Micro-Foundations of Fragility: Concepts, Measurement and Application

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Abstract: In this paper, we explore the micro-foundations of fragility by discussing how to measure the exposure to fragility at the individual level. In particular, we focus on two important notions that are not covered by existing indicators of fragility at the aggregate level. First, different individuals or societal groups may experience fragility very differently. Second, even though a country as a whole may not be "fragile", individuals living there may be exposed to manifestations of fragility. This differentiation is particularly important as it suggests that the experience of fragility varies not just at national levels but also between sub-national regions and, indeed, between households and individuals. To test this idea, we define the novel concept "exposure to fragility", which accounts for human security, economic inclusion and social cohesion. Building on this definition, we derive a series of metrics that can be collected in typical household surveys and test the performance of this "fragility exposure module" in an on-going survey in Kenya. Analysis of this data shows that individuals living in rural areas, as well as young and single individuals, exhibit greater exposure to fragility. These findings demonstrate the importance of understanding fragility at the individual level, particularly as it provides the basis to understanding which regions or people would benefit most from pro-stability interventions and to how these interventions perform.

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1. Introduction and Background

1.1 Introduction

In the last two decades, a growing literature has focused on the negative role of state failure for economic growth and development. While it is strongly assumed and well understood that strong institutions are important, there is no real consensus on their role in fostering economic development (North et al., 2007). The causal relationship between the constituent components of strong states – such as governance, institutions and security – and positive economic performance remains complex to disentangle, particularly at the macro-level. On the one hand, weak institutions are considered a hindrance to economic performance (Acemoglu et al., 2005), while on the other hand, poorly performing economies are prone to 'fragility'. Such debates have been equally prevalent among practitioners given that "fragile states" face enormous difficulties in achieving the Millennium Development Goals, particularly as the poor governance of such "fragile states" often led to reduced international aid (OECD, 2013).

Nevertheless, it is equally agreed that there remains an ambiguity on what defines a "fragile state" and how the criteria are put together to generate a meaningful measure of fragility. We posit that the root of this issue lies in the state-centred approach that is often taken to 'measuring' fragility. Instead, we argue that fragility can be traced to the individual-level by accounting for individuals' exposure to various manifestations of its impacts. In turn, we argue that accounting for the micro-foundations, micro-experiences and micro-perspectives of fragility will have significant implications for economic research on fragility and for the design of fragility-sensitive policies and interventions. In particular, our micro-level approach to fragility focuses on the importance of how different actors experience fragility and how such experiences can aggregate into fragility at the state-level. For example, a diffuse perception of macro-level uncertainty due to fragility will translate into changed perceptions at the individual level, which can, subsequently, harmfully impact on economic decision-making.

In this article, we generate a working definition of fragility, focussing on three domains: economic inclusion, social cohesion and human security, which in turn acts as the basis of our proposed 'fragility exposure module'. Although the terms used differ slightly from those used in other attempts to empirically understand fragility, such as the Fragile States Index (FSI),[2] the concepts included are analogous. Based on this definition, we generate a list of indicators that comprise each domain of fragility, which were inserted into the HORTINLEA[3] survey. Using multidimensional indexing techniques, we aggregate the indicators into a single Fragility Exposure Index (FEI) and compare its

[2] See: http://fundforpeace.org/fsi/

[3] HORTINLEA is an on-going micro-level panel survey conducted in rural Kenya. See www.hortinlea.org for more details.

outcomes across key regional and demographic groupings.

The results indicate notable variations in experiences of fragility across geographic locations. Individuals living in rural areas are more likely to be exposed to fragility. Moreover, young and single households are more exposed to fragility compared to other individuals in the sample. Religious background also plays an important role on how individuals experience fragility: Catholics exhibit more fragility compared to protestants and Muslims. These results provide important support for the idea that fragility manifests itself differently at the individual level, even if such micro-level experiences are not necessarily its cause.

In a final step, we compare an aggregate version of the FEI with outcomes from the FSI. This comparison reveals that the FSI draws a bleaker picture of the state of fragility in Kenya than can be aggregated from the micro-level. We find the major source of this difference stems from the social cohesion, as the FSI does not (or cannot) account for the role of informal institutions and networks, an important aspect of Kenyan society that can mitigate the influence and experience of fragility (Narayan, 2002). These findings show the importance of considering and measuring fragility at the micro-level. Future work should seek to analyse multiple case studies of nationally representative data, in order to provide more precise and robust findings across multiple contextual backgrounds.

The rest of this paper is structured as follows: Section 1.2 provides a concise literature review on current state of fragility indices. Section 2 describes in detail our approach, underscoring the definitions used (2.1), the Fragility Exposure Index (2.2), and the survey module of fragility exposure (2.3). Section 3 presents the results from the case study in Kenya. The last section concludes and describes possible future work.

1.2 Status Quo

Beginning in the mid-1990s, a large body of literature has developed that focussed on the role of the state, state collapse and state failure (Binzel and Brück, 2009; Zartman, 1995; Milliken, 2003; Goldstone et al., 2004; Francois and Sud, 2006; Anderson et al., 2007; Ghani and Lockhart, 2008). Following this work, the debate on fragility widened – particularly among practitioners – to include countries that emerge from statue failure and those that are threatened with future collapse. Different terminologies have been proposed and used to describe this phenomenon – “low income countries under stress” (LICUS; World Bank, 2005; IEG, 2006); “difficult environments” (Moreno et al., 2004); “fragile states” (USAID, 2005) and “weak states” (Rice, 2006). At the same time, despite such terms being in common use for over a decade, there is still significant debate about the meaning and definition of fragility – or indeed, of what characterises a non-fragile state (Asian Development Bank, 2006).

Definitions of fragility are typically state-centred, perhaps because of the term finding its origins in a literature on state collapse. Indeed, what we are effectively discussing is the concept of "state fragility" (Khan, 2004; Picciotto et al., 2005; Dibeh, 2008). Consequently, definitions tend to focus on state-level issues like legitimacy, effectiveness, capacity to impose a Weberian monopoly on the use of violence, provision of public goods, etc. Particularly given that some states may exhibit some adverse features but not others, however, it is still unclear how a combination of these adversities, or indeed which combination of these adversities, add up to fragility.

