non-linear with peaks observed in the years 2002, 2007, 2013 and 2017. These are the years in which the general elections were held. VAC, Riots, and Protests event type contributed the highest number of armed conflict cases. Some counties in Kenya exhibited a nonlinear trend similar to the overall trend such as Nairobi, Nakuru and Kisumu while counties like Wajir portrayed a linear trend. Most of the counties had linear trend which had a low gradient an indication that the number of armed conflict cases did not vary much over time in these counties.

The number of fatalities declined over time and had a non-linear trend with peaks observed in the years 2001, 1998, 2005, 2007 & 2008, 2013, and 2017. Three of the fatalities peaks were in the years in which general elections were held and one year where there was a referendum poll. Explosions/Remote Violence, Battles and VAC event types contributed the highest number of fatalities.

## Contributions

PK, CM, HA, conceived and designed this study, conducted analyses, interpreted the results, and drafted the manuscript. PK, CM and HA were involved in discussing the design and analysis; critically revised the manuscript for its content and approved its final version.

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