

# Migration aspirations in Kenya, Morocco and Nigeria during the COVID-19 pandemic: A social media analysis



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**This paper explores trends in migration conversations on social media from three African countries – Kenya, Morocco and Nigeria – to determine what these can tell us about migration aspirations. Our analysis of social media posts has shown that migration aspirations peaked midway through the COVID-19 pandemic – likely due to the pandemic-induced economic downturn – with increased interest in student visa applications, job opportunity searches and emigration procedures. We conclude that migrants from Africa use social media to inform their migration decisions, and to facilitate exchange of goods and services among transnational communities.**

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## Table of contents

### **01**

#### **Executive summary**

Page 5

---

### **02**

#### **Introduction**

Page 6

---

### **03**

#### **Theory**

Page 10

---

### **04**

#### **Data and methods**

Page 13

---

### **05**

#### **Empirical analysis**

Page 27

---

### **06**

#### **Discussion and conclusion**

Page 33

---

## **07**

### **Bibliography**

Page 36

---

## **08**

### **Appendices**

Page 45

---

# Executive summary

This paper explores trends in migration conversations on social media from three African countries – Kenya, Morocco and Nigeria – to determine what these can tell us about migration aspirations. To measure migration aspirations across time in relation to European, Gulf Cooperation Council (GCC) and North American destination countries, we used Meta (formerly known as Facebook) data collected through the CrowdTangle API with a final sample size of 620,458 individual posts. The dataset includes only publicly accessible information that was placed in the public domain by its authors, and we took precautions to ensure that the posts remain anonymous and cannot be linked back to individual users.

Using natural language processing (NLP) techniques, we demonstrate that migrants engage in a variety of discussions on social media, particularly on visa procedures, foreign education and job opportunities, business plans and opportunities, and relationship matters. We further show that throughout the COVID-19 pandemic, the proportion of migration-related and non-migration-related posts shifts, with increased attention to emigration, visa and document services. Our analysis strengthens existing evidence that migrants and would-be migrants in all population groups use social media platforms to inform their decision-making and determine their migration trajectories, and adds new evidence showing that migrants and would-be migrants use social media platforms to ease their access to goods and services in their destination country. The use of social media to exchange goods and services that meet particular needs of various populations is an important and unique contribution of this research. We found that an informal international trade in local commodities was evolving as Africans offered to supply those in the diaspora with these items.

## Introduction

The number of internet users has increased significantly in Africa over the last decade. The continent had around 570 million internet users in 2022, which is twice the number of internet users in 2015. Nigeria is ranked first (122.5 million internet users) among internet users in Africa, while Morocco ranked fourth (33.18 million internet users) and Kenya tenth (with 17.86 million internet users)(Galal, 2023). As a result, the internet and communication tools have become ubiquitous in dynamics of migration in Africa. Research shows that it helps convey informal and formal information about travel routes, places to live and assists migrants in creating and maintaining necessary networks while travelling towards various destinations (Dekker et al., 2018a; Dekker & Engbersen, 2014)

Recent findings suggest that social media platforms (SMPs), namely Meta, Instagram and X (formerly Twitter) are especially important communication tools in Nigeria, Morocco and Kenya for deciding when, how and where to migrate – in other words, for migration decision-making (Dekker et al., 2016; Kaufmann, 2018; Merisalo & Jauhiainen, 2021; Olawale & Ridwan, 2021a). Studies explore the influence of these platforms on migration aspirations – defined as desire, capabilities, intentions and experiences – particularly on the imaginations of successful migrants who have departed from Africa (Olawale & Ridwan, 2021b) and its association with increased mobility (Zijlstra & Liempt, 2017). Yet capabilities can be restrained by external or structural influences on what the individuals ‘can do’.

This paper explores trends in migration conversations on social media from three African countries – Kenya, Morocco and Nigeria – to determine what these can tell

us about migration aspirations. We conducted a text analysis to assess the aspirations, capabilities, intentions and experiences migrants discuss on Meta. We first identified relevant migration groups on Meta and then segmented their contents across seven discussion categories, which we divided further into general migration-related discussions and non-migration-related discussions. We show that migration aspirations seem to react substantially to the COVID-19 pandemic and spike midway through the health crisis, with increased interest in applying for student visas, looking for job opportunities abroad and various emigration procedures. In contrast, migration aspirations voiced online do not react nearly as much (or at all) to dynamics that precede the COVID-19 pandemic. Our findings are based on an analysis of public online groups of migrants on Meta in three different countries of emigration – Kenya, Nigeria and Morocco – and in relation to three different regions of immigration – Europe, North America and GCC countries.

The dataset includes only publicly accessible information that was placed in the public domain by its authors. We have taken precautions to ensure that the posts remain anonymous and cannot be linked back to individual users. There was no profiling based on race, ethnicity, religion or gender, and all posts were treated impartially. Initial topic selection was conducted using NLP to minimise subjectivity, with subsequent manual verification of topic categories by the team.

## Objectives of the paper

This paper emerges from a need to better understand migrant discussions on social media platforms and the various dynamics that affect them. Questions it aims to answer include:



- What are the key categories of migrant discussions and how do they reflect migrant aspirations and decisions?
- How have the topic categories evolved in social media posts in Kenya, Nigeria and Morocco in relation to transit and destination countries in Africa, the Gulf and Europe?
- What factors drive these shifts in topic categories in social media posts?

## Structure of the paper

**Section 2** reviews the state of academic discourse on the use of social media in migration decision-making and identifies a gap in the understanding of how these conversations shift over time.

**Section 3** explores our data composition by country of origin, by destination and by post category, further separating these into migration- and non-migration-related posts. It provides samples of conversations in these categories to facilitate an understanding of what constitutes such categories.

**Section 4** provides time trends of posts showing the seven identified post categories. It explores time trends of discussions on Europe and GCC countries as destinations and separating migration- from non-migration-related conversations. Our time trends reveal clearly that the frequency of posts starting in 2021 and the frequency of posts related to emigration, visas and document services rises substantially in the same period. In other words, the activities of migration-related public posts became more pronounced in 2021 and particularly so in Moroccan and Nigerian groups. The upwards trends of posts on emigration, visa and document services from Africa is even more pronounced and occurs slightly earlier (in the

summer of 2020) for the GCC countries than for Europe. This shows a dispersion of migration aspirations towards new destinations.

**Section 5** is the concluding section. The paper contributes to the compelling evidence that migrants use social media as a source of information in migration decisions. We also add new evidence of emerging commodities and service markets to serve the needs of migrants in the diaspora.

## Theory

Research on social media and migration falls into two categories. The first focuses on the ways social media platforms are used by migrants, political and/or civil society actors who work on migration (Brekke & Thorbjørnsrud, 2018a; Crepaz, 2022; Dekker et al., 2018b; Dekker & Engbersen, 2013; Ennaji & Bignami, 2019; Neag & Supa, 2020; Walsh, 2019; Worrell, 2021a). The second category centres around research on migration-related discourse on social media platforms – especially in relation to public attitudes toward migrants (De Coninck et al., 2023a; Heidenreich et al., 2020; Nonnecke et al., 2022; Siapera et al., 2018a; Yantseva, 2020a).

In this paper, we extend this scope by using social media discussions, questions and other forms of engagement, which take the form of posts on Meta’s public groups as a way to measure dynamic migration aspirations. While most previous research has focused on refugees, we also extend that scope to encompass all forms of would-be migrants who expressed themselves on SMPs.

Most of the large N, quantitative studies of social media and migration have focused on ways in which non-migrants discuss migrants and migration on SMPs, especially with an eye to measuring public opinion towards migration and/or migrants (Abdul Reda et al., 2023; De Coninck et al., 2023b; Heidenreich et al., 2020; Siapera et al., 2018a; Walsh & Hill, 2023; Yantseva, 2020a). We have known for some time that individuals’ sentiments related to migration are well represented by their behaviour on social media platforms (De Coninck et al., 2023b; Smoliarova & Bodrunova, 2021b), that individuals tend to interact with content online that echoes their existing

perspectives (Heidenreich et al., 2022), and that individuals tend to act out in real life the opinions they voice online regarding migrants (Brekke & Thorbjørnsrud, 2018a; Siapera et al., 2018b; Yantseva, 2020b). That being said, little has been done to date to track the aspirations, capabilities, intentions and experiences migrants discuss on SMPs and the various dynamics that may affect them.

Work on the ways in which social media platforms are used by migrants suggests social media has the potential to change, impact and influence migrants' decision-making (Dekker et al., 2018b; Martin & Hayford, 2021a), their path in the migration journey (Dekker & Engbersen, 2013; Gillespie et al., 2018a; Kutscher & Kreß, 2018a; Miconi, 2020a; Worrell, 2021a), and ease their integration in their place of settlement. Some suggest that migrants use social media as a source of information, as a tool to stay connected to their network of families and friends left behind, and as a tool to ease their anxieties and fears around the migration process (Ihejirika & Krtalic, 2021). While some argue that using social media remains challenging for many migrants because it requires digital and technological literacy, linguistic proficiency, and the ability to afford internet access (Ennaji & Bignami, 2019; Ihejirika & Krtalic, 2021; Udwan et al., 2020), many disagree and argue that smartphones and social media are part and parcel of migrants' daily lives, thus making them a nonissue (Alencar et al., 2019; Dekker et al., 2018b). Moreover, most work on the use of social media in migration focuses on refugees, with little research treating other categories of migrants; and most of that research is conducted using small N qualitative techniques (Alencar et al., 2019; Charmarkeh, 2013; Dekker et al., 2018b; Ennaji & Bignami, 2019; Gillespie et al., 2018a; Kutscher & Kreß, 2018a; Neag & Supa, 2020; Smets et al., 2021; Thorpe & Wheaton, 2021; Worrell, 2021a).

Recent work on the ways in which social media platforms are used by political or civil society actors who engage with migrants outline several security concerns.

While many suggest that social media platforms can ease migrants' decision-making, settlement and integration, some suggest that it also poses an increased risk to migrants' safety as it eases the work of policing agencies in tracking migrants and manipulating migration flows (Brekke & Thorbjørnsrud, 2018b; Walsh, 2019). In contrast, others focus on the benefits for researchers and civil society organisations that exist in retrieving data on migrants from social media platforms. Thanks to a high level of engagement in the digital space, migrant data on social media can help challenge problematic perceptions of migration, make accurate policy recommendations, and contribute to data-driven decision-making (Curry et al., 2019; Mazzoli et al., 2020; Zagheni et al., 2017). Yet, more work needs to be done to address ethical concerns with problematic data use on migrant populations from social media platforms (Mahoney et al., 2022).

# Data and methods

To measure migration aspirations across time in Nigeria, Kenya and Morocco, and in relation to European, GCC and North American destination countries, we use Meta data collected through the CrowdTangle API. The data made available by Meta through this API serves as a public insight tool maintained by Meta itself to provide engagement data on public pages, groups and posts to researchers.

This data is the best currently available to scholars who seek to explore influential activity on Meta despite it being limited to data collection from public groups. The platform collects data on every ‘influential’ public page and group throughout the Meta platform – influential is defined as a minimum of 500 followers. As a result, CrowdTangle tracks 99.89% of public pages and groups with more than 100,000 followers – but only 7.20% of those with a followership between 500 and 2500 individual users. In total, CrowdTangle claims that it tracks more than 7 million pages, groups and verified profiles on Meta – which amounts to all pages with more than 50,000 likes and all groups with more than 95,000 members throughout the world. This means that the Meta data made available through CrowdTangle has an inclination toward pages and groups that see more traffic and interaction with their content – something that this paper takes into account in the identification strategy, which we discuss later (Fan, 2023; Tess, 2023a, 2023b).

The key limitation of the Meta data collected through CrowdTangle is that it does not contain data from any private post for privacy purposes – it does not track ‘regular’ people’s activity on Meta. This caveat naturally limits what research can be done with the data Meta makes available through CrowdTangle but also allows scholars to

focus on influential activity. Indeed, Meta groups and pages with high followership allow us to capture a reasonable snapshot of the popularity of a specific issue. It is rather logical that an activity that seeks to gather attention or information would be largely made public and that it would have a higher followership if said activity is influential enough. Yet, the logical caveat is that such data is vulnerable to activity that could be fragmented amongst many smaller groups or could be buried within large groups that remain anonymous for privacy purposes. Some may indeed fear some kind of external oversight, which would ultimately affect their personal security, and would therefore opt for private group chats (Fan, 2023; Tess, 2023a, 2023b).

Despite its limitations, Meta data collected through CrowdTangle contains several invaluable advantages compared to other data from other SMPs. At the substantive level, we know that posts on Meta matter for the way people behave worldwide. Previous research finds that Meta posts about refugees by far-right parties yielded acts of violence against them in German cities (Müller & Schwarz, 2023). Others documented that Meta has been used extensively to mobilise people and bring vaccine opposition into the mainstream in the US between 2009 and 2019 (Broniatowski et al., 2022). Finally, the use of Meta to spread fake news about COVID-19 origins, contamination rates and potential cures is very well documented at this point (Stier et al., 2021; Bandeira et al., 2021; Soares et al., 2021). At the structural level, Meta data collected through the CrowdTangle API also offers some important quality advantages. In fact, it generates very rich panel data regarding the interaction of Meta users with a specific public post, which helps us better understand the influence of specific social media dynamics on society. For instance, it aggregates the content of a post – whether text, image or video – against measures of interactions with the specific post at a time  $t$ . Measures of interaction include the number of comments, views or likes, and types of reactions to the post according to Meta's new like features (love, hate, laugh, et cetera). The

wealth of that data is also compounded by the very flexible time and geographic component – the platform tracks posts through a very rich time component and contains data from around the world. The historical archive component is also much more flexible than that available for data from other SMPs – such as X – as one can go as far back in the past as is desired – with X data, this is a paid feature with very limited yield (Fan, 2023; Tess, 2023b, 2023a).

As a first step, we mapped Meta public groups that were labelled as a platform for migrant discussions using Google Search to detect topics for Kenya, Morocco and Nigeria as source countries and the United Arab Emirates, Saudi Arabia, the United Kingdom, France and Italy as destinations. As the CrowdTangle API only collects data from public posts for privacy purposes, the study considered only public groups in which migration discussions were taking place. Only public and active groups were included in the mapping. Groups which had less than ten posts per day were considered inactive and were therefore not included in the mapping. The Meta group mapping took place over a period of three months between May and July 2023, with teams working separately on each country and bi-weekly cross-checks for the scope and extent of mapping in each country. The mapping exercise was concluded once the researchers considered that they had reached saturation and no new information was coming up. Our final list of groups comprised 192 Meta groups (see Appendix for the full list)<sup>1</sup>. We collected the historical data from these groups for a sample size of 620,458 individual posts for the period of 27 May 2018 until 14 April 2023. This period covers pre- and post-COVID-19 timelines and accounts for all meaningful shocks from the pandemic that were introduced to migration patterns *during* the pandemic itself.

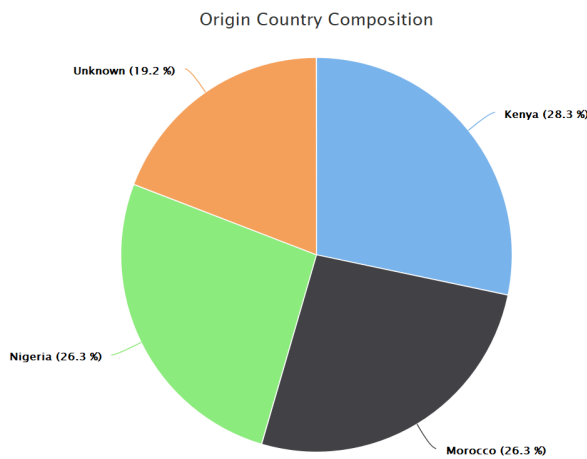
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<sup>1</sup> The final dataset takes the form of a panel, without the kind of markers necessary for modelling network nodes for privacy purposes.