Two measures have been proposed to implement these definitions empirically: the Failed States Index (FSI) (Fund for Peace, 2009) and the Political Instability Task Force (PITF). FSI is updated annually and is composed of 12 state-level indicators of presumed drivers of fragility – these include: "mounting demographic pressures"; "uneven economic development along group lines"' and "progressive deterioration of public services". These sub-indicators can be grouped in three distinguishable domains, namely political and military, economic, and social - analogous to our micro-level concepts of human security, economic inclusion and social cohesion. Based on the given threshold, the FSI classifies a large number of countries as fragile, affecting not only low-income countries, although many low-income countries are deemed fragile. The PITF also looks at a variety of societal, demographic, economic, political and environmental factors that influence the likelihood of state failure (Goldstone et al., 2005). Both approaches, however, suffer potential endogeneity as many of these features are as much an outcome of fragility as they are a cause of it. Accordingly, the strongest predictor of fragility in one period is fragility in the previous period, creating a pernicious cycle of fragility.

In this context, despite initial promise, definitions and measure of fragility remain in their infancy. There remains a lack of profound understanding of the actual mechanisms involved. How does fragility emerge? What effects does it have on growth and poverty? How it is maintained or contained? And how it can be overcome? Moreover, there is a paucity of knowledge on how people actually experience fragility, how it impacts on their life, how they cope with it, and how their lives differ from those living in a non-fragile settings. To overcome this gap, we develop the FEM and FEI, which measure how individuals experience fragility by collecting and aggregating information on how people are exposed to various indicators of state or other failures. In turn, whilst providing understanding of how individuals experience fragility, when the FEM is collected in representative household surveys, the FEI can be aggregated into regional or national measures of fragility. This is akin to recent developments in conflict research, which has seen an increased reliance on the measurement of conflict and conflict exposure at the individual level (Brück et al., 2016; Justino et al., 2016).

2. Approach

It is now commonly accepted in research and policy communities that multidimensional indicators are important means of measuring complex phenomena. In many contexts, several factors, rather than single measures, define the extent of what is commonly considered a single outcome variable. Particularly in related development fields – such as the measurement and understanding of poverty, measuring food (in)security, etc. – strong methodologies for generating such indices have been developed (see: Alkire and Foster, 2011). Until recently, fragility measures did not tend to include multidimensionality, even though recent work (OECD, 2015) acknowledges its importance. The OECD (2015) report suggests that the use of multiple indicators is needed to measure fragility and that such measures should include: indicators of: violence; access to justice; effective, accountable and inclusive institutions; economic inclusion and stability; and capacity to prevent and adapt to shocks and disasters.

In typical approaches, all of these indicators - and consequently the measurement of fragility itself - are identified at the state level. Such approaches, however, may be sub-optimal for a number of reasons. First, whilst a state as a whole may not be fragile, areas within it could well surpass given thresholds where those areas, instead, the unit of analysis. Second, a number of important concepts within these macro-level indicators may be difficult to measure at the state level. This is of particular concern to indicators that aim to measure social phenomena, which almost inherently take place at the individual or group level. Third, at the macro-level, a number of endogeneities are likely present between these indicators, inflating (long-term) the level of fragility. For example, the link between conflict and macroeconomic growth is uncontroversial (Miguel et al., 2004). In turn, indicators that include both concepts risk multiplying such effects. At the micro-level, however, such concerns are not, immediately, as concerning. A household that is affected by conflict but experiences no associated change in economic status experiences fragility differently to one that experiences both conflict and changing economic fortune. Therefore, whilst we propose to take these ideas of multidimensional indexing, we do so in order to develop and identify the index at the individual level, using bespoke data collected from household surveys.

To this end we propose a non-state centred conceptualisation of fragility that looks at the existence of persistent, systematic and interrelated social, political and economic uncertainties experienced by individuals. Such an approach allows these measures to vary across even small geographic areas; between different individuals; and between different socio-economic or demographic groups. More so, the time dynamics of the experiences of these individuals (say, in response to some counter-fragility intervention) can also be studied in situations where longitudinal data is collected. This allows us to include specific features that are uniquely prevalent at the local or regional level, as well as at the national level.

In turn, this boils the conceptualisation of fragility, even when it is defined at the state level, as something that impacts on different groups and different individuals in different ways. Even outside of such concerns, however, measurement at this level overcomes some of the endogeneities that may be present in indices that bring together aggregated state-level indicators. Our approach, therefore, does not aim to disregard or undermine the significant and important work that has been done at the state level but, rather, to refine these concepts and to project their significance at the individual level.

In short, this boils down to the notion that fragility, even defined at the state level, impacts on different groups and individuals in different ways. Our approach does not, therefore, aim to disregard the significant work that has been done at the state level but, rather, to project their significance onto the individual level.

2.1 Defining Fragility

There is no single shared definition of fragility – indeed, such a lack of a shared definition is much of the reason why multiple lists of fragile countries exist and why these lists seldom, if ever, fully overlap. In a number of cases, the definition of fragility seems to derive from the countries that find themselves on a given list, rather than the other way around. At least three major issues stem from this kind of process. First, it remains unclear why some countries end up being defined as fragile and others not, despite the differences between some fragile and nonfragile states being smaller than those between nonfragile pairs. Third, by defining a country as 'fragile', or measuring fragility only at the state level the spatial dimensions within that country are fundamentally ignored. Fourth, there is a significant diversity of reasons why countries may be considered fragile. This includes experiences and threats that are commonly thought of when considering fragility, like weak governance or conflict risks, but in some cases also includes climate risks, for example, and weak capacity to deal with associated climate shocks. In turn, "fragile" states may be fragile in some dimensions but they may be non-fragile in other dimensions. In turn, some highly fragile states may share more commonalities with less fragile states than with other highly fragile ones.

In response, we seek a definition of fragility that builds up from the micro-level. This is not to say that we view fragility, itself, as stemming from the individual level or as being entirely a micro-level phenomenon. Rather, it is an argument that fragility can be measured through individuals' experiences of manifestations of fragility. This is what we call in short "exposure to fragility".

The benefits of such an approach are manifold. First, at the international level, it reduces the need to draw artificial distinctions between fragile and nonfragile states,

which can be damaging given the diversity of reasons why a state is considered fragile and the spatial variation in fragility within states. Second, by aggregating up from an individual level, we facilitate analysis of differences at individual, group and sub-national levels, as well as across countries. Such an approach not only allows better understanding of the spatial dimensions of fragility but also about which forms of fragility affect which groups most. More so, it provides better opportunity to understand the feedbacks between fragility and economic development that are not available at the state level. Finally, because such an approach aggregates together a wide diversity of drivers of fragility, it provides the basis of comparison between people, sub-national regions and countries. In turn, a country could score well on some aspects of fragility and poorly on others, allowing better "matching" of fragile states or regions by typology. Such comparisons would provide a better means of comparative research across fragile countries, areas or regions. This is particularly important in understanding the effectiveness of various fragility-reducing interventions, particularly those effective enough to shape individual lives but not large enough to impact at the national level.

