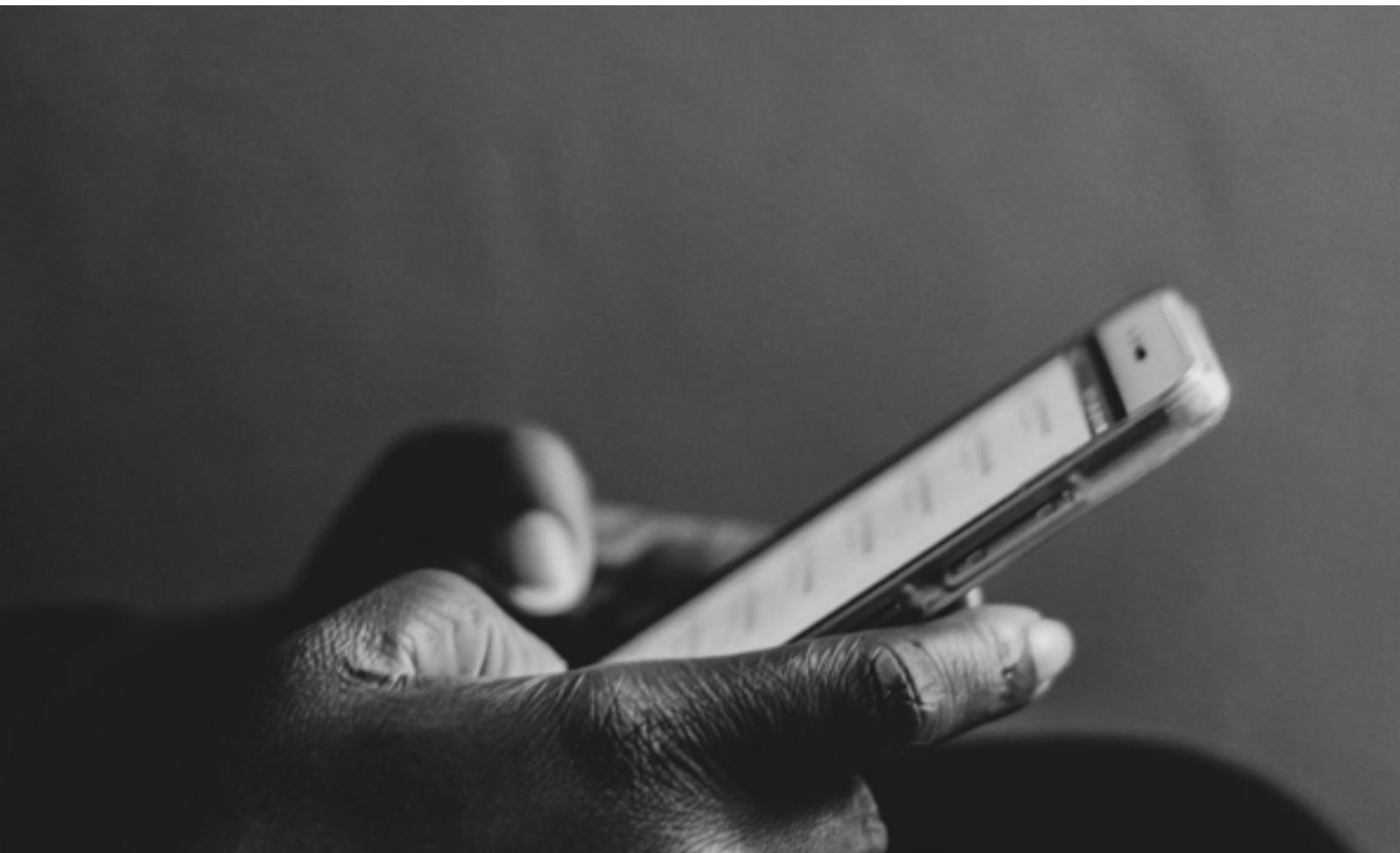


Analysis of social media groups on migration decisions and experiences



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Analysing public online groups of migrants on social media, particularly Meta, in different countries that attract people interested in migrating and transiting, and who have arrived in destination countries in Africa, the Gulf, and Europe. UM6P conducted text analysis to assess the aspirations, capabilities, intentions and experiences migrants discussed in these groups. Elizade University supported UM6P to identify relevant Meta groups and conduct the literature review. Depending on the quality of the data and preliminary findings, T2.3 will explore the modelling of network nodes based on public online group discussions with a view to detecting migrant decisions on where to go and the impact social media has on actual mobility. The resulting research paper (D2.2) adds to the in-depth individual perspectives provided by T2.2 and WP3 by engaging with group dynamics in discussions about migration decisions.

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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 in 2015. Nigeria is ranked first (122.5 million internet users), while Morocco ranked fourth (33.18 million internet users) and Kenya tenth (with 17.86 million internet users) among internet users in Africa (Galal, 2023). As a result, 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 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’.

In this paper, we conduct a text analysis to assess the aspirations, capabilities, intentions, and experiences migrants discuss on Meta (formerly known as Facebook). We first work to identify relevant migration groups on said platform and

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then segment their contents across seven categories of discussions, 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 regained 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 Gulf Cooperation Council (GCC) countries.