Figure 1 illustrates the composition of the dataset by source country, with an equivalent distribution of the dataset by country. Posts for Morocco and Kenya as origin countries stand at almost similar cumulative percentages of the dataset – with 162,312 posts for Morocco and 159,072 posts for Nigeria – while posts with Kenya as an origin country are slightly higher, with 173,400 posts in total, accounting for 28% of the dataset. The ‘unknown’ origin country designates groups for which no origin country was clearly flagged in the name of the group<sup>2</sup>.

**Figure 1: Origin country composition of the dataset**



**Note: Cumulative percentages of the origin country composition of our dataset.**

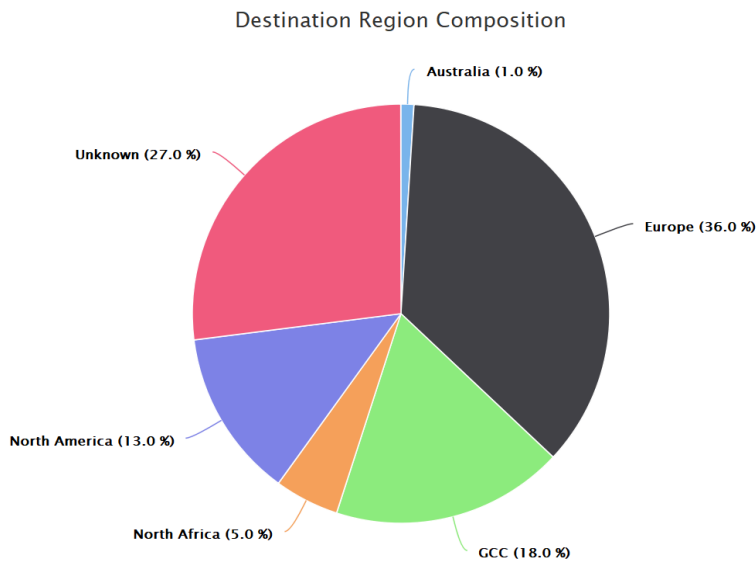
We identified the destination country of the groups in the same manner as for origin countries. From there on, we aggregated these destination countries by region for analytical purposes. Figure 2 shows the composition of our dataset by destination region. European countries are the most popular destination for posts in the dataset,

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<sup>2</sup> To identify source and destination countries in the dataset, a detailed analysis of the "Group Name" column was carried out. We carefully examined group titles. With this approach, the source and destination nations were extracted automatically from the generated names using the "pycountry" library. When automation proved insufficient, accurate assignment of source and destination nations was verified through a manual assessment of a subset of names.

standing at 36% of all posts, with the unknown category in second place (27%) and GCC countries in third place with 18%.

**Figure 2: Destination region composition**



**Note:** Cumulative percentages of the destination regions of interest to the posts in our dataset.

Here, we develop an innovative way to measure migration aspirations by using topic modelling methods derived from advances in NLP. We do so in echoing some of the criticism that the notion of migration aspirations – various desires, intentions and preparations to migrate – has been notoriously difficult to measure. Recently, some have identified that preparation to migrate should not be conditional upon answering affirmatively to whether one would “like to permanently move to another country” (migration aspirations as measured in the Gallup World Poll) because tied migrants and others who do not aspire to migrate still intend to do so (Huber et al., 2022). While we acknowledge that migration aspirations and flows co-vary, there is a

significant difference between those who aspire to migrate and those who actually do; the latter being conditional on the *capability* to migrate (Aslany et al., 2021; de Haas, 2021). Migration policies also likely curtail capabilities to migrate differently for men and women and for the global north and south, conditional on skill and income levels (Flahaux, 2016; Huber et al., 2022), which should be randomised on SMPs.

To disentangle migration aspirations from all other discussions taking place on the groups over almost five years, we topic-modelled the data by focusing on the three countries of origin of interest to us – Nigeria, Kenya and Morocco. For Nigeria and Kenya, we focused on English language posts, while we used Arabic posts for Morocco – written both in the Arabic alphabet (later referred to as Arabic) and with the Latin alphabet (later referred to as Darija)<sup>3</sup>. We opted for non-supervised algorithms – here non-negative matrix factorization (NMF) and latent dirichlet allocation (LDA) – to have a comprehensive and unbiased view of what the groups talk about instead of providing migration seed words around which to model the dataset. Through mathematical measures and qualitative verification, we found that NMF provided more coherent topics, and therefore focus on these when we discuss our findings later in the paper.

We coded the NMF algorithm to provide us with a list of 30 topics with 10 top words for each topic. We decided to cast a wide net by clustering the dataset over 30 topics instead of the more common 10 or 20, because we did not want the algorithm to omit relevant discussions that we could have missed by artificially reducing our scope. Ultimately, the topic modelling only served as a starting point for the categorisation, as teams of research assistants reviewed each topic individually, in relation to their top words and actual posts in the dataset, to offer a topic name in

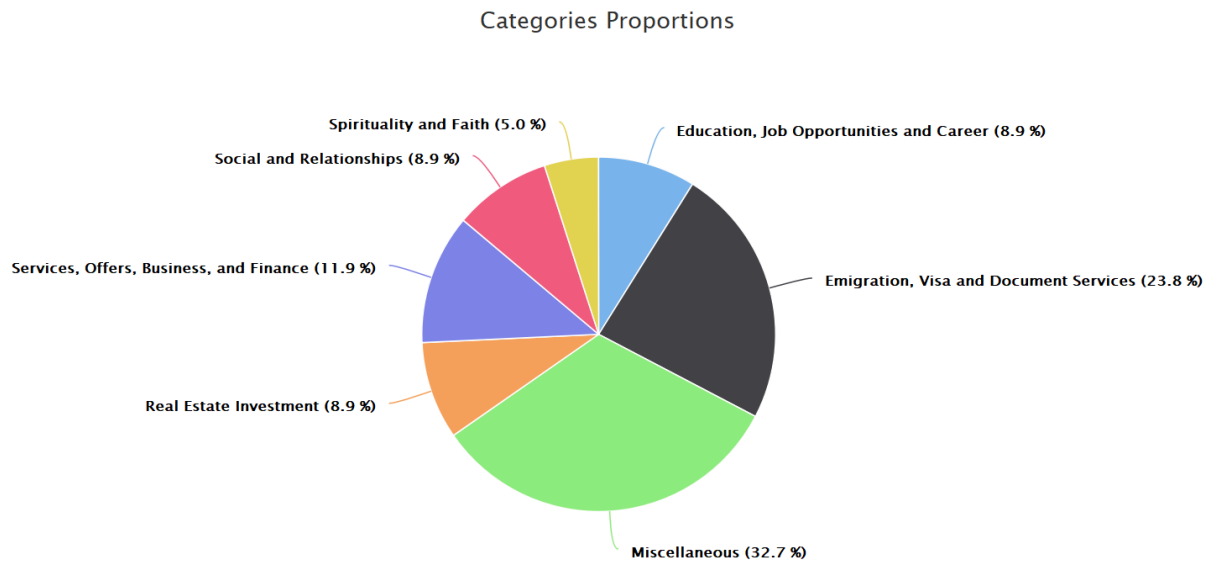
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<sup>3</sup> The tasks of creating the topic models and cross-checking their validity was carried out by native speakers of these countries, which helped ensure quality in the final product.

natural language. Research assistants cross-checked each other after each task was completed to ensure consistency and congruence over the labels<sup>4</sup>.

To increase cross-country comparability, we qualitatively categorised all the topics across all three origin countries into seven general categories based on the final labels assigned to individual topics<sup>5</sup>. Figure 3 summarises the distribution of categories in the dataset.

**Figure 3: Categories percentages**



**Note: Cumulative percentages of the seven post categories in our dataset.**

Emigration, visa and document services is our main category of interest. It is centred on the theme of migration and international mobility, with posts asking questions

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<sup>4</sup>The initial phase involved closely scrutinising the top words associated with each topic, identifying patterns and common themes among these words. This process aided in the formation of preliminary topic labels and laid the foundation for our categorization effort. To fully unveil the essence of each topic, we delved into the messages contained within them. Through a meticulous review of these messages, we refined and confirmed our understanding of each topic, gaining a more profound comprehension of their content. Subsequently, with a comprehensive understanding derived from the review of messages, we proceeded to assign final labels to each topic. These labels were crucial for facilitating clear communication and content management, ensuring that each topic's essence was succinctly captured.

<sup>5</sup> For more details on the topic models and the preprocessing for each country, see Appendix.

about legal emigration processes and others offering help for various visa and emigration document services. Common themes include freelance and partner visas, family visa procedures and inquiries about accommodation. Passport-related issues, such as appointment booking, good conduct certificates and embassy requirements, are also frequently raised. It also addresses international job placements and travel logistics like insurance and flight bookings and provides updates on visa availability for specific countries. Posts here serve as a valuable resource for individuals contemplating opportunities in foreign countries, seeking to understand visa requirements, or looking for information on document services for international travel. Examples of such posts include:

*“passport booking early appointment date good conduct pushing embassy stamp WhatsApp me”; “passport application and pushing international job placement visa application travel insurance flight ticketing hotel booking”; “atar one year visiting visa available we deliver sure traveling visa also you can call us to any police station for agreement follow or like our fb page [mentions name] to keep getting visa update”; “study and work in Latvia Europe Schengen winter Latvia intake apply now for admission February March intake with the option of paying service charge before or after you have gotten your visa available courses and tuition fee bachelor degree programme”*

Posts within this category are common for Nigeria, Kenya and Morocco, and show how people search for opportunities to emigrate. The six other categories encompass a wide range of topics being discussed on the migration-related public Meta groups we collected for Nigeria, Kenya and Morocco. They are all related to migration in some way in that they are discussions aimed at the diaspora or would-be migrants, but not all are immediately relevant to our aim here – measuring

migration aspirations, capabilities, intentions and experiences. The real estate and investment category represents several topics that investigate the intersection of real estate investing abroad or at home for the diaspora, employment and study abroad with life and success motivations. Posts in this category focus on attaining financial progress and uncovering global prospects for migrants and would-be migrants. Additionally, this category addresses marketing issues in building construction at home and abroad, providing readers with a thorough understanding of effective real estate marketing tactics. Examples of posts in this category include the following:

*“Some properties you can check out to purchase with instalments plan call”;  
“looking for prime serviced plots exclusive affordable housing development  
unserviced land and industrial plots within [mentions location] call me on”.*

These examples show advertisements for properties available for purchase in the form of lands and houses.

The education, job opportunities and career category covers educational opportunities and online job opportunities abroad for would-be migrants and the diaspora. The posts largely offer job opportunities abroad, presenting a broad spectrum of global career prospects. Examples of such posts are:

*“We are still looking for both males and females for security drivers food packaging in Qatar for more information”; “Are you aware of the many opportunities out there in Canada Australia turkey and other Schengen countries contact us for more details via call WhatsApp [mentions identifier]”.*

These posts range from recruitment calls to awareness about opportunities in Canada, Australia, Turkey and other Schengen countries.

Topics categorised under services, offers, business and finance focused on discussing financial matters, business prospects and services for both diaspora members and would-be migrants. The posts under this category encompass a wide spectrum of commercial and service offers and opportunities. For instance, posts within this category may offer valuable insights into financial guidance or information on loans abroad or at home. It also addresses issues related to help, support and advice, along with discussions on business opportunities and financial services. Examples include:

*“quality mattress available delivery are done countrywide payment on delivery size inches [mentions name] price call text or WhatsApp”; “cash loan business loan emergency loan personal loan message me”.*

These show the extent to which people go to publicise their products even for the seemingly small products.

In the services, offers, business and finance category, some posts discussed emerging transnational markets, particularly the demand and supply of local food and textiles between Africa and various foreign destinations. Services adjust to meet the demands of labour migrants but with little organisation of these mobility infrastructures (Shire, 2020). For example, SMP users offered to be personal shoppers in exchange for a fee; others offered to transport goods on behalf of others. One user posted:

*“we export quality Nigerian foodstuffs worldwide contact us for your supplies of food spices garri beans flour yam flour cassava flour palm oil crayfish melon seed ... other agricultural products”.*

Transport of goods for the use of migrant communities is not unique to Africa. Nancheva (2022) for example discusses the van and lorry shipping of food between Bulgaria, Romania and the United Kingdom as the destination facilitated by the creation of transnational spaces through informal social online support groups.

The social and relationships category lumps together posts about human connections, personal bonds and the dynamics of interpersonal relationships for migrants and would-be migrants. Posts span diverse topics, including love, marriage and casual meet-ups with romantic intentions. This includes posts like the following:

*“hallo all recently moved to [mentions location] and am looking to meet my fellow Kenyans hoping to make some new friends”; “when you love someone and you love them with your heart it never disappears when you’re apart and when you love someone more and you ‘ve done all you can do you set them free”.*

The spirituality and faith category contains posts that mostly focus on religious matters, offering discussions on spells, charms and rituals, and spiritual practices in general by the diaspora community and would-be migrants. Broader conversations about spirituality, faith and support are also included, offering valuable perspectives on belief systems, spiritual guidance and faith. Some of such posts are:



*“why worry when you can pray trust in Jesus Christ he will make way for you”, “love spell caster in Kenya traditional herbalist doctor [mentions name] how can help you to solve your spiritual problem...”.*

Finally, the miscellaneous category encompasses a wide spectrum of topics, such as general (political) information and entertainment by the diaspora community. It includes general announcements and information sharing, along with diverse subjects such as gambling, betting, social media engagement, personal stories and more. Examples of posts include the following:

*“candle blowing challenge hilarious see who won click here to watch”,  
“another odds have been posted on my telegram group don’t miss it out join quickly before the kickoff starts”.*

To better disentangle the discussions on migration generally speaking, we created an additional category that spanned across posts and the original seven categories. The migration category differs from the previously mentioned emigration, visa and document services category, which exclusively focuses on posts related to migration plans, obtaining travel documents and preparing for visas. In contrast, the migration category encompasses a broader spectrum, including various pathways for moving to another country, such as through education, employment, business ventures and more. This unites individual topics that revolve around embracing new horizons and opportunities. It includes discussions on life and success motivations, real estate investment, work and study abroad, online small jobs, love, marriage, job opportunities, and visa and document services. It provides insights into individuals exploring new horizons and opportunities on an international scale.