A lack of agreed definitions, however, acts as much of a barrier to measuring and analysing fragility at the individual level as it does at the national level. As a result, we generate a working definition of fragility that will be used in the generation of an illustrative Fragility Exposure Module. We do not present this definition as exhaustive or definitive – other definitions could well include different components and associated metrics. At the same time, we build this definition from a range of literature on fragility and stability, which ensures that the resulting FEM and FEI are properly contextualised.

2.2 The Fragility Exposure Index

In line with the state-centric macro-level literature on fragility, we consider fragility in the context of state functions and institutional capacities. Methodologically, an important feature of any definition to be used in the generation of a multidimensional index is that at each domain of the index, and thus each constituent part of the definition itself, can be readily separated. As such, combining this need for separation between the domains with the fundamental bases of traditional definitions of fragility yields three domains of interest: human security; economic inclusion; and social cohesion. Although we title these domains differently for parsimony, they share a number of key overlaps with those derived from other definitions of fragility (e.g. the FSI)[4] grounding both the definition and the outcomes in the body of literature to date.

[4] *We do not present this definition as either exhaustive or definitive but as a useful baseline from which to create and analyse a micro-level index of fragility. Due to the nature of the data, however, the approach itself is not sensitive to definitions, as metrics can be included or excluded to match alternative definitions. A future source of research should test how sensitive the index and results are to definitions.*

As with other definitions, the basis of fragility in this work is rooted in the functioning of a strong and good government, with each domain linking to these functionings. Therefore, the absence of constituent parts of any of these plays a contributory role to fragility. We further define each sub-component of the index as follows:

Human Security is, at its very base level, a focus on individual protection but is considered more broadly than simply individuals being protected from physical violence. We therefore consider human security to encompass physical safety, such as exposure to armed actors and experience of violence but also a lack of group- or gender-based discrimination, and equal rights before the law. In turn, this domain has strong links to political institutions, such as an effective local and national justice system; civilian police force; etc.

Economic Inclusion addresses alleviating extreme poverty and inequality but, again, lacks a single accepted definition. Those definitions that do exist, however, share a number of important overlaps, on which we focus. In that regard, we consider economic inclusion as the provision of opportunity and ability for all people to take an equal share in economic opportunity. That is, that no individuals, or groups, should be excluded from such opportunity. Whilst this can focus on poor personal economic situations and opportunities, it can also include uneven access to public services or the experience of corruption.

Social Cohesion is based around an idea that members of communities have the opportunity to cooperate within and across groups. As Chan and Chan (2006) state, this is a situation that facilitates vertical and horizontal interactions and a set of attitudes and norms that include trust, a sense of belonging, and a willingness to participate. In this regard, we consider social cohesion to reflect participation in communities and trust in government and other institutions (both formal and informal).

The Fragility Exposure Index (FEI) for individual *i* in time *t* is then specified as:

$$FEI_{it} = 100 \times Norm(D_{it})$$

$$D_{it} = Norm(\sum_{j=1}^{N} X_{ijt}) + Norm(\sum_{j=1}^{M} Y_{ijt}) + Norm(\sum_{j=1}^{O} Z_{ijt}) \qquad (1)$$

where X_{ijt}, Y_{ijt}, and Z_{ijt} represent the three domains: human security, economic inclusion, and social cohesion, respectively. Each sub-indicator within the following domains in normalised to take a value between 0 and 1 as follows:

$$X_{ijt} = Norm(x_{ijt}) = \frac{x_{ijt} - min(x_{jt})}{max(x_{jt}) - min(x_{jt})}$$

where i, j and t denote the individual, sub-indicator, and time period (e.g., year), respectively. This is important to ensure that each sub-indicator within each domain takes the same weight in the final index, as not all variables have similar answer ranges. Hence, for each domain we sum up the total number of the normalised sub-indicators to develop an equally weighted domain index. In the final step, as shown in equation (1), each domain is then also normalised in order to provide equal weights between these domains for the generation of the FEI. Given a lack of strong priors on which are the most important and a lack of bespoke data on those that individuals consider key, we argue that this equally weighted index is the most appropriate method available for this analysis. These equal weights can be augmented to deal with many of the concerns raised in a range of multidimensional indexing literature (Goos and Manning, 2002).

Using equation (1), we are able to classify individual experiences of or exposure to fragility into one index which has, initially, a value between 0 and 3, where 0 is the least fragile and 3 is the most fragile. However, the normalisation of the index allows us, or other researchers, to transform the values to suit specific analytical needs without jeopardizing the underlying distributions. Here the final FEI takes value of 0 and 100.

We discuss the implementation of these facets of fragility in the next section.

2.3 The Fragility Exposure Module

We focus our attention on three main "domains" that we argue construe a wide range of fragility-related issues: human security, economic inclusion and social cohesion. From this stems a requirement to discuss which indicators and metrics accurately reflect these domains and which do optimally. In reality, given the restricted space in on-going surveys, these desires need to be traded-off against ensuring that the module can easily be inserted in a range of surveys. Similarly, they also need to be traded off with the style of the questions asked and the familiarity of these questions to survey designers, statistical agencies and enumeration teams.

We first boil our three domains down into two distinctive categories: "Experiences" and "Perceptions" of fragility. The former includes indicators that measure actual experiences of fragility at the micro level. These include for example political and community engagement and experiences of insecurity and corruption.[5] While the latter

[5] *It is well worth noting that all existing household surveys collect information on a household's economic situation and their expectations for the future. Similarly, questions about trust in institutions are common in these surveys – including the HORTINLEA data we use in this article, in which we have already inserted the*

include indicators capturing: individual fears and satisfaction on a range of security, economic, and social aspects; individual perceptions of the effectiveness of a number formal and informal institutions, and trust in these institutions.

In order to generate the questionnaire, we reviewed a range of surveys and garnered an extensive list of potential questions. Subsequently, we reduced this list to include those most directly linked to these key concepts, whilst also ensuring that these concepts were now 'double counted'. Below we describe the indicators that we used in the generation of our index.

First, fear and satisfaction capture the extent of fragility experienced at the micro-level in all three domains. In regards to human security, we include measures on satisfaction with personal, neighbourhood and national security; fear of crime, assault, war, ethnic conflict, and police violence. As for economic inclusion and social cohesion, we measure satisfaction with economic and financial situation, education, health, community integration, etc. We regard increases in fear as worsening of the fragility status quo and improved satisfaction as a betterment.

Second, we measure institutional strength through questions that ask about individual perception on the effectiveness of a range of formal and informal institutions. The specifically named institutions include some that are generic – such as central or local government, police, or courts – and others that are context specific, such as tribal elders, religious bodies, etc. In general, we view increasing perceptions of effectiveness as the basis of a lower exposure of fragility. This implies, not only that more effective state institutions correspond to lower levels of fragility but that, in the absence of such effective institutions, more effective informal institutions still mitigate fragility. Moreover, trust is measured through a range of questions that ask individuals how much they trust these various formal and informal institutions, as well as their families, their neighbours and their countrymen and assumes that higher trust is a sign of less fragility.

Third, political and community involvement is based on self-reported participation in a range of secular and religious organisations, political parties, and elections. We hypothesise that more participation is a sign of increased community cohesion and of reducing fragility. Experience of corruption is measured through questions that ask how easy it is to obtain assistance from a range of institutions without paying a bribe, while experiences of insecurity is measured through the presence of active criminal groups.

Table 1 lists all the sub-indicators used within each domain. Moreover, an example of

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fragility exposure module. The fragility exposure module, therefore, should be viewed as an extension of existing data collection processes, rather than a separate effort.

the augmented questionnaire can be found in Annex A for our work in Kenya.[6]

[TABLE 1 ABOUT HERE]

3. Case Study: Fragility in Kenya

3.1 Country and Data Background

Kenya is an ethnically, culturally, and economically diverse country. After the post-election violence that took place in 2007, Kenya has been classified by a number of indices as a fragile state, and since then the country has remained in the high-risk group of fragility. For example, based on the 2016 FSI, Kenya lies in the 20 most fragile states. In the aftermath of the contested 2007 election, Kenya has undergone a number of legislative and constitutional reforms, which mainly reduced the power of the president, enhanced the role of parliament and citizens, and created an independent judiciary. Most notably the reforms provided a very ambitious decentralization process which aimed to transfer important governance decision-making to sub-national legislative unies. This gives counties full autonomy to address local needs in provision of services (World Bank, 2012). However, these constitutional reforms coupled with impressive economic growth were not sufficient to significantly improve Kenya's fragility classification. Based on the diverse nature of the country, and the newly introduced decentralisation reforms, exploring the underlying experiences of fragility at the micro-level are likely to shed light on why such apparent improvements have not substantially changed the macro-level fragility environment.

We use data collected in the 2016 HORTINLEA survey collected in rural, peri-urban, and urban areas of Kenya to test the validity of our fragility exposure index. Data collection under the HORTINLEA survey started in September 2014 and continued in 2015 and 2016 in a total of three waves. The FEM was introduced to the survey questionnaire in the latest wave.[7] Even though the main focus of the survey is on agricultural and horticultural production, it contains comprehensive socio-economic information on households and individuals, which augment the reach of the FEM.

Households for the survey were selected using a multistage sampling approach. Given

[6] *In each survey, these questions will be context specific. This ensures that the institutions we use in our questions, the reference to neighbourhoods and areas, etc. are matched to those that our respondents understand.*

[7] *The 2016 wave was conducted from September till October 2016 by Humboldt University of Berlin in collaboration with Egerton University and Leibniz University of Hannover. The data collection is funded under the initiative for global food security (GlobE) of the German Federal Ministry of Education and Research and the German Federal Ministry for Economic Cooperation and Development.*

the agricultural nature of the survey, a purposive sampling technique was used to select the five counties within rural and peri-urban strata. These included Kisii and Kakamega (rural), Nakuru, Kiambu (peri-urban), and Nairobi (urban). Selection of the sub-counties and divisions was based on information from the respective district agricultural offices. From each division, locations/wards were randomly selected, and households within locations were in turn randomly selected. Total sample size N = 1000 households: 700 in rural and peri-urban counties and 300 in Nairobi. It is important to note that HORTINLEA household survey is not representative at the national level. However, the data provides a comprehensive overview of households engaged in small-scale agricultural production in rural and peri-urban areas. Therefore, although the results of analyses conducted using this survey data cannot be fully generalized to represent state-level fragility in Kenya, it provides the opportunity to test the baseline hypotheses of this work - that individuals and groups experience fragility differently, even when all reside within a demonstrably fragile state.

3.2 Approach

The HORTINLEA survey questionnaire includes a large section on crime and fragility in addition to general socio-economic and demographic information, ensuring that the survey already covers a range of key FEM questions. These include: satisfaction in living conditions, personal and neighbourhood security, financial and social standing; fear of crime at home and outside, and fear of war and ethnic conflict; participation in local and central elections, as well as membership in political parties and social groups (e.g., women's groups); trust in a comprehensive list of formal and informal institution (e.g., central government, police, courts, informal village government, etc); perception of power these institutions and their effectiveness in the provision of services; experiences of crime, insecurity (measured via the presence of non-state groups), and corruption.

Before delving into the results of the final index, we provide an example on the importance of using micro-level fragility measures. Figure 1 indicates for a selected number of formal and informal institution the mean values of the following four variables: (i) Power; (ii) Effectiveness; (iii) Trust; and (iv) Ease of Services Without Bribes. In all cases, questions are asked on Likert scale running from 1-10, with 1 implying the worst indicators; and 10 the best.

We find that religious institutions have a mean value of about 8 for all four variables. In other words, Kenyans perceive religious institutions to be very powerful, effective, trustworthy, and that they can obtain services easily from them without bribes. This static trend also applies for village governments at a mean value of about 6. However, even though Kenyans perceive the central government to be powerful (mean value of about 7), they do not trust it with the same intensity, and are not able to get assistance easily without bribes. The same diminishing trend applies to the police and courts.