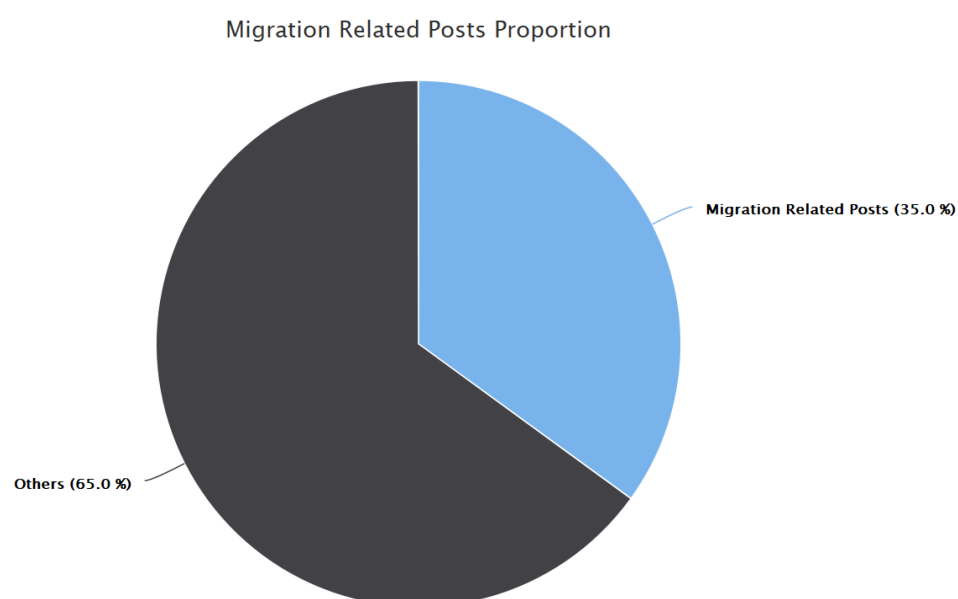
# DYNAMIG

The general migration category also provides insights into various *personal* aspects of migration and individual growth. Some topics included here centre around the concept of emigration, encompassing both physical and personal transitions. It therefore encompasses discussions of people considering the possibility of moving to another area or nation for a variety of purposes, including self-discovery, career, education or relationships. As a result, topics in this category help encompass all the nuances of migration, providing perceptions into the drivers, difficulties and pragmatic considerations that accompany a substantial relocation. It acts as a helpful general category for posts discussing motivation, knowledge and direction as individuals go on journeys of exploration, development and transformation across geographical boundaries. Examples of those posts are:

*“ever dreamed of studying travelling and acquiring personal and career growth all in one journey...what are you waiting for apply today study in Australia study in Canada study in UK study abroad [mentions name]”; “anyone in Europe in need of well-paying parttime job comment me”; “am [mentions name] hahaahaaaaa my enemies am no longer in Kenya come to united kingdom also and fight me love peace and being rich are enough for me to live most happy life thank you .. [mentions name] with your team here don't rush take your time for more about her online connection find her on WhatsApp via”; “Bahrain jobs available visa in days food accommodation provided office location [mentions location] center and floor office line call WhatsApp”; “passport application and pushing international job placement visa application travel insurance flight ticketing hotel booking”.*

Figure 4 illustrates the distribution of this category across our dataset and shows that roughly a third of our original dataset is made up of posts that discuss general migration<sup>6</sup>.

**Figure 4: Migration-related posts (proportions)**



**Note:** Cumulative percentage of the composition of the dataset across two categories (migration versus non-migration).

While the structure of the Meta data prevents network analysis, its panel data format allows us to draw many conclusions about discussions of migration aspirations, capabilities, intentions and experiences on SMPs. In the next section, we discuss the evolution of migrants' use of public Meta groups using time series of the categories we have discussed so far.

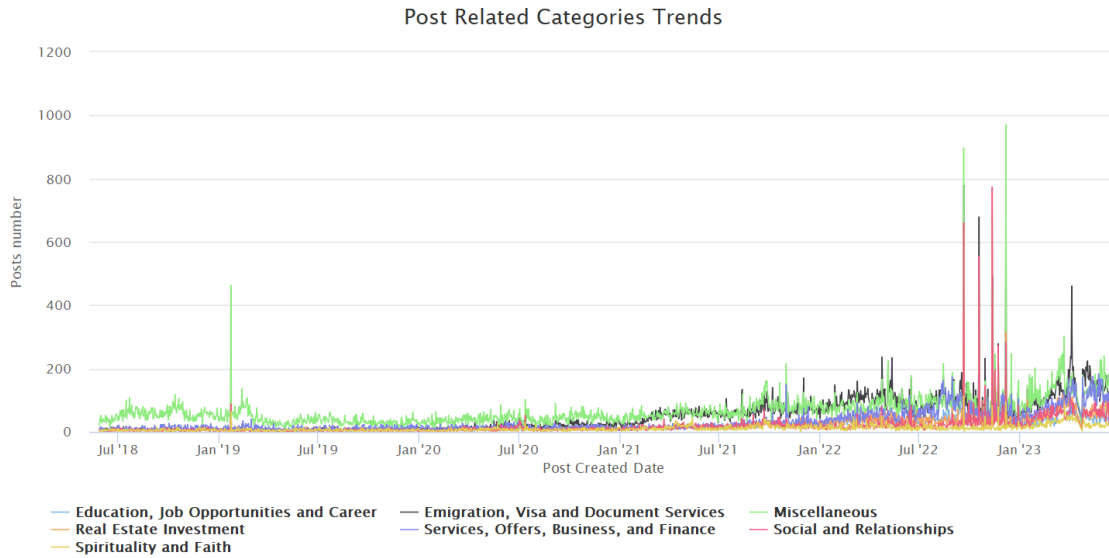
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<sup>6</sup> Some information in the example posts in this section were anonymised, as per the specifications between brackets.

# Empirical analysis

Figure 5 shows the evolution of our time series for each of the seven post categories on Nigerian, Kenyan and Moroccan public groups related to emigration on Meta. The historical timeline is plotted on the horizontal axis, while post frequencies are plotted on the vertical axis, and the evolution of frequencies through time for each of the seven categories is represented by one of the seven colour-coded curves. We can clearly see two things – first, that the frequency of posts in these groups jumps substantially starting in 2021, and second, that the frequency of posts related to emigration, visa and document services – represented by the black curve – rises considerably in 2021, too. In other words, migration-related public groups became significantly more active in 2021, and there is an important change in the issues discussed in those groups, from a dominance of miscellaneous discussions to a dominance of discussions on emigration, visa and document services. An examination of these trends divided by origin country (see Appendix for the figures) shows the dynamic at hand is pushed mostly by Moroccan and Nigerian groups, with Kenyan groups seeing a much lower engagement with discussion of emigration, visa and document services.

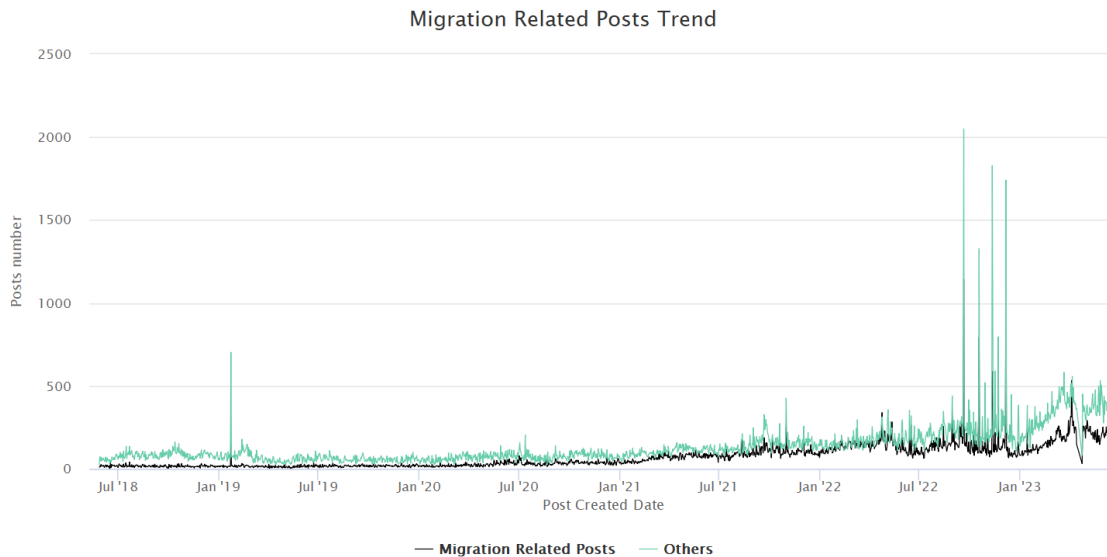
**Figure 5: Post frequencies by category (2018 to 2023)**



**Note: Evolution of each of the seven categories of discussion (frequencies) from 2018 to 2023.**

Trends for the general migration category, which we constructed out of all the topics, confirm the findings on Figure 6. In Figure 6, we plot a time series of all topics categorised as being about migration independently from the seven topics presented in Figure 6. Here too, the timeline of the time series is plotted on the horizontal axis while post frequencies are again plotted on the vertical axis, and the evolution of frequencies through time for each of the two categories is represented by one of the two curves. Figure 6 shows a clear rise in the migration category from 2021 onward, and cross-examination with country-specific time series shows the same trend as the one mentioned above for Figure 6 – see Appendix.

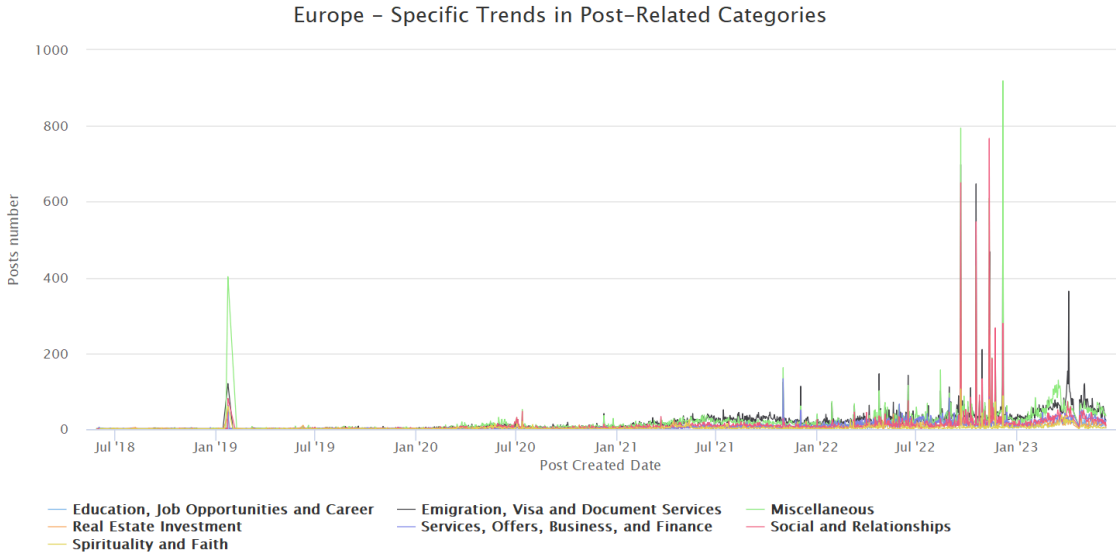
**Figure 6: Migration-related posts (frequencies, 2018-2023)**



**Note: Evolution of migration- vs non-migration-related posts (Frequencies, 2018 to 2023).**

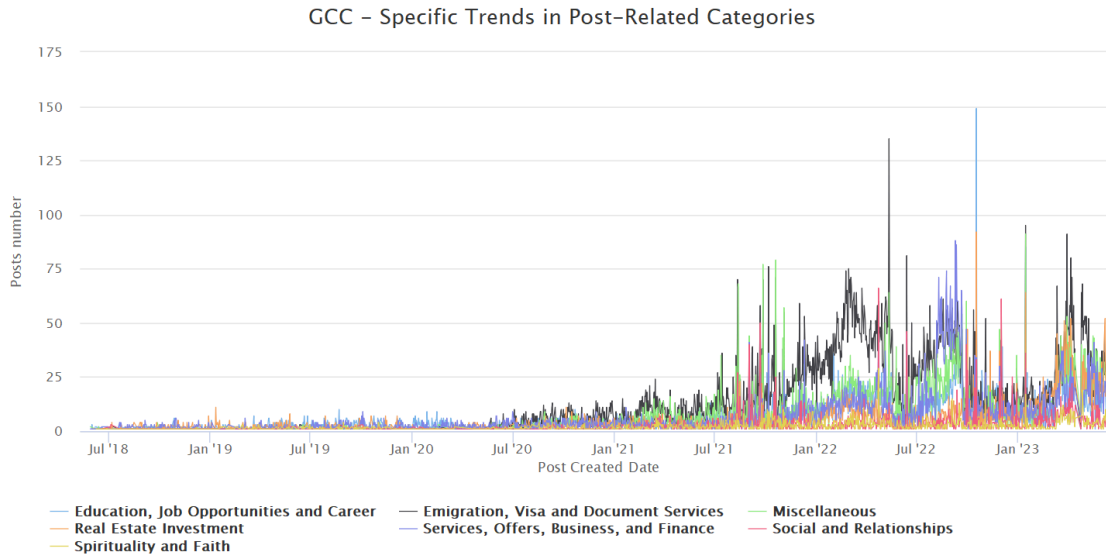
In Figures 7 and 8, we focus on posts for all seven categories in groups aimed at European and GCC countries as destination countries (respectively). Structured in the same way as Figure 6 above, both show a clear trend of gradual relevance of posts about emigration, visa and document services starting during the COVID-19 pandemic. For European countries, the trend starts to visibly dominate over other forms of discussion online around late 2020, and especially around July 2021. We can then see the black line representing this category overtake all the other curves – which represent other categories of discussions on these public Meta groups. For GCC countries the trend is even more pronounced. In Figure 8, we see the dominance of posts around emigration, visa and document services emerge noticeably starting in July 2020 and mostly overtake all forms of posts on GCC-oriented groups for the rest of the time series.

**Figure 7: Post frequencies by category; Europe as a destination region (2018-2023)**



**Note: Evolution of frequency of posts related to each of the seven categories for Meta groups with Europe as a destination region (2018-2023).**

**Figure 8: Post frequencies by category; GCC as a destination region (2018-2023)**

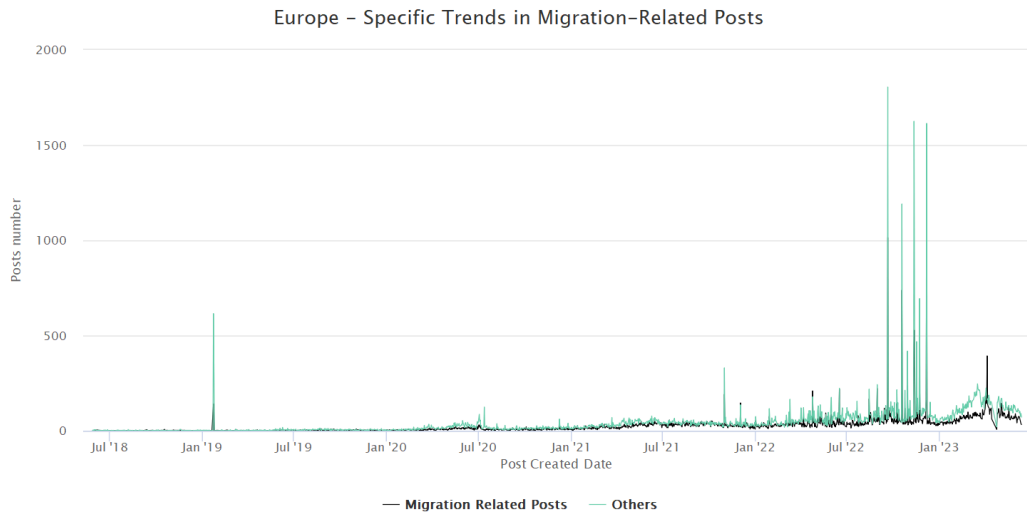


**Note: Evolution of frequency of posts related to each of the seven categories for Meta groups with GCC countries as a destination region (2018-2023).**

In Figures 9 and 10, we again explore the same dynamic, this time focusing on the general migration category. Even if more moderate, we still notice an overall parity of posts for migration- and non-migration-related discussions for Europe-oriented public migration groups on Meta, with some overtakes by the migration category in 2021, 2022 and 2023. For GCC-destined groups, the trend of dominance of the migration category is even more pronounced and behaves in a similar way to the variation discussed earlier for the emigration, visa and document services toward GCC countries in the figure above. The trend of dominance of the migration category for groups destined toward GCC countries starts around summer 2020 and overtakes the time series for most of 2022, while receding a little during 2023.