[FIGURE 1 ABOUT HERE]

These results provide an important glimpse on the existence of a 'governance gap' for formal institutions in Kenya between the central and local levels. Central, formal institutions are viewed as less able to deliver legitimate services, despite their perceived power. Identifying this gap underscores the importance of using micro-level indicators for measuring fragility and to understand better how different individuals are affected by it. A powerful central government or police force need not necessarily effective in the provision of services to local communities, implying counteracting impacts on fragility. Individuals trust local informal village governing bodies more, and are believe they are more likely to obtain better services from them vis-a-vis the central and county governments. *Ceteris paribus*, such a situation may not be viewed as desirable, yet in the case of weak delivery from the central government, shortfalls can be compensated by an effective, if informal, form of local governance. In such a case, *ceteris paribus*, effective (informal) local institutions mitigate and reduce experience of fragility. Measures that do not account for such different experiences across people and across branches of government are likely to misrepresent the experience of fragility at the country level.

3.3 Results

Next, based on equation (1), we construct the FEI using the normalised value of the sub-indicators as listed in Table 1. The results can be summarized as follows:

In the first instance, we present the basic statistics of the three domains that constitute the FEI. Figure 2 compares graphically the distribution of these three domains in the HORTINLEA sample. A number of interesting features develop. First, Kenyans are more likely, on average, to experience fragility via human security and economic inclusion, with mean values of 0.53 and 0.56, respectively, compared to social cohesion, which has mean values of 0.36. Second, the median is very close to that of the mean, particularly for the economic inclusion domain, suggesting that outliers have negligible effects on our comparisons.

[FIGURE 2 ABOUT HERE]

In order to understand the underlying dynamics behind the fragility domains, Figure 3 plots the distribution of the FEI separating the sub-indicators capturing perceptions of fragility versus experiences of it. The same is applied to each of the respective domains. Figure 3a. shows the distribution of the total fragility index separated by perceptions and experiences sub-indicators. One clearly sees that Kenyans are more fragile in terms of perceptions (mean of 55.7) than in terms of actual experiences (mean of 47.5). The differences are highly significant with a p-value < 0.001. This holds true for the Human

Security domain (Figure 3b) and the Social Cohesion domain (Figure 3d). However, the reverse is true for the Economic Inclusion domain.

[FIGURE 3 ABOUT HERE]

In the next stage, we run comparative analyses by splitting the sample across a range of individual and household characteristics, including region, gender, age groups, marital status, and religion. The FEI mean differences between the groups and their significant values are shown in table 2, as well as for the three domains of the index. For categorical variables, such as region, marital status, age, and religion, we report the significance levels of the average means of the pairwise differences between each category.

First, in terms of regional variations, we find that individuals living in rural counties in Kenya experience significantly more fragility than residents of peri-urban counties. The differences are significant at the 5% level. However, this pattern does not always hold if we examine each county separately. Individuals residing in Kakamega, a rural county, experience higher fragility levels in comparison the rest of the individuals in the sample. In contrast, peri-urban Kiambu residents exhibit lower fragility compared to the rest of the sample. Yet, there are no notable mean differences for Kisii (rural) and Nakuru (peri-urban). Hence, although the differences in fragility exposure between rural and urban areas are significant, the effect is driven mainly by county-specific variations.

Second, younger people (aged 25 and below) are more fragile in comparison to the rest of the age cohorts in the sample, however these differences are only significant for the social cohesion domain at the 1% level, implying that older people have stronger social networks. Given the time taken to build up such networks, such a finding seems uncontroversial, yet is still important as it implies younger people may lack the networks to successfully cope with major shocks. Third, there are no notable differences in fragility between men and women, which is mainly driven by the equal means in the human security domain. Males experience more fragility than females in the economic inclusion domain, with differences significant at the 5% level, while females experience greater fragility than males in the social cohesion domain.

[TABLE 2 ABOUT HERE]

Fourth, in terms of religion, we find no differences in exposure to fragility for protestants (the largest group) and muslims (the smallest group). However, catholic individuals are on average more exposed than any of the other groups in the sample, including individuals who reported having other religious preferences or none. Lastly, monogamous households experience less fragility than single and polygamous households. The differences in exposure to fragility between these groups is very notable and significant at the 1% level and is particularly strong for single individuals, despite no noticeable differences in the economic inclusion domain between these

groups.

Next, we compare the findings from our case study to that of the Fragile States Index for Kenya in 2015. In order to generate a valid comparison, we transform both our index and the FSI to take a value between 0 and 30, where 30 denotes the greatest fragility. Given that the FSI also groups its 12 indicators into three similar categories: Political, economic and social, we take the averages of the indicators for each category as an indicator of domain-level fragility. It is important to note that there are indeed differences between the indicators from the two indices. For example, the FSI includes demographic pressure and the presence of refugees and IDPs as indicators in the social domain, which are not covered in our social cohesion indicators.[8]

Table 3 shows the average fragility per category for the two indices. The FSI for Kenya has a value of 24.4 out of 30, while the FEI index has a value of 14.6 out of 30. The largest variations is, as expected, stemming from the differences in the social domain. Taking these figures at their face values, the findings indicate that although Kenya exhibits high fragility in all three domains, fragility exposure at the individual level is less pronounced. We also compare the results of the FEI with that of the Global Peace Index, which measures the relative position of states' peacefulness, taking into considerations, for example, relations with neighbouring countries and level of terrorist and crime activity. The Global Peace Index has a total value of 14.3 for Kenya in 2016 which is much closer to that our fragility exposure index.

[TABLE 3 ABOUT HERE]

4. Conclusions

In this article, we seek to inspect the micro-foundations of fragility. In doing so, we define fragility along the lines of previous work but apply these concepts to how individuals experience manifestations of such fragility. In doing so, we open up a significantly richer research potential than is provided by state-centric, aggregate, and/or binary measures of fragility that are common in the literature. We generate a so-called Fragility Exposure Index (FEI), which is based on three distinct domains: Human Security, Economic Inclusion, and Social Cohesion. These domains are in turn composed of sub-indicators from a set of variables which can be inserted into standard household or individual surveys. We propose a comprehensive fragility exposure module that captures the various aspects of our index.

[8] We also note that the HORTINLEA dataset is not nationally representative. Although we believe it to be unlikely, variations between the FSI and the FEI could, technically, be determined by inconsistencies arising from a lack of representativeness.

The analysis of this data not only allows us to define if a state is 'fragile' or not but also to consider how different individuals in that state experience fragility. To test the ideas behind this work, we conduct a trial using FEI based on our full fragility exposure module, which was inserted in a survey in Kenya in 2016. The results from this analysis demonstrate that individuals in Kenya experience fragility differently depending on their location (rural areas), age group (youth), religion (catholics), and marital status (singles). Such findings support our assertions that aggregate measures are, often, a blunt instrument in measuring and understanding fragility. Individuals in different locations and of different socio-economic characteristics clearly experience fragility differently.