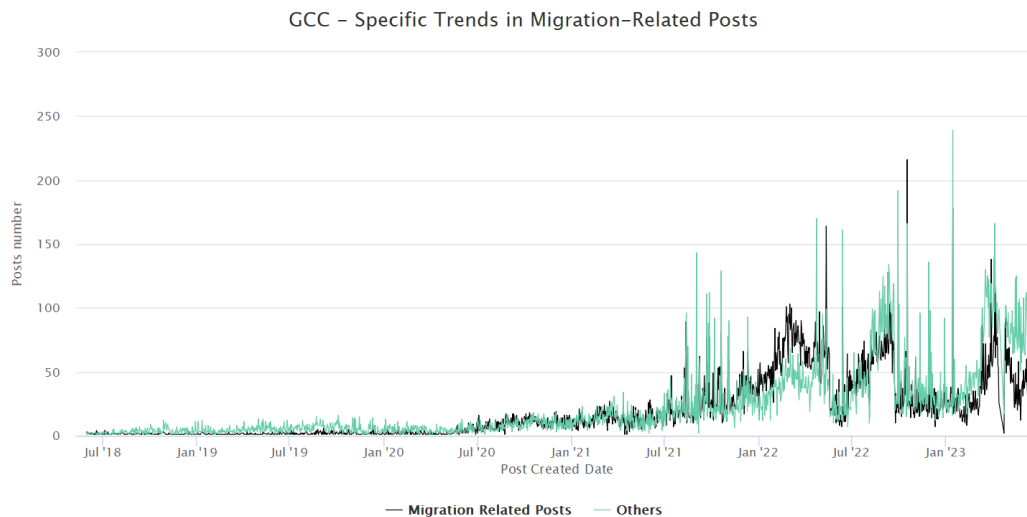


**Figure 9: Migration-related posts; Europe as a destination region (frequencies, 2018-2023)**



**Note: Evolution of frequency of migration- vs non-migration-related posts for Meta groups with Europe countries as a destination region (2018-2023).**

**Figure 10: Migration-related posts; GCC as a destination region (frequencies, 2018-2023)**



**Note: Evolution of frequency of migration- vs non-migration-related posts for Meta groups with GCC countries as a destination region (2018-2023).**

# Discussion and conclusion

In this paper, we explored the aspirations, capabilities, intentions and experiences migrants discuss on Meta, with the goal to identify migrant decisions on where to go and the impact social media has on mobility. To do so, we identified public Meta groups organised for and about migration from Nigeria, Kenya and Morocco, to a variety of destination regions – especially Europe, GCC countries and North America – and collected posts on these public groups between 27 May 2018 and 14 April 2023. Based on a final sample of 620,458 individual posts, we show two things in the paper – first, that migrants discuss a large variety of issues on social media platforms, and second, that migration *aspirations* rise rapidly during the COVID-19 pandemic. We divided discussions on the public Meta groups into seven categories using NLP techniques to show that migrants and would-be migrants largely discuss their migration aspirations by asking for help with their plans (such as visa procedures and both foreign education and job opportunities), business plans and opportunities, and relationship matters (whether purely social or even romantic). Moreover, we divided our sample further into purely migration-related posts and non-migration-related posts, and show that the ratio of migration- to non-migration-related posts changes drastically during the pandemic. Indeed, migration aspirations, intentions and experiences rose substantially during the COVID-19 pandemic compared to all other posts, especially those that discuss emigration, visa and document services.

Our findings contribute to the literature on social media and migration in two ways: first, it confirms some previous findings on the ways migrants (and would-be migrants) use social media platforms. Second, it adds some new use cases to the

table. Regarding our first contribution, we used large  $N$  quantitative techniques to show that migrants and would-be migrants, whether refugees or conventional migrants, do use social media platforms to inform their decision-making, their path in the migration journey, and ease their integration in their place of settlement. This corroborates previous findings by others that were based on qualitative methods and self-reported answers by migrants, and especially refugee populations, with most samples being drawn from Syrian refugee populations (Dekker et al., 2018c; Gillespie et al., 2018b; Kutscher & Kreß, 2018b; Martin & Hayford, 2021b; Miconi, 2020b; Worrell, 2021b).

Regarding our second contribution, our findings suggest a previously unreported (or unnoticed) use case for migrant groups on social media platforms: business. Our findings suggest that migrants also used public Meta groups to exchange goods and services, particularly those that addressed needs of their selected population group, such as hair styling and cooking services, financial support to fellow migrants and even resource pooling. This implies that while some of those services might be available at destination, an informal market was evolving supplying additional services. For instance, a shared economy was evolving in which migrants offered to split necessities such as accommodation. Africans also used social media to maintain linkages with migrants offering to support those in the diaspora in shopping for local commodities, particularly food items and to transport those products abroad.

Migrants also showcased lifestyle changes that took place at their destination. While we could not ascertain that showcasing lifestyle changes had any influence on migration aspirations of those who remained at origin, the most common trend on the pages we examined was to present the migration journey as successful.

Future works would gain to address the open question on which we ended the empirical analysis of social media discussions by migrants on Meta: why do migration aspirations rise so much starting in 2021? As a final note to this paper, we discuss possible causal mechanisms at play and draw some conclusions. Our main hypothesis is that the COVID-19 health crisis caused this sudden rise in emigration aspirations by way of some other variable, which we suspect to be economic downturns. The reason why we suspect that the pandemic is not the only causal factor here is because interest in emigration, visa, and document services only rises in 2021.

We infer that were the health crisis the only causal factor, posts about legal emigration would have risen in popularity earlier than in 2021, given that by then, the pandemic had been ongoing already for a year, and some other intermediary factor must be at play here (Okunade & Awosusi, 2023). By 2021, the impact of COVID-19 on our economies was already being felt, which we suspect is the main reason for the large interest in legal emigration in Moroccans' and Nigerians' Meta groups. That said, it is also possible that the effects of the pandemic had an impact on emigration aspirations with a time lag. In other words, the pandemic alone is the main culprit, and with or without a substantial economic downturn in 2021, the individual and societal toll of COVID-19 would have caused interest levels in legal emigration to spike.

An important consideration in attempting to understand the relationship between the pandemic, economic downturns and migration aspirations is that Kenya is an outlier case in our analysis – both Moroccan and Nigerian groups on Meta saw a rise in migration aspirations and migration-related posts, but Kenya noticeably did not. Future studies could explore why some societies seem to experience a rise in emigration aspirations while others do not during the COVID-19 pandemic.

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# Appendices

## Appendix A: Topic models

### Appendix A1: Topic modelling and categorisation

#### **Preamble to topic modelling using Meta posts**

We mapped Meta public groups that were labelled as a platform for migrant discussions. The data from these groups were extracted and sorted using non-negative matrices to compose optimised topics. The posts were categorised into 30 topics labelled from 0 to 29. The sample size covered the period of 27 May 2018 to 14 April 14, 2023.

The topic labels contained keywords that were suggestive of the discussion. In order to be clear on the content of discussion, Meta posts were read manually. We established a topic label for the topic number in question after we had reached saturation with the posts – meaning the same subject(s) were repeated time and again. In other words, we manually checked and read the posts that are categorised within these 30 topics, in order to understand what each topic refers to in relation to the top words presented in the Table. Following a presentation of these 30 topics along with the top words that best defined them, certain repetitive themes were identified. These led to a categorisation of the topics using 10 categories for Nigeria under which all the topics could be grouped.

## **Category 1: Real estate investment**

Within this category, the primary focus revolves around the real estate sector, particularly real estate investment. Topics in this category include media and entertainment with a strong connection to real estate, local real estate advertisements, and broader discussions surrounding real estate and property. These topics likely provide insights into the trends, opportunities, and dynamics within the real estate industry, offering valuable information for those interested in real estate investments.

## **Category 2: Education, job opportunities and career**

Category 2 centres on educational opportunities, job prospects and career development. Topics in this category span a wide range of subjects, from skill acquisition and business opportunities, often oriented towards international opportunities, to training programs designed for migrants. Additionally, the category covers job advertisements and the services provided by job agents. The content within this category is likely valuable for individuals that are seeking education, job placements or career advancement, especially in international contexts.

## **Category 3: Services, offers, business and finance**

This category encompasses a diverse array of discussions related to services, business offers and financial matters. Topics delve into subjects like business and marketing, with a particular focus on 'get-rich-quick' schemes. There are also discussions about market trends and pricing, export and remittance services and opportunities for product registration. The content in this category is likely beneficial for individuals exploring business opportunities, marketing strategies and financial services, including international trade and remittances.

## **Category 4: Social and relationships**

Category 4 centres on social and interpersonal dynamics, shedding light on various aspects of human relationships. Topics in this category touch on subjects such as gender dynamics and conversational expressions, providing insights into societal interactions and the nuances of relationships. This content is likely informative for those interested in understanding human behaviours, communication patterns and social dynamics.

## **Category 5: Spirituality and faith**

This category delves into matters of spirituality, faith and personal well-being. Topics within this category encompass discussions on spirituality, encompassing personal and communal aspects, and broader conversations about religious beliefs and practices. Individuals seeking spiritual guidance, insights into faith-related topics or a better understanding of well-being may find this category enlightening.

## **Category 6: Emigration, visa and document services**

Category 6 is dedicated to discussions related to emigration, visa services and travel documents, particularly focusing on aspirations to migrate. Topics include export and business opportunities, visa-related discussions, agent services, networking resources for relocation and country-specific information, travel logistics, family visa-related information, and work permits. Additionally, this category provides updates on visa-related information through social media channels.

These topics collectively offer a comprehensive guide for individuals planning to relocate, seek work permits or engage in international travel.

## **Category 7: Miscellaneous**

The miscellaneous category spans a diverse range of topics, providing insights into a wide array of subjects. This includes discussions related to human relationships,



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specific names and orders, politics, current affairs with a focus on Nigeria-specific content, Nigerian politics and prominent personalities, crime and security, Nigerian news encompassing football and soccer updates, and general observations of human actions. This category offers a blend of content catering to diverse interests and information needs.

## **Migration category**

Migration-related discussions are dispersed across several categories and encapsulate a wide range of topics. These encompass aspirations and preparations for migration, business opportunities, educational prospects abroad, job advertisements, services provided by agents, family visa information, work permit details, updates on visa-related information via social media, employment opportunities, recruitment services, and travel information with a connection to real estate. Together, these topics offer a comprehensive view of the experiences, challenges and opportunities associated with migration and international mobility.

## Appendix A2: Nigeria NMF topic model categories

### **Category 1: Real estate investment**

- Topic 5: Media and entertainment, real estate
- Topic 18: Local real estate adverts
- Topic 19: Real estate and property

### **Category 2: Education, job opportunities and career**

- Topic 11: Pre-relocation skill acquisition and business opportunities mainly abroad
- Topic 17: Training for migrants

- Topic 20: Job advertisements and agent services
- Topic 28: Employment and recruitment

## **Category 3: Services, offers, business and finance**

- Topic 0: Business and marketing, particularly 'get-rich-quick' schemes
- Topic 1 Market and pricing, export and remittance
- Topic 7: Registration for services

## **Category 4: Social and relationships**

- Topic 25: Gender, conversational expressions

## **Category 5: Spirituality and faith**

- Topic 10: Spirituality and wellbeing
- Topic 21: Religion and faith

## **Category 6: Emigration, visa and document services**

- Topic 2: Export and business, visa (aspirations to migrate)
- Topic 3: Agent services
- Topic 9: Networking for relocation and country information
- Topic 12: Travel and documentation
- Topic 22: Family visa information
- Topic 27: Social media and updates on visa
- Topic 24: Travel information and real estate
- Topic 26: Work permits

## **Category 7: Miscellaneous**

- Topic 4: Human relationships and age
- Topic 6: Specific names and orders

- Topic 8: Politics, current affairs and government (Nigeria-specific)
- Topic 13: Nigerian politics and personalities, home fellowship and service
- Topic 14: Political figures and Nigerian current affairs
- Topic 16: Crime and security
- Topic 23: Nigerian news (football, soccer, Premier League)
- Topic 29: General people and actions

## **Migration categories**

- Topic 1: Export and business, visa (aspirations to migrate)
- Topic 2: Export and business, visa (aspirations to migrate)
- Topic 3: Agent services
- Topic 9: Networking for relocation and country information
- Topic 11: Pre-relocation skill acquisition and business opportunities
- Topic 12: Travel and documentation
- Topic 15: Education opportunities abroad [also work and study abroad]
- Topic 17: Training for migrants
- Topic 19: Real estate and property
- Topic 20: Job advertisements and agent services
- Topic 22: Family visa information
- Topic 26: Work permits
- Topic 27: Social media and updates on visa
- Topic 28: Employment and recruitment
- Topic 24: Travel information and real estate

## Appendix A3: Kenya NMF topic model categories

### **Category 1: Real estate investment**

- Topic 1: Life and success motivations, real estate investment, work and study abroad
- Topic 3: Building and building construction marketing
- Topic 5: Real estate investment
- Topic 8: Real estate investment and professional services
- Topic 15: Real estate investment and property opportunities
- Topic 26: Property listings and accommodations

### **Category 2: Education, job opportunities and career**

- Topic 2: Online side hustles and job opportunities
- Topic 10: Job opportunities abroad
- Topic 25: Foreign job opportunities and recruitment

### **Category 3: Services, offers, business and finance**

- Topic 12: Products and services offerings
- Topic 14: Services and opportunities offers
- Topic 18: Commerce and services
- Topic 27: Financial services and loans
- Topic 0: Helps and support
- Topic 20: Business opportunities and financial services

### **Category 4: Social and relationships**

- Topic 4: Love, marriage, hookup, investment
- Topic 21: Social connections and dating

## **Category 5: Spirituality and faith**

- Topic 7: Spell, charm, ritual
- Topic 17: Spirituality, faith and support

## **Category 6: Emigration, visa and document services**

- Topic 23: Visa and document services

## **Category 7: Miscellaneous**

- Topic 11: Diverse announcements and information
- Topic 13: Miscellaneous announcements and information sharing
- Topic 28: Diverse announcements and information
- Topic 19: Gambling, betting and promotions
- Topic 9: Social media engagement and video contents
- Topic 22: Social media captions and trending content
- Topic 6: Personal loss and restoration stories
- Topic 16: Testimonials and personal experiences
- Topic 24: Personal stories and experiences
- Topic 29: Personal stories and experiences

## **Migration category: Embracing new horizons and opportunities**

- Topic 1: Life and success motivations, real estate Investment, work and study abroad
- Topic 2: Online side hustles and job opportunities
- Topic 4: Love, marriage, hookup, investment
- Topic 10: Job opportunities abroad
- Topic 23: Visa and document services

## **Topic 0**

The posts here represent the need for help by Kenyans for their various needs and business adverts. Help took the form of donations, support, prayers, travelling /job opportunities outside Kenya, and so on. But among this, the need for medical help in terms of donations occurred more frequently.

## **Topic 1**

The predominant focus of the conversations in this setting is on the reasons behind success and the broader aspects of life. At the same time, most of these motives have been primarily applied to business endeavours, with a special emphasis on the real estate industry. A huge number of the posts were also centred on real estate. The last part is the study or work abroad.

## **Topic 2**

Most of the discussions under this topic were centred on hustling – to make extra income via online platforms like WhatsApp or Meta through betting and even trading. It also centred on posts about job opportunities, however, most of the job opportunities were for Kenyans in diaspora.

## **Topic 3**

This subject matter extensively features marketing discussions that revolve around buildings, encompassing their construction, sales, leasing and even interior design. The majority of the posts are dedicated to advertising and promoting houses for lease or sale, as well as marketing construction materials. While there are also conversations about investing in houses and real estate, they are not as prominently highlighted as the discussions surrounding property sales and leasing.

## **Topic 4**

A significant portion of the content within topic 4 revolves around themes of love, life partners, marriages, strategies for maintaining successful marriages, breakups, and even discussions about marriage/love spells. Intriguingly, a significant portion of these individuals are keen on connecting with individuals of white ethnicity, and it appears that there is a dedicated platform for this purpose. Many individuals posted testimonials after successfully establishing these connections, as it provided them with opportunities to travel abroad.

## **Topic 5**

The topic is all about real estate investments-buying landed properties, houses, gardens and leasing out buildings and apartments.

## **Topic 6**

The posts in topic 6 are more of individual stories of people on how they 've lost some things in their lives that led to pain and sorrow but now have been restored. Most of the posts appeared to make testimonies in order to help or boost the business of an individual.

## **Topic 7**

Posts in this topic are focused on spells and rituals for love, money, winning court cases, travelling abroad, business improvement, among others. This is done both for individuals based in the home country for those in the diaspora.

## **Topic 8**

The focus of posts in this topic is majorly on real estate investment opportunities. The other major content of the post was on professional services for those looking

for jobs or other opportunities that require setting up CVs, recommendations, among others.

## **Topic 9**

This topic contains posts discussing social media contents, especially videos. They were mostly comments and feedback about some videos and a plea to like, subscribe and watch.

## **Topic 10**

This topic is essentially a hub of exciting job opportunities online for those who have their eyes set on international horizons. From the Gulf to Europe and Asia, the spectrum of job openings is extensive. From the posts, they showcase the diverse roles available, from security drivers and food packaging in Qatar to receptionists, cleaners, and even positions in Kuwait.

## **Topic 11**

Topic 11 has no specific topic; it revolves around several announcements and information. These statements touch on various subjects, from lifestyle and photography to real estate, membership, travel and visa offers. They do not necessarily fit a single overarching theme but rather represent a collection of announcements and messages covering different aspects of life, services and opportunities.

## **Topic 12**

These statements provide information about various products and services available for purchase or use, such as land fencing, building materials, sneakers, roofing solutions, clothing, interior and exterior design services, international calling apps, concrete blocks, sofa covers, and more. These announcements revolve around



different offerings for customers, including pricing, delivery options and payment methods.

## **Topic 13**

These statements cover a range of different subjects and messages, including offerings related to irrigation systems, prayer requests, retail POS systems, content sharing, borehole drilling services, financial updates, personal connections, remittances, voting requests, community support, interview requests, and discussions about household chores. They do not fit a single specific theme but rather represent a collection of announcements, updates and requests across various topics.

## **Topic 14**

These statements revolve around offering a variety of products, services, and opportunities to the audience. The offerings include land investment, fixed matches, architectural services, visa application assistance, travel opportunities, home construction, real estate investments, job opportunities, event tickets, property sales, and various products like artificial dreadlocks.

## **Topic 15**

These posts primarily focus on promoting various types of plots and properties for sale. They highlight the benefits of owning land and offer details about different locations, sizes, prices, payment plans, and amenities available for potential buyers. The topic revolves around providing information to individuals interested in investing in real estate and property.

## **Topic 16**

These statements share personal stories and experiences of individuals who have benefited from various services, assistance or guidance. The testimonials cover a range of topics including spiritual help, immigration assistance, property deals, podcasts, deals and services, warnings about fraudulent activities, gratitude for positive changes, and more. The common thread is that individuals are sharing their personal experiences and expressing their feelings about certain situations or services.

## **Topic 17**

These posts primarily focus on sharing religious messages, inspirational thoughts, prayers, and expressions of gratitude. They also include announcements of events related to religious or charitable activities, such as fellowship, donations, and support for those in need. The common theme is the emphasis on faith, hope, community and positive values.

## **Topic 18**

These posts primarily involve various types of businesses, services and products being offered. They include advertisements for construction materials (stones), transportation services, sandals for sale and available rooms for rent. The posts are aimed at promoting products and services, providing information about pricing, availability and contact details for interested customers.

## **Topic 19**

Most of the posts under this topic involve the promotion of betting tips, odds and opportunities for financial gain through gambling or betting. They often encourage users to join certain groups, subscribe for tips or take advantage of special offers related to betting and gambling activities. Additionally, some posts mention activities

related to secret societies or organisations, which can also be associated with certain forms of promotions or beliefs related to luck and success.

## **Topic 20**

The majority of the posts in this topic involve offering opportunities for individuals to engage in various business ventures, investment opportunities and financial services. They cover a range of topics including affiliate marketing, business openings, investment advice, real estate opportunities, career growth, and financial literacy. Additionally, some posts touch on political and news-related topics related to various parties and individuals.

## **Topic 21**

The posts here involve individuals seeking connections, friendships and romantic relationships with others. They are looking to meet people for various purposes, including companionship, marriage or dating. The posts also mention matchmaking services, introductions, and connections for individuals looking for partners.

## **Topic 22**

These posts are typically found on social media platforms and include hashtags, keywords, or descriptions related to videos, funny content, trending topics and other casual or entertaining content. They are short, often fragmented and are used to describe or provide context for the accompanying content, such as videos or images. This type of content is common on platforms like Instagram, TikTok and X, where users share their thoughts, reactions and observations in a concise and engaging manner.

## **Topic 23**

These posts involve various services related to visa applications, document processing and assistance with official documentation. The topics covered include passport application and processing, international job placement, travel insurance, flight ticketing, hotel booking, birth certificate replacement, good conduct certificates, and other document-related services. These posts are often aimed at individuals looking to travel, work, study or live in different countries and require assistance with the necessary paperwork and documentation.

## **Topic 24**

These posts involve individuals sharing their personal experiences, challenges, and journeys. They discuss various life situations, such as relationships, health issues, career struggles and the solutions they have found. Some posts mention seeking help from traditional healers or experts to address specific challenges. Overall, these posts provide insights into the lives and experiences of the individuals sharing their stories.

## **Topic 25**

These posts involve individuals or companies offering various job positions, especially in foreign countries. The posts mention job vacancies, requirements and the application process. They cover a range of industries and roles, from general workers to skilled professionals. These posts provide information about job opportunities and recruitment efforts in various countries.

## **Topic 26**

These posts involve advertisements related to various property offerings and accommodations. The posts mention available rooms, apartments, bed spaces and amenities such as internet, parking and kitchen facilities. They also include

information about visa services, transportation and other services related to the local area. Overall, these posts provide information about available properties, accommodations and related services.

## **Topic 27**

These posts involve advertisements related to loans, financial assistance and services related to managing financial situations. They include offers for different types of loans, such as personal loans, business loans, emergency loans, school fees loans, and more. The posts also mention terms, conditions and application procedures for obtaining loans. Additionally, there are mentions of door-to-door services, cash loans and other financial-related offers.

## **Topic 28**

Topic 28 has no specific focus; it revolves around several announcements and information. These statements touch on various subjects, from travel, lifestyle and photography to job opportunities, inspirational quotes, achievements and congratulations, graphic design, legal case and plumbing works, among others. They do not necessarily fit a single overarching theme but rather represent a collection of announcements and messages covering different aspects of life, services and opportunities.

## **Topic 29**

The posts here consist of individuals sharing their personal journeys, challenges, transformations and achievements. While the specific stories may vary, they all share the common theme of individuals recounting their unique life paths, challenges they have faced, and how they overcame them or achieved personal growth. This category captures the diversity of narratives and experiences shared by people in these statements.

## Categories description

### **Category 1: Real estate investment**

There are a ton of insightful articles in this category about real estate investing. It explores how real estate investment, employment and study abroad are integrated with life and success motivations, providing insightful viewpoints on attaining financial progress and discovering global prospects. It also looks at building and building construction marketing issues, giving readers a thorough understanding of real estate marketing tactics.

### **Category 2: Education, job opportunities and career**

This category has a lot of content that is geared on helping people advance their careers and education. It covers side projects and jobs that can be found online, which are especially pertinent in the current digital era. The discussions provide insights into job opportunities abroad and foreign job opportunities and recruitment, offering a broad spectrum of career prospects on a global scale.

### **Category 3: Services, offers, business and finance**

Discussions about financial issues, business prospects and services are centrally located in this area. The topics cover a wide spectrum, with a focus on commerce and services, from offerings of goods and services to offers of opportunities. For those looking for financial guidance or loan-related information, dedicated topics offer valuable insights. This category also addresses topics related to help and support, providing assistance and advice, alongside discussions of business opportunities and financial services.

## **Category 4: Social and relationships**

The social and relationships category offers a comprehensive exploration of human connections, personal bonds and the dynamics of interpersonal relationships. It includes discussions about love, marriage, hookup and investment, offering insights into personal relationships and romantic endeavours. Additionally, the discussions delve into social connections and dating, providing perspectives on social interactions and the dating experience.

## **Category 5: Spirituality and faith**

This category delves deep into matters of the spirit, offering discussions on spells, charms and rituals, providing insights into spiritual practices. It also includes broader conversations about spirituality, faith and support, offering valuable perspectives on belief systems, spiritual guidance and faith.

## **Category 6: Emigration, visa and document services**

Centred on the theme of migration and international mobility, this category provides insights into discussions related to visa and document services. It is a valuable resource for individuals contemplating opportunities in foreign countries, seeking to understand visa requirements, or looking for information on document services for international travel.

## **Category 7: Miscellaneous**

The miscellaneous category is a diverse landscape that covers a wide spectrum of topics, making it a one-stop destination for staying informed and entertained. It includes general announcements and information sharing, as well as diverse subjects such as gambling, betting, social media engagement, personal stories, and more. This category offers a wide range of content to cater to diverse interests and informational needs.

## **Migration category: Embracing new horizons and opportunities**

This category unites topics that revolve around embracing new horizons and opportunities. It includes discussions on life and success motivations, real estate investment, work and study abroad, online side hustles, love, marriage, job opportunities, and visa and document services. It provides insights into individuals exploring new horizons and opportunities on an international scale, making it an ideal resource for those seeking inspiration and practical guidance on their journey to new opportunities and experiences. This category provides insights into various aspects of migration and personal growth.

It gathers a collection of topics that centre around the concept of migration, encompassing both physical and personal transitions. This category serves as a forum for people to consider the possibility of moving to another area or nation for a variety of purposes, including self-discovery, career, education or relationships. The topics in this category shed light on the nuanced aspects of migration, providing perceptions into the drivers, difficulties and pragmatic considerations that accompany making a substantial relocation. It acts as a helpful centre for those looking for motivation, knowledge and direction as they go out on journeys of exploration, development and transformation across geographical boundaries.

## **Appendix A4: Morocco Arabic NMF topic model categories**

### **Category 1: Real estate investment**

Topic #21: Rent and housing offers

Topic #24: Rent and housing in the Middle East



## **Category 2: Study and job opportunities abroad**

Topic #11: Job opportunities

Topic #15: Job search and issues

## **Category 3: Emigration, visa and document services**

Topic #2: Immigration and visa services

Topic #7: Migration documents and procedures

Topic #8: Migration documents

Topic #9: General migration procedures

Topic #23: Tourism and visa information

Topic #25: Visa administrative procedures

Topic #13: Migration to Turkey for tourism

Topic #14: Migration to Italy

Topic #16: Migration to and from the Middle East

## **Category 4: Services, offers, business and finance**

Topic #10: Business and trade overseas

Topic #12: Transportation and housing

## **Category 5: Social and relationships**

Topic #4: Relationships and spiritual matters

Topic #20: Love and marriage affairs

Topic #17: Marriage, family and households

Topic #28: Marriage and family affairs

## **Category 6: Spirituality and faith**

Topic #26: Religious discussions

Topic #29: Religious holidays and festivities

## **Category 7: Miscellaneous**

Topic #0: Seeking help and assistance

Topic #1: Seeking assistance and advice

Topic #3: Seeking information and advice

Topic #5: Streaming services and entertainment

Topic #6: Visa, World Cup and football

Topic #18: Group activities and interactions

Topic #19: Posts on Morocco

Topic #22: General news and interactions

Topic #27: Health and lifestyle

### **Topic #0: Seeking help and assistance**

Members in this topic actively engage in sharing their concerns and seeking guidance from the community, fostering a supportive and empathetic environment where individuals can find the necessary resources and assistance to overcome their challenges and achieve their goals.

### **Topic #1: Seeking assistance and advice**

This topic revolves around members reaching out to others for various types of help and guidance. They actively seek assistance and advice on diverse topics, including travel, work-related queries, personal matters and general life challenges. The community actively participates in providing support, sharing valuable insights and offering practical advice, ensuring that members have access to the necessary resources and guidance needed to address their concerns effectively.

## **Topic #2: Services related to immigration and visas**

This topic primarily focuses on the exchange of services related to immigration and visas. Members actively seek assistance with visa-related matters while others advertise services pertaining to immigration. The community serves as a valuable resource for individuals seeking professional assistance and guidance for their immigration-related needs, fostering a supportive environment for individuals navigating the complexities of the immigration process.

## **Topic #3: Seeking information and advice**

Individuals in this topic seek information and advice on various topics, including travel, business opportunities, health and personal matters. Members actively participate in asking questions and seeking guidance from the community, fostering a collaborative and informative environment where individuals can access valuable insights and advice to make informed decisions and address their queries effectively.

## **Topic #4: Marital relations, love and spiritual matters**

Posts in this topic are related to marital relations, love relationships and spiritual matters. Members actively share their experiences, seek advice and offer insights into fostering healthy and fulfilling relationships. Individuals seek guidance and support on matters related to love, spirituality and emotional well-being, ensuring that members receive the necessary support and guidance for nurturing positive and meaningful relationships.

## **Topic #5: Streaming services, TV shows and movies**

Discussions here are related to streaming services, TV shows and movies. Members actively engage in sharing recommendations, reviews and discussions about various entertainment options available through streaming platforms.

Individuals seek insights into the latest TV shows and movies, fostering a vibrant and interactive environment for members to discover and enjoy diverse forms of entertainment.

## **Topic #6: Visa, World Cup and football**

In this topic, discussions are related to visas, the World Cup and football. Members actively participate in sharing information, insights and discussions concerning visa procedures, updates on the World Cup and engaging Moroccan football-related content.

## **Topic #7: Migration documents and necessary procedures**

Posts in this topic are about migration documents and the necessary procedures involved in the migration process. Members actively engage in discussions surrounding the essential documentation required for migration and share practical insights on navigating the complex procedures effectively.

## **Topic #8: Documents related to migration**

This topic groups posts delving into the crucial aspects of migration, specifically focusing on the acquisition, renewal and validation of essential documents such as passports, visas and driving licences. Members actively share their experiences, inquiries and practical advice on meeting the necessary requirements and staying compliant with the migration regulations of various countries.

## **Topic #9 : General migration procedures**

This topic groups posts serving as a comprehensive guide for navigating the complex procedures involved in migrating to different countries. Members participate in discussions centred on the legal protocols, necessary steps and key prerequisites for a smooth migration process. They exchange insights on obtaining work permits,

securing legal residency and seamlessly integrating into new societies, providing valuable support for individuals embarking on their migration journey.

## **Topic #10: Business and trade in migration**

Posts in this topic discuss the intricacies of international business and trade activities within the realm of migration. Members engage in comprehensive conversations concerning cross-border transactions, customs regulations and the efficient management of international trade. They actively share valuable strategies and insights into establishing and expanding businesses, ensuring efficient package delivery and navigating the complexities of global trade policies.

## **Topic #11: Job opportunities in migration**

Posts in this topic are related to individuals seeking rewarding employment opportunities in their migration destinations. Members actively participate in sharing job listings, employment resources and practical insights into different industries and sectors with high demand for migrant workers. They also offer effective strategies for building professional networks, obtaining work permits and successfully assimilating into diverse workplace cultures, ensuring a successful career transition for aspiring migrants.

## **Topic #12: Transportation and housing in migration**

In this topic, posts provide a comprehensive overview of transportation and housing solutions for individuals undergoing migration. Members engage in proactive discussions about cost-effective travel arrangements, airfares and car rentals, ensuring a seamless transition to their new destinations. They also share valuable insights on housing options, rental agreements and real estate market trends, offering practical guidance on securing comfortable and suitable living arrangements for migrants in different parts of the world.

## **Topic #13: Migration to Turkey for tourism**

Posts in this topic are about individuals planning to migrate to Turkey for tourism purposes. Members actively share insights on tourist visa procedures, popular destinations and cultural experiences, ensuring a memorable and fulfilling travel experience in Turkey. They offer valuable recommendations on must-visit attractions, local customs and travel regulations, enabling aspiring tourists to navigate the intricacies of Turkish tourism seamlessly.