It is important to note that the findings are based on a limited case study of our fragility exposure module which uses data from the HORTINLEA survey in Kenya. In this regard, the results we present here should be taken as illustrative of what can be achieved by this approach, rather than as a finished product. However, the full Fragility Exposure Module has been inserted also in the Life in Kyrgyzstan (LiK) Study (Brück et al., 2014). The LiK Study provides a wide range of socio-economic, demographic and other information similar to that of HORTINLEA. Its main advantage is that it is representative at the national level in Kyrgyzstan. The inclusion of the fragility exposure module in other surveys allows a better robustness and validation test of our index.

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Annexes

Annex 1: Tables and Figures

Table 1. Sub-indicators and domains of the Fragility Exposure Index (FEI)

Domains	Individual Sub-Indicators (Experiences)	Individual Sub-Indicators (Perceptions)
HUMAN SECURITY	Presence of non-state criminal actors in district Previous experiences of theft, sexual assault, physical assault and bribery happened in the last year Preventive measures undertaken to protect against crime Ease of service without bribe from formal institutions (central government, county government, police) Considering leaving due to security Distance 2 police	Fear of crime at home and unsafety in neighbourhood Satisfaction with personal, neighbourhood, and district security Importance of owning personal weapons and reporting family member who committed crime Trust and perception of effectiveness in formal institutions (central government, county government, police, courts) Fear of war, ethnic conflict, religious/ethnic conflict, governmental and local authority misconduct, and police violence and arbitrary controls, crime in village, banditry, Juvenile delinquency, and worry about land conflicts
ECONOMIC INCLUSION	Ease of service without bribe from private sector and NGOs	Satisfaction with financial situation, food security, and living standards Fear of corruption in village, and worry about unemployment, loan sharking , and food insecurity in country Trust and perception on effectiveness of privates sector and NGOs
SOCIAL COHESION	Membership of women and youth groups and political parties Registration and participation in previous local and central elections Stealing if stolen from and contact for settling disputes in case of crime Ease of Service without bribe from informal village governments, courts, religious institutions, and traditional institutions.	Satisfaction with leisure time, social equality in village, community integration, and family life. Expectation of registration and participation in future local and central elections Trust and perception on effectiveness of village govs, courts, religious institutions and traditional institutions