## **Topic #14: Migration to Italy**

In this topic, the posts serve as an indispensable resource for individuals planning to migrate to Italy, offering a comprehensive understanding of the legal, cultural and practical aspects of the migration process. Members share valuable information on Italian visa procedures, residency requirements and employment prospects, facilitating a smooth transition for migrants seeking to settle and integrate into Italian society.

## **Topic #15: Job search and general issues**

In this topic, individuals actively engage in discussions concerning resume building, job interview strategies and effective ways to overcome common obstacles in the job search process. They also provide practical advice on adapting to new environments, navigating cultural differences and accessing support networks, ensuring a seamless transition for migrants entering the workforce in their new destinations.

## **Topic #16 : Migration to and from the Middle East**

In this topic, members actively exchange insights on visa procedures, employment opportunities and the cultural nuances specific to the region. They offer valuable support and guidance on navigating the unique challenges and opportunities

associated with Middle Eastern migration, ensuring a smooth transition and integration into the diverse societies of the Middle East.

## **Topic #17: Marriage, family and household affairs**

Posts grouped in this topic are about discussing the complexities of marriage, family dynamics and household management in the context of migration. Members engage in proactive conversations about intercultural marriages, family reunification procedures, and the challenges of raising families in new environments. They also provide valuable insights on the legal aspects of marriage and family affairs, ensuring a supportive environment for migrants navigating the complexities of familial and domestic life in their new countries.

## **Topic #18: Group interactions and activities**

This topic fosters posts about a dynamic community environment on the relevant Meta groups, encouraging meaningful interactions and discussions. Members actively participate in sharing group initiatives, updates and events related to migration and other relevant topics. They contribute to creating an engaging and supportive community atmosphere, ensuring that the group remains a valuable resource for migrants seeking information, guidance and social support during their migration journey.

## **Topic #19: Posts on Morocco**

This topic is about posts on Morocco. Members actively share updates on current affairs, cultural festivities and societal developments within the country, providing a comprehensive overview of Morocco's rich cultural heritage, tourism opportunities, and significant developments across diverse fields such as sports, politics and entertainment.

## **Topic #20: Love, marriage and relationships**

This topic is about love, marriage and various aspects of interpersonal relationships in the context of migration. Members actively engage in sharing their experiences, seeking advice on relationship challenges and discussing the cultural nuances influencing romantic relationships in diverse migration settings. They offer valuable insights and strategies for navigating the complexities of love and marriage in new cultural environments, ensuring a supportive environment for individuals embarking on their migration journey.

## **Topic #21: Housing rental and demand**

This topic groups posts where individuals actively share information on available rental properties, housing market trends and effective strategies for securing suitable accommodation. They also provide valuable guidance on lease agreements, rental negotiations and the legal aspects of housing transactions, ensuring a seamless transition for migrants seeking comfortable and secure living arrangements in their new destinations.

## **Topic #22: General news and interactions**

Here, individuals actively participate in exchanging opinions and insights on a wide array of current events, cultural trends and global developments relevant to the context of migration. They contribute to creating an engaging and informed community atmosphere, ensuring that the group remains a valuable source of information and knowledge for migrants across the globe.

## **Topic #23: Tourism and visa information**

Individuals in these posts actively share insights on travel requirements, visa application processes and practical tips for ensuring a seamless and hassle-free travel experience. They also provide valuable recommendations on popular tourist



destinations, travel itineraries and cultural etiquettes, ensuring that migrants have access to the necessary information for a fulfilling and memorable travel experience.

## **Topic #24: Housing in the Middle East and other destinations**

This topic offers comprehensive guidance on housing situations and rental inquiries, specifically focusing on the Middle East and other popular migration destinations.

Members actively share their experiences and provide valuable advice on local housing regulations, market dynamics and practical tips for securing suitable accommodation. They ensure that migrants have access to the necessary information and resources for finding comfortable and secure living arrangements in their new destinations.

## **Topic #25: Visa administrative procedures**

This topic serves as a comprehensive resource for discussing the administrative procedures and processes involved in obtaining visas for migration. Members actively engage in sharing practical insights, tips and guidelines on navigating the intricate visa application procedures, ensuring a smooth and efficient visa acquisition process for individuals planning to migrate to their desired destinations.

## **Topic #26: Discussions on religion**

Members actively participate in exchanging insights, interpretations and reflections on religion. They contribute to fostering a respectful and informative environment, ensuring that discussions surrounding religion and expressions remain insightful and culturally enriching for all members.

## **Topic #27: Health, weight management and lifestyle discussions**

In this topic, members seek valuable insights and tips on maintaining optimal health, managing weight effectively, and discussing general lifestyle-related topics.

Members actively engage in discussions about various health and wellness practices, offering practical advice and sharing personal experiences. They provide valuable recommendations for achieving fitness goals, maintaining a balanced lifestyle and adopting sustainable health habits, ensuring the well-being and vitality of all members within the group.

## **Topic #28: Seeking marriage and family affairs**

In this topic, posts are about members seeking guidance and support in matters related to marriage and family dynamics. Members actively share their experiences, seek advice on relationship challenges and discuss strategies for fostering healthy and fulfilling familial relationships. They engage in thoughtful discussions and offer valuable insights into various aspects of marriage and family life, ensuring a supportive and nurturing environment for individuals navigating the complexities of relationships within the context of migration.

## **Topic #29: Religious holidays and Islamic festivities**

This topic groups posts about religious holidays and Islamic festivities. Members actively share insights, cultural traditions and significant celebrations. They contribute to creating an educational and celebratory atmosphere, ensuring that the group remains a valuable resource for members seeking to deepen their understanding of religious customs and practices associated with Islamic holidays and festivities.

## Appendix A5: Morocco Darija NMF topic model categories

### **Category 1: Real estate investment**

- None of the topics directly relate to real estate investment

### **Category 2: Study and job opportunities abroad**

- Topic #10: Visa inquiries and job opportunities
- Topic #15: Italian cities and work opportunities
- Topic #22: International journey planning

### **Category 3: Emigration, visa and document services**

- Topic #0: International travel from Morocco
- Topic #2: Visa and residency queries
- Topic #5: Travel plans and visa applications
- Topic #7: Italian immigration and residency
- Topic #13: Visa and immigration assistance
- Topic #14: Immigration to Italy and visa inquiries
- Topic #16: Visa related questions and travel
- Topic #20: Residency and living abroad
- Topic #27: Travel and migration information

### **Category 4: Services, offers, business and finance**

- Topic #3: Diverse inquiries and requests
- Topic #8: Varied information and assistance
- Topic #12: Employment and job-related queries
- Topic #19: Legal information and immigration
- Topic #24: Transportation discussions
- Topic #25: Transportation services
- Topic #26: General requests and assistance

## **Category 5: Social and relationships**

- Topic #1: Personal and cultural matters
- Topic #9: Marital relationships and marriage
- Topic #17: Family reunification and travel
- Topic #28: Family situations and support

## **Category 6: Spirituality and faith**

- None of the topics directly relate to spirituality and faith

## **Category 7: Miscellaneous**

- Topic #4: Seeking information and assistance
- Topic #6: Location and city information
- Topic #11: Information and general requests
- Topic #18: Renting and COVID-19 queries
- Topic #21: Residence and accommodation queries
- Topic #23: Information and assistance in Europe
- Topic #29: Offering and seeking help

## **Topic #0**

Inquiries and requests about international travel from Morocco to other countries dominate this topic.

## **Topic #1**

Personal and cultural topics, with a few messages seeking assistance on health issues, as well as questions about travel and where to buy specific items in specific locations, are discussed here.

## **Topic #2**

Requests for information about visas, work opportunities and residency in different countries, especially Italy and Spain, as well as immigration, job hunting and

adapting to life in a new country, are central themes in this category. It also includes requests about documents like "nulla osta" and "permesso di soggiorno," with individuals seeking assistance and information.

### **Topic #3**

Inquiries and requests related to various topics, including travel, visas, contracts, and personal matters are common here, with individuals seeking advice, assistance and/or information.

### **Topic #4**

This topic encompasses travel plans, visa application processes, especially for Italy, and concerns regarding visas and travel arrangements.

### **Topic #5**

Discussions in this category revolve around location and city information, travel and visa inquiries, with a particular emphasis on Italy, and individuals requesting assistance.

### **Topic #6**

The common theme here is Italy, with discussions covering immigration, residency permits, visa issues, job opportunities and questions about specific cities or regions in Italy.

### **Topic #7**

This category includes individuals seeking information, assistance or guidance on varied topics, such as travel plans, job opportunities, documentation issues and general inquiries.

## **Topic #8**

Marital relationships, marriage-related inquiries and requests related to marriage are central to this topic.

## **Topic #9**

This topic focuses on visa inquiries, challenges related to visas and job opportunities.

## **Topic #10**

Inquiries and requests here revolve around seeking information, travel arrangements, international relocation and general requests.

## **Topic #11**

Employment and job-related questions, work opportunities and contracts in Morocco and abroad are discussed in this category.

## **Topic #12**

Individuals seek information and assistance on visa and immigration-related topics, residency permits, and occasionally discuss family matters.

## **Topic #13**

This topic centres around immigration to Italy, visa inquiries, fees, travel arrangements and bureaucratic processes.

## **Topic #14**

Discussions here involve immigration and work opportunities in Italian cities, marriage-related migration, personal situations and family reunification.

## **Topic #15**

Topics include visa-related questions, travel and tourism, and educational opportunities.

## **Topic #16**

This category covers family reunification processes and arrangements, as well as travel requirements and needs.

## **Topic #17**

Conversations revolve around looking for rent, general questions about COVID-19 and vaccination.

## **Topic #18**

Topics here provide specific legal and administrative information to navigate immigration processes, including discussions about COVID-19 testing (PCR), family reunification and administrative procedures.

## **Topic #19**

Conversations in this category touch on residency requirements, rent, living abroad, work opportunities, finding roommates and questions about tourism in Turkey.

## **Topic #20**

Topics include discussions about residence and accommodation, migration generally, looking for work opportunities and COVID-19 vaccination.

## **Topic #21**

This category encompasses a range of topics related to planning and executing international journeys, making travel arrangements and addressing related challenges, with a focus on Turkey, Italy and the USA.

## **Topic #22**

Discussions in this category revolve around information and assistance related to Spain, Italy and Turkey.

## **Topic #23**

Topics here involve asking for and requesting assistance, with many questions and requests related to PCR testing and travel information in the context of COVID-19 travel conditions.

## **Topic #24**

Within this category, numerous discussions centre around various aspects of transportation. Conversations revolve around topics like modes of transportation, commuting, public transportation systems, vehicle maintenance and travel-related logistics. Participants in this topic frequently seek advice, share experiences and inquire about transportation options in different regions.

## **Topic #25**

This topic is dedicated to transportation services, encompassing both offers and requests. Members engage in conversations related to rideshare services, carpooling arrangements, public transit and vehicle-related services. Users commonly post listings for rides and inquire about transportation options to reach specific destinations.



## **Topic #26**

General requests and pleas for assistance are prevalent in this category.

Participants turn to this topic to seek help with a wide range of issues, from technical queries and recommendations for various services to advice on personal matters. It serves as a communal space for members to connect and offer support to one another.

## **Topic #27**

In this topic, the focus is on seeking and providing specific travel and migration information, particularly related to European countries such as Belgium, Italy and France. Users engage in discussions about visa procedures, travel itineraries, immigration policies and cultural aspects of these regions. This topic acts as a valuable resource for those planning to travel, migrate or settle in these European countries.

## **Topic #28**

Family situations and personal matters take centre stage in this category. Members share stories and seek advice on family-related issues, relationships, parenting and personal development. It serves as a supportive space for individuals to discuss their experiences and seek guidance from others who may have faced similar challenges.

## **Topic #29**

Within this category, the primary theme revolves around asking, seeking or offering help. Users come together to provide assistance, offer solutions and lend a helping hand across a broad spectrum of topics. Whether it's technical guidance, recommendations for services or emotional support, this topic fosters a sense of community and collaboration among its participants.

## Appendix A6: Moroccan data preprocessing

The Moroccan data – which is defined as data that Morocco as the origin country of the Meta group – has a total of 135,876 rows after removing duplicate values from the following columns: 'Message,' 'Group Name,' 'Post Created Date,' and 'Post Created Time' simultaneously, to eliminate data redundancy before applying the NMF algorithm. Additionally, any null values in the 'Message' column were also removed.

As the Moroccan people use different languages on social media, we divided the textual data in the 'Message' column into two subsets: Arabic textual data, which uses Arabic written letters, and non-Arabic textual data that employs Latin written letters. For the non-Arabic subset, we applied a language detector to the 'Message' column. This detector identified the following languages: ['fr', nan, 'sv', 'en', 'es', 'id', 'da', 'so', 'cy', 'sw', 'ca', 'ro', 'hr', 'pl', 'et', 'tl', 'fi', 'nl', 'pt', 'sl', 'sk', 'it', 'af', 'hu', 'cs', 'vi', 'no', 'de', 'tr', 'zh-cn', 'ru', 'lt', 'lv', 'sq', 'uk']. Afterward, we divided this non-Arabic data into two categories: 'French,' where we selected only the messages detected as 'fr,' and we excluded the following languages to consider the rest as Moroccan dialect: ['en', 'fr', 'it', 'es', 'cy', 'ca', 'sv', 'pt', 'et', 'hr', 'lv', 'sl', 'sk', 'nl', 'sq', 'ro', 'da', 'fi', 'lt', 'de', 'None', 'NaN'].

### **Data preprocessing for posts detected as written in French in Moroccan groups:**

First, we converted all the text to lowercase. Next, we removed links, special characters, multiple whitespaces and stop words from the 'Message' column after applying the lemmatizer from NLTK library. After text preprocessing, we used the

TF-IDF (Term Frequency-Inverse Document Frequency) statistical method to convert the textual data into numerical values. Subsequently, we applied the NMF (Non-Negative Matrix Factorization) algorithm to create topic models. Finally, we predicted the topic numbers for each message in the French subset of the Morocco data.

### **Data preprocessing for posts detected as written in Darija in Moroccan groups:**

We applied the same preprocessing steps as we did for the French language, with an additional step of removing irrelevant words that we deemed unimportant to our subject. These irrelevant words were treated as stop words specific to the Moroccan Dialect. In our list of stop words, we also excluded the stop words from the French and English languages, given that Moroccan dialects may contain some French and English words due to their cultural influence.

### **Data preprocessing for posts detected as written in Arabic in Moroccan groups:**

We started by converting the text to lowercase, removing links, special characters, multiple white spaces, non-Arabic letters, elongations, diacritics (Tashkeel) and Arabic stop words. Additionally, we normalised Arabic words by transforming  $\text{أحمد}$  to  $\text{احمد}$  and removing repeated letters. Then, we applied the stemmer from the Farasa Library to reduce each word to its root form. Following this preprocessing, we used the NMF algorithm. Finally, we predicted the topic numbers for each message in the Arabic subset of the Moroccan data.