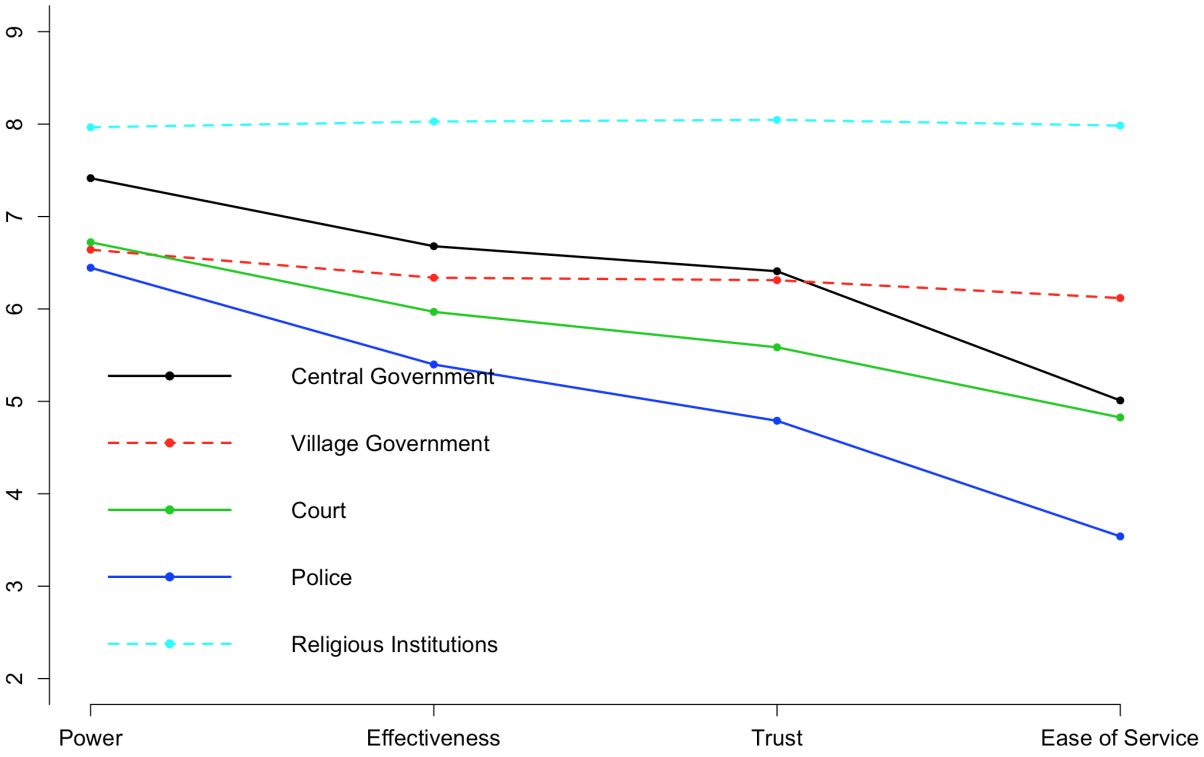

Figure 1. Governance Gap of Formal Institutions in Kenya

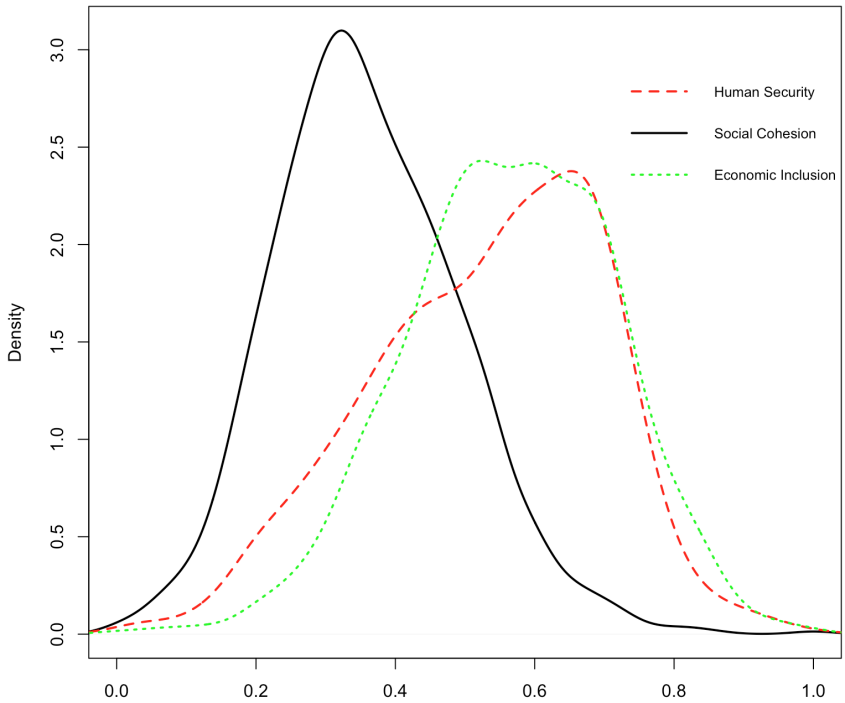

Figure 2a. Distribution of the Domains of Fragility Exposure Index – Kenya

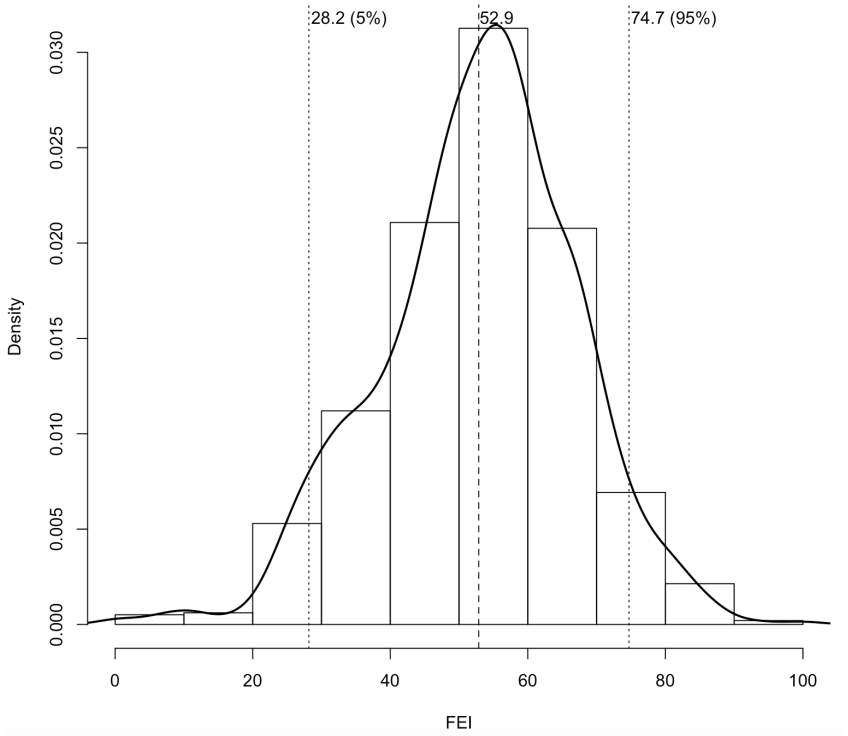

Figure 2b. Distribution of the Fragility Exposure Index - Kenya

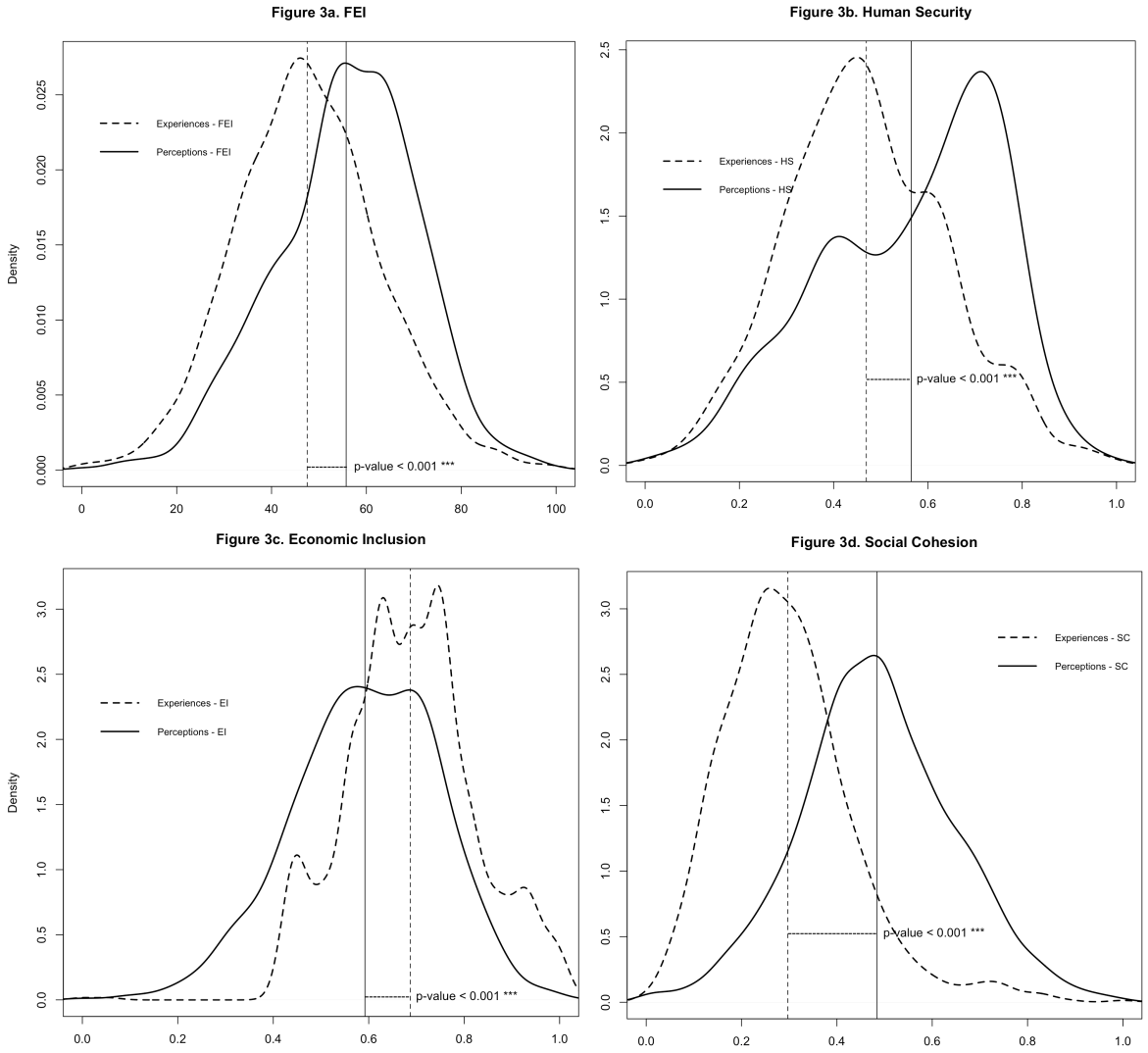

Figure 3. Differences between experiences and perceptions of the Fragility Exposure Index and its Domains - Kenya