# Appendix B: Data visualisations

Figure B1

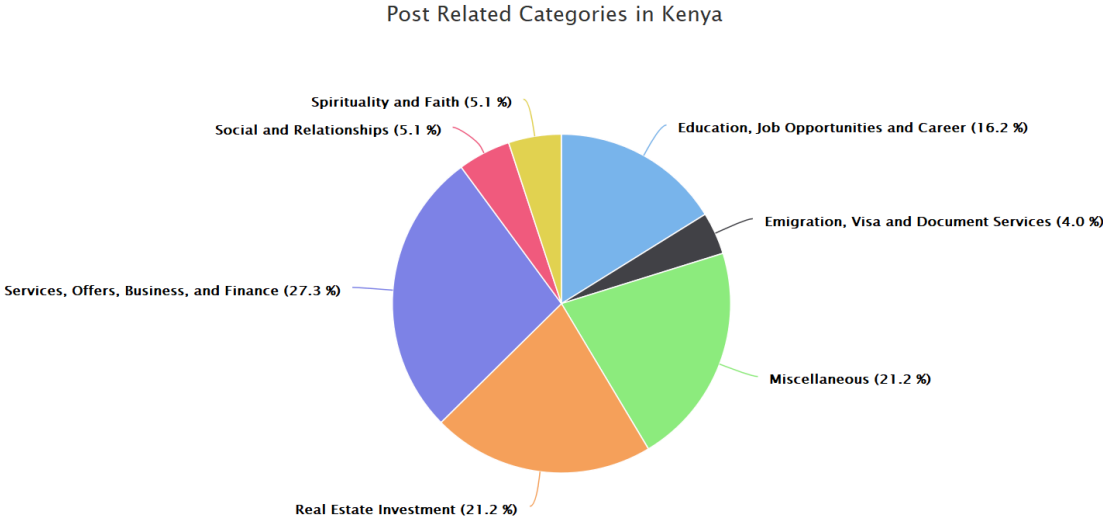


Figure B2

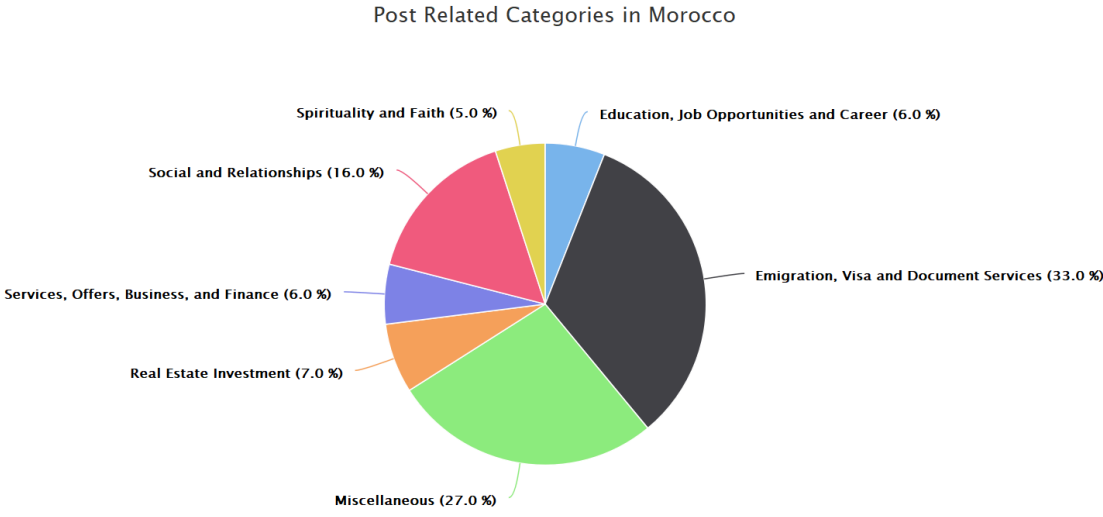


Figure B3

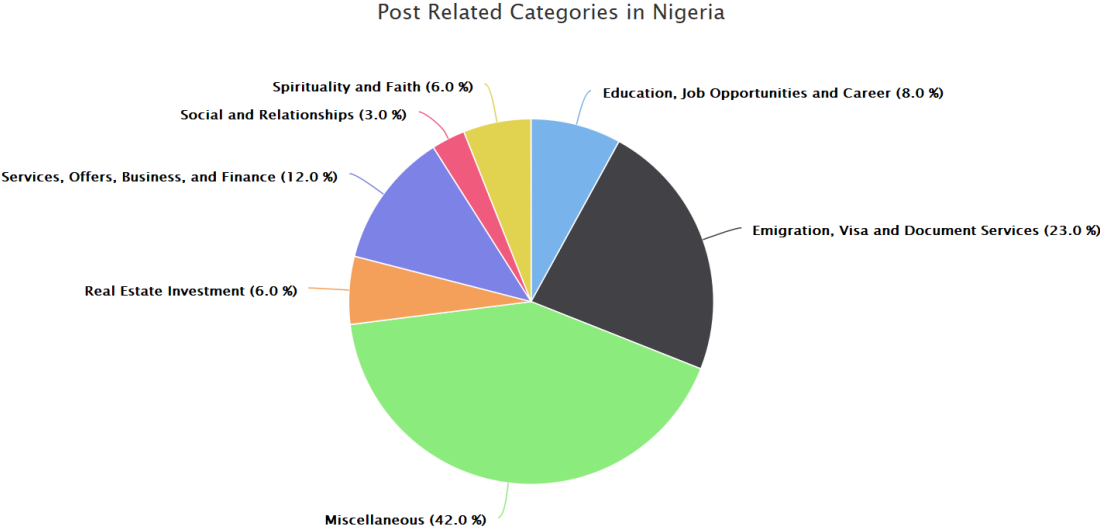


Figure B4

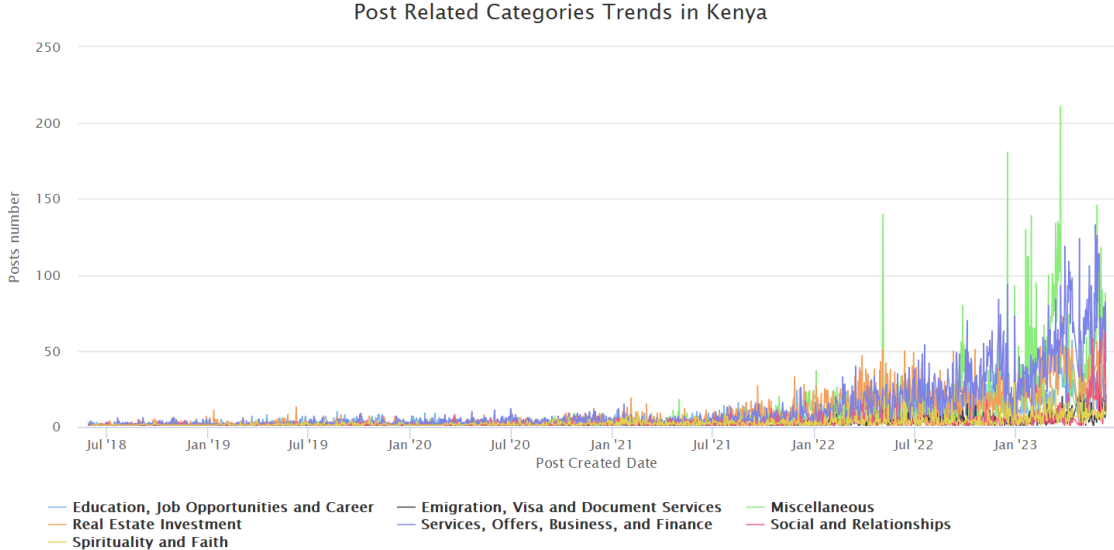


Figure B5

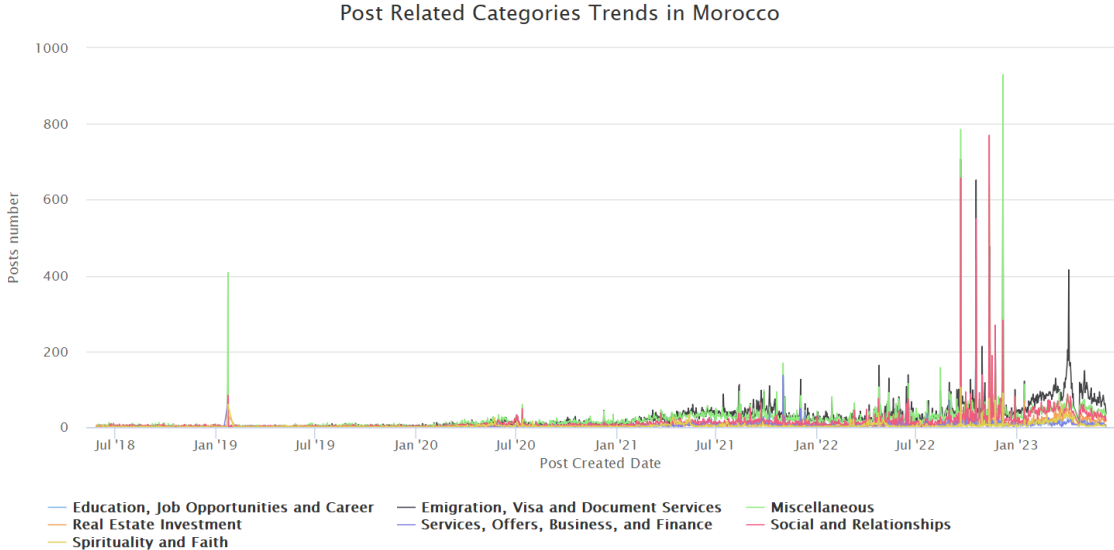


Figure B6

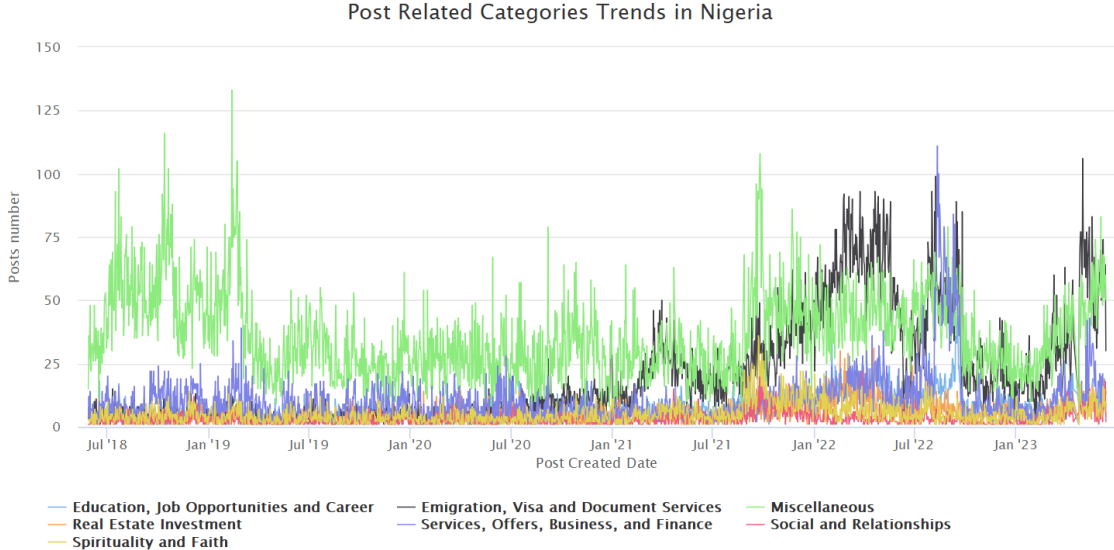


Figure B7

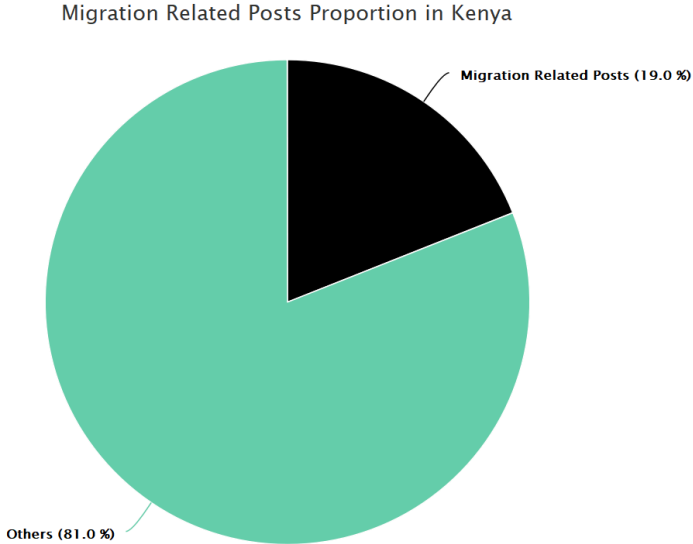


Figure B8

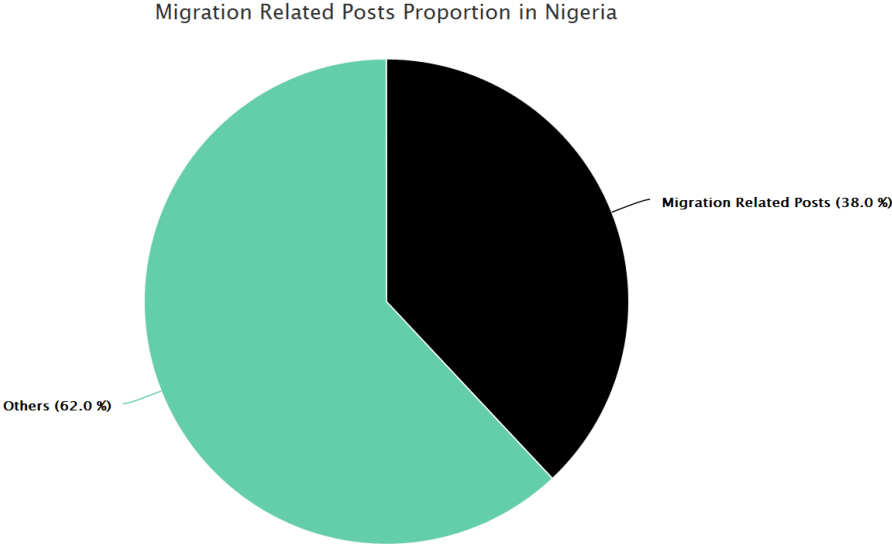
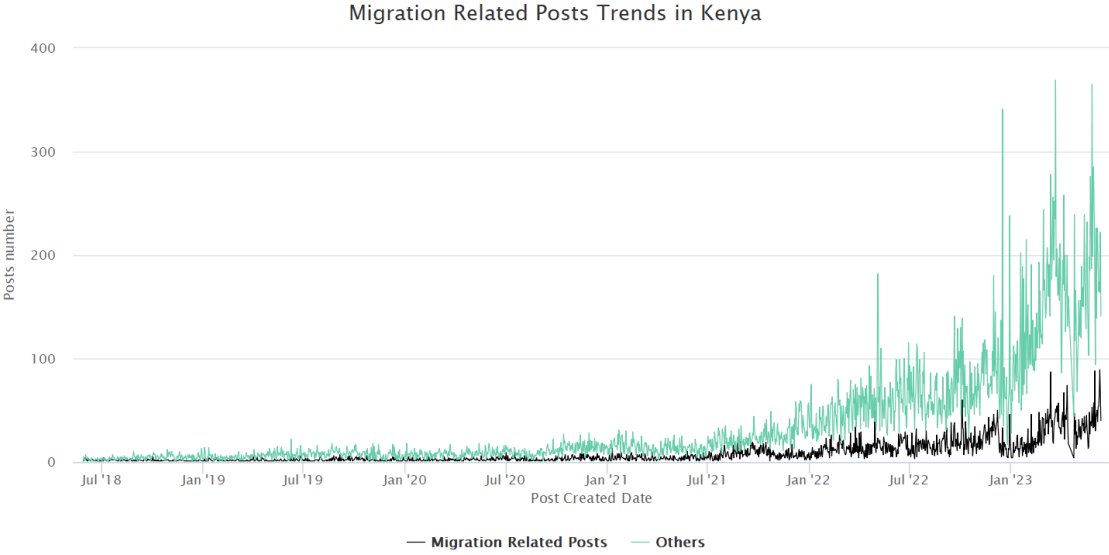
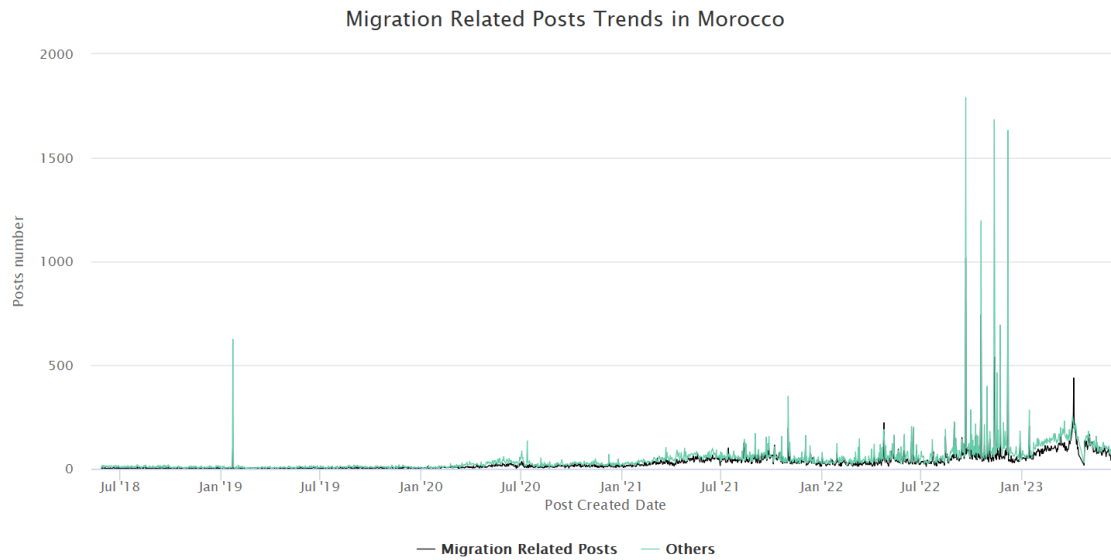