Table 2. Variations in exposure to fragility across groups and locations

	FEI	Human Security	Econ Inclusion	Social Cohesion
Gender				
Female	52.96 (14.03)	0.54 (0.17)	0.56 (0.15)	**0.37 (0.13)**
Male	52.59 (14.24)	0.52 (0.17)	**0.59 (0.15)**	0.34 (0.13)
p-value	0.721	0.254	0.010**	0.019**
County				
Nairobi	**55.84 (13.32)**	**0.55 (0.16)**	**0.58 (0.14)**	**0.40 (0.14)**
Kisii	50.71 (14.05)	0.53 (0.18)	0.54 (0.16)	0.33 (0.12)
Kakamega	53.38 (14.46)	0.54 (0.17)	**0.58 (0.15)**	0.34 (0.13)
Nakuru	52.54 (14.14)	0.54 (0.17)	0.56 (0.16)	0.35 (0.12)
Kiambu	50.63 (14.03)	0.49 (0.17)	0.55 (0.15)	0.36 (0.14)
p-value	<0.001***	0.010**	0.046**	<0.001***
Age Group				
Age <= 25	55.44 (12.84)	0.55 (0.16)	0.53 (0.14)	**0.44 (0.13)**
25 < Age <= 45	53.27 (14.03)	0.53 (0.17)	0.57 (0.15)	0.37 (0.14)
45 < Age <= 65	52.20 (14.00)	0.53 (0.17)	0.57 (0.15)	0.34 (0.13)
Age > 65	51.47 (15.61)	0.51 (0.17)	0.57 (0.16)	0.34 (0.14)
p - value	0.265	0.634	0.322	<0.001***

Table 2 – Continued. Variations in exposure to fragility across groups and locations

	FEI	Human Security	Econ Inclusion	Social Cohesion
Religion				
Protestant	52.59 (13.71)	0.52 (0.17)	0.57 (0.15)	0.36 (0.13)
Catholic	**55.25 (13.76)**	**0.56 (0.16)**	0.58 (0.14)	0.38 (0.13)
Muslim	49.09 (13.88)	0.48 (0.18)	0.55 (0.17)	0.33 (0.08)
Other Christian	51.36 (14.95)	0.53 (0.16)	0.54 (0.15)	0.35 (0.14)
Other	**55.72 (11.34)**	0.46 (0.13)	**0.63 (0.08)**	**0.44 (0.14)**
p-value	0.033**	0.032**	0.05*	0.044**
Marital Status				
Single	**57.91 (13.95)**	**0.59 (0.16)**	0.58 (0.15)	**0.41 (0.14)**
Married, Poly	53.32 (15.60)	0.53 (0.18)	0.57 (0.15)	0.37 (0.14)
Married, Mono	52.03 (13.91)	0.53 (0.16)	0.56 (0.15)	0.35 (0.13)
Divorced/Widowed	53.44 (13.56)	0.53 (0.18)	0.55 (0.14)	0.39 (0.13)
p-value	0.002***	0.008***	0.679	<0.001***

standard deviation in parentheses.

Table 3. Comparing micro and macro fragility indices for Kenya

Fragile States Index (FSI) *			Total
Political and Military Indicators	Economic Indicators	Social Indicators	
8.2	7.7	8.5	24.4 / 30
Fragility Exposure Index (FEI) **			
Human Security Domain	Economic Inclusion Domain	Social Cohesion Domain	
5.3	5.6	3.6	14.5 / 30
Global Peace Index ***			14.3 / 30

** The mean of the indicators within each domain from FSI are calculated.*
*** Our fragility exposure index is transformed to match that of FSI, where each domain is multiplied by ten.*
**** The GPI is transformed to match that of FSI. There are three domains in GPI: Militarisation, Society & Security, and Domestic & Int. Conflict.*
All values for 2016/most recent available.

Annex 2: Fragility Module

PERSONAL SATISFACTION: Please choose the level, which fits to your personal perception!
On a scale of 1 = completely dissatisfied to 10 = completely satisfied, how satisfied are you with …
…your personal security?
… the security in your neighborhood?
… the security situation in your district?
… you community integration / social integration, supportive interaction with neighbours?
… you social equality in your village / community
… spare time / leisure
… you family life
… your financial situation

How often in the last year have you or anyone in your family:
… Felt unsafe walking in your neighbourhood at night
… Feared crime in your own home

In the previous 12 months, were there any organized groups posing insecurity in your district?	0 = No ; 1 = Yes
On a scale from 1 to 10, how important is it to own a weapon to defend yourself and your family?	
Imagine that a close family member committed a violent crime. On a scale from 1 to 10, how likely would you report him/her to the police?	

Do you belong to a political party?	0 = No 1 = Yes
Did you register to vote in the last national election?	
Did you register to vote in the last local elections?	
Do you think you will register to vote in the next national election?	
Do you think you will register to vote in the next local election?	

Please indicate how much you are afraid of certain phenomena in your village	
…	
banditry	0 = No fear 5 = fear
War	
Religious/ethnic conflict	
Misconduct of govern. authorities	
Misconduct of local authorities	
Police violence	
Arbitrary police control	
Crime	
Corruption	

Type of Institution	How Powerful is the [institution] in Kenya today?	How good does [institution] deliver services in Kenya today?	How much do you trust [institution] in Kenya?	How easy can you obtain assistance from [institution] without bribe in Kenya today?
Central Government	1 = Extremely weak to 10 = Extremely Powerful	1= Very Ineffective to 10 = Very Effective	1= Completely Untrustworthy to 10 = Completely Trustworthy	1= Extremely difficult to 10 = Extremely Easy
Local/County Government				
Police				
Court				
Religious Institutions				
Traditional Institutions				
NGOs				
Private Sector				
Village government (informal)				