Figure B9





### Figure B10



### Figure B11

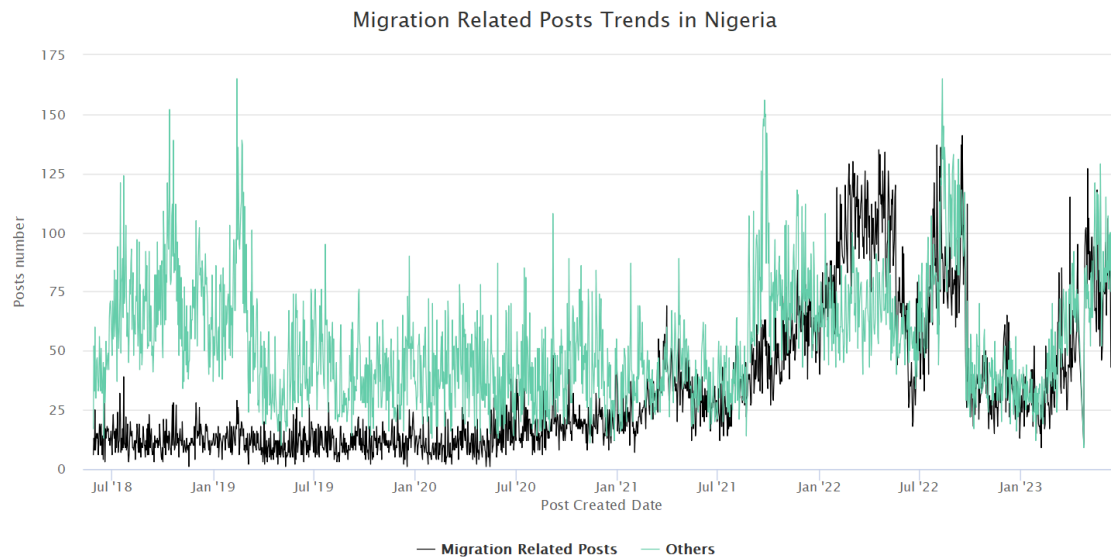


Figure B12

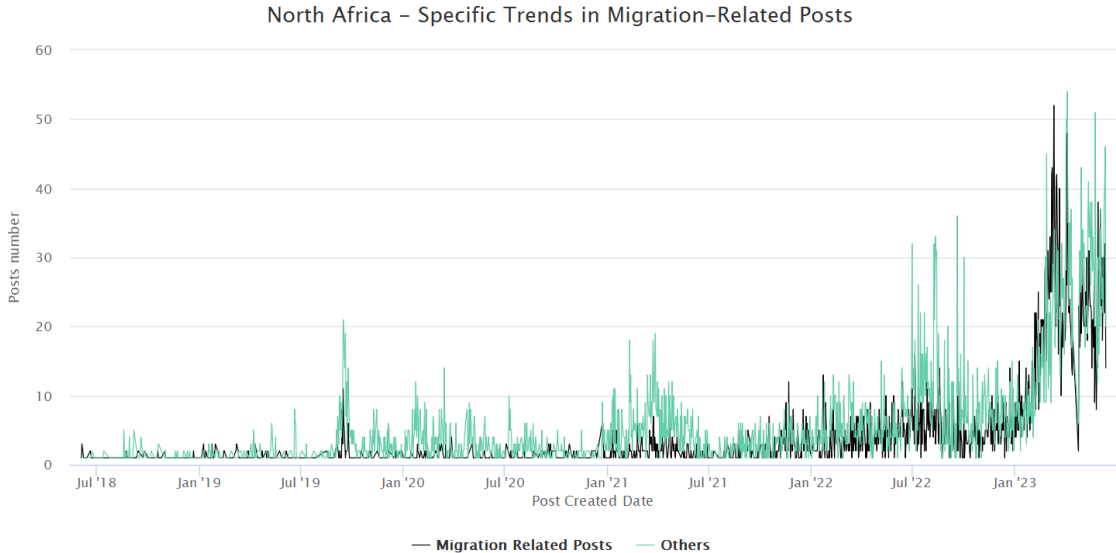


Figure B13

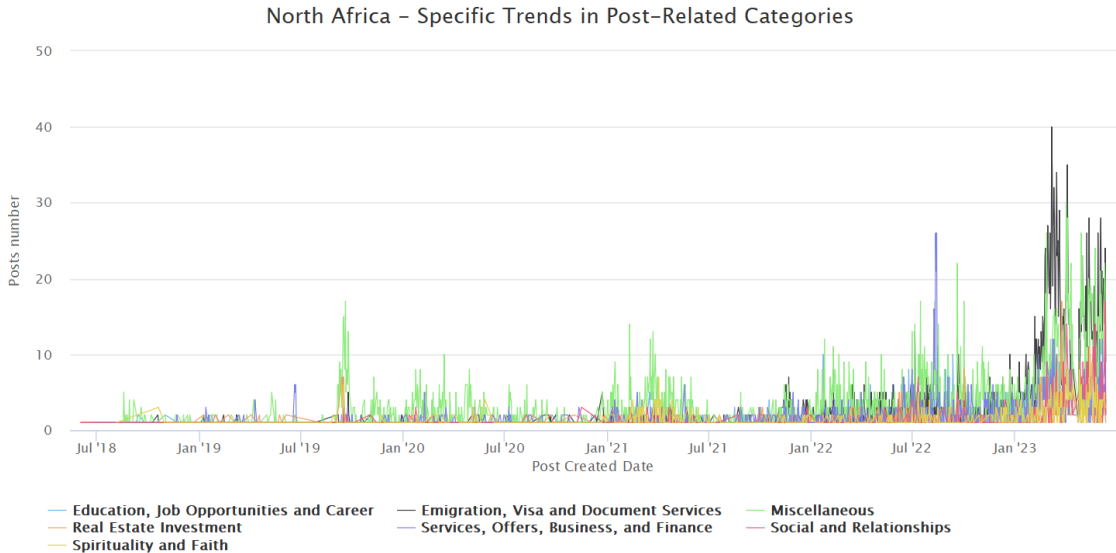


Figure B14

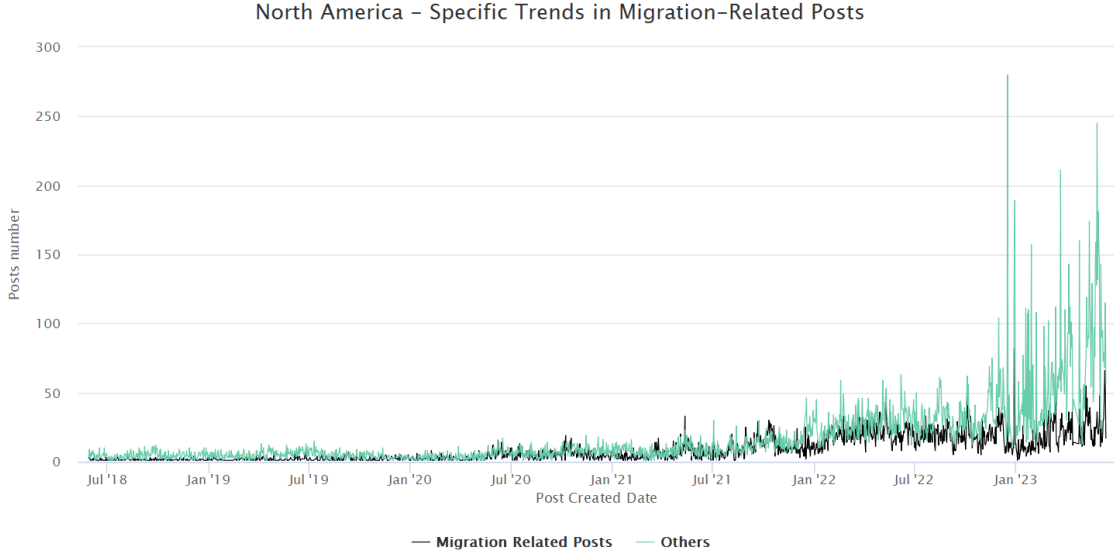


Figure B15

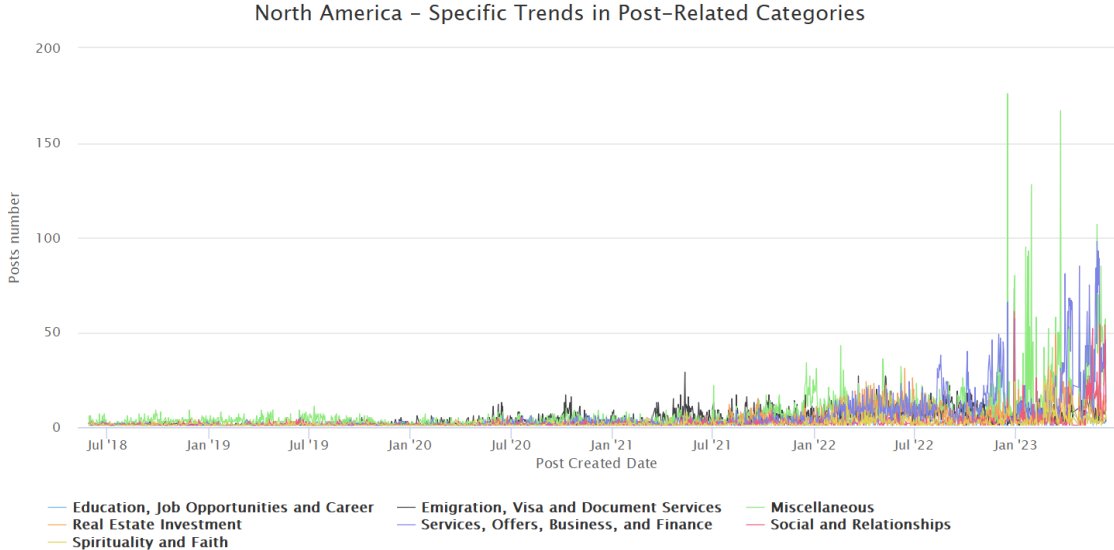


Figure B16

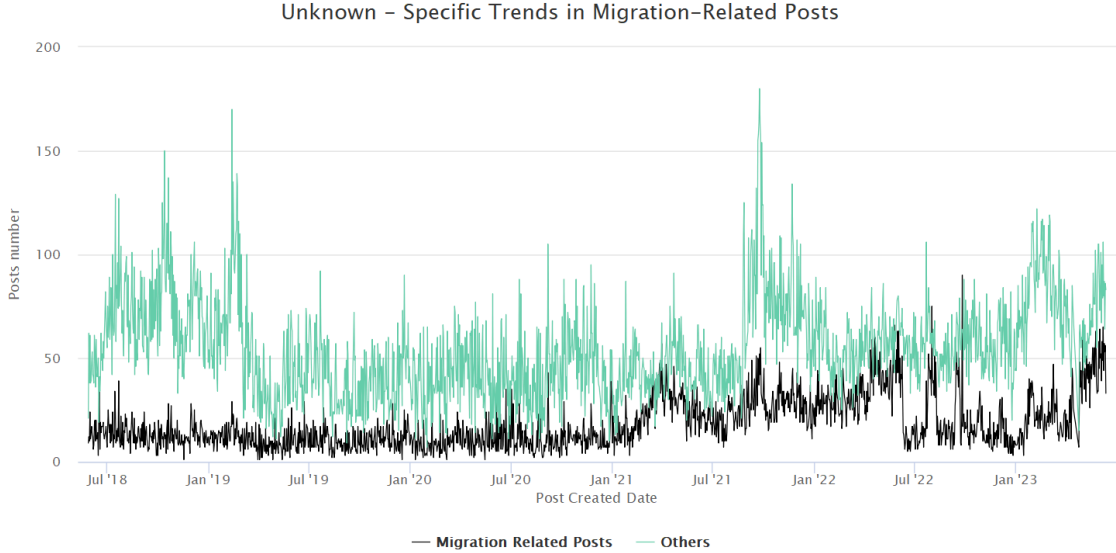
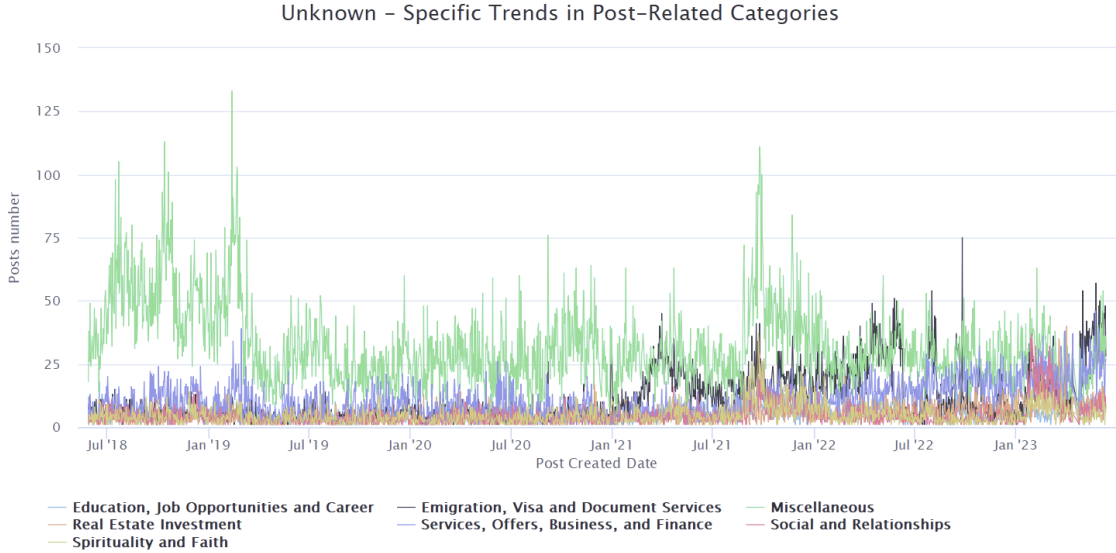


Figure B17



## About DYNAMIG

DYNAMIG is a three-year project that aims to create a more thorough understanding of how people make decisions on whether and how to migrate. Focusing on Africa and Europe, we will analyse to what extent the diverse experiences of migrants are taken into consideration when migration policies – or policies that impact migration – are made. We will also look at how effective these policies are in shaping migrants' decisions and behaviour.

## Website

[dynamig.org](http://dynamig.org)