Theory

Research on social media and migration falls across two categories: the first focuses on the ways social media platforms are used by migrants and/or 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 is centred 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 so far on ways 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’ sentiment over migration is 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 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 parcels of migrants' daily lives thus making them a nonissue (Alencar et al., 2019; Dekker et al., 2018b). Moreover, to this day, 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 works on the ways 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

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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 Crowd Tangle 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 its being limited to data collection from public groups only. 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, Crowd Tangle 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 2,500 individual users. In total, Crowd Tangle 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 Crowd Tangle 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 Crowd Tangle 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 Crowd Tangle but also allows scholars to focus on influential activity. Indeed, Meta groups and pages with high followership can 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 Crowd Tangle 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 Crowd Tangle 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, etc.). The wealth of

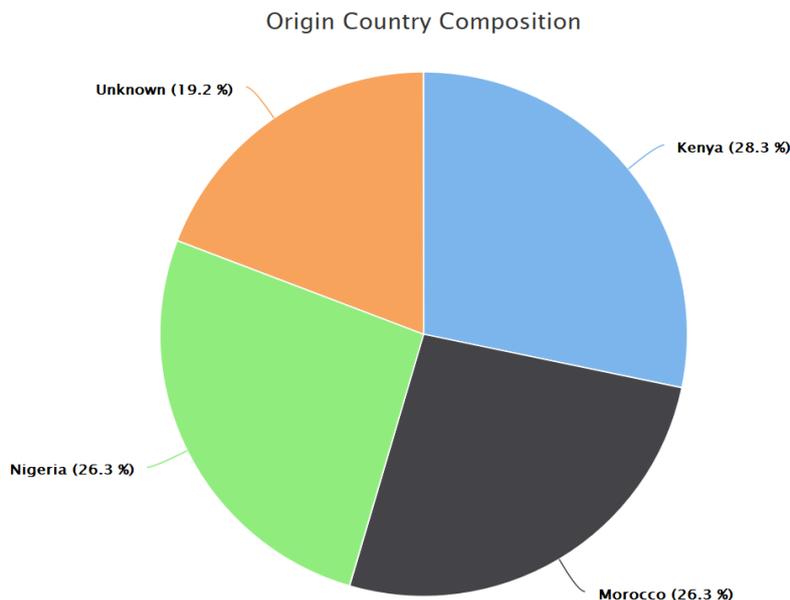
that data is also compounded by the very flexible time and geographic component—the platform tracks posts through a very rich time component and contains data from around the world. The historical archive component is also much more flexible than that available for data from other SMPs—such as Twitter—as one can go as far back in the past as is desired—with Twitter 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 United Arab Emirates, Saudi Arabia, United Kingdom, France and Italy as destinations. The study considered only public groups in which migration discussions were taking place. Private groups were excluded for ethical reasons. 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)—we collected the historical data from these groups for a sample size of 620,458 individual posts for periods of May 27th, 2018, to April 14th, 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. Groups like “UK naija, Nigeria in Italy, Nigerians in the USA, Nigeria visa, Nigerians in US, Canada and UK, Naija in UK, Nigerian in Diaspora, Nigerians in Georgia, USA, Kenyans in Dubai, Kenyans in Diaspora, Kenyans in Saudi Arabia, Kenyans in the UK, The Kenya society (UK), Kenyans in Europe, International Morocco Group,

simply Morocco Group, Moroccan in UK, Moroccan Youth in UK, Moroccans in Italy” are included in the dataset¹.

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

Figure 1: Origin Country Composition of the Dataset



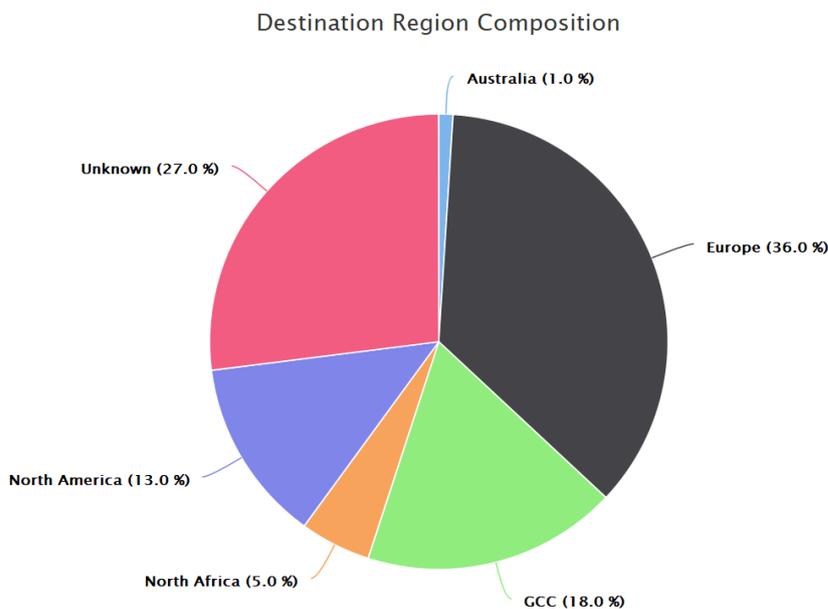
Note: Cumulative percentages of the origin country makeup of our dataset.

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

28% of the dataset. The “unknown” origin country designates groups for which no origin country was clearly flagged in the name of the group².

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,

Figure 2: Destination Region Composition



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

² 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, some examples are: "les marocains de Montréal et les environs" "KENYA DIASPORA ALLIANCE, UNITING KENYANS AROUND THE WORLD", "NIGERIANS IN ITALY COMMUNITY(NIC)". 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 the Gulf Cooperation Council (GCC) in third place with 18%.

Here, we develop an innovative way to measure migration aspirations by using topic modelling methods derived from advances in Natural Language Processing. 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 covary, 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 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)³. We opted for non-supervised algorithms—here Non-Negative Matrix Factorization (NMF) and Latent Dirichlet Allocation (LDA)—

³ 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.

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. We found through mathematical measures and qualitative verification that NMF provided more coherent topics and therefore focus on these when we discuss our findings later in the paper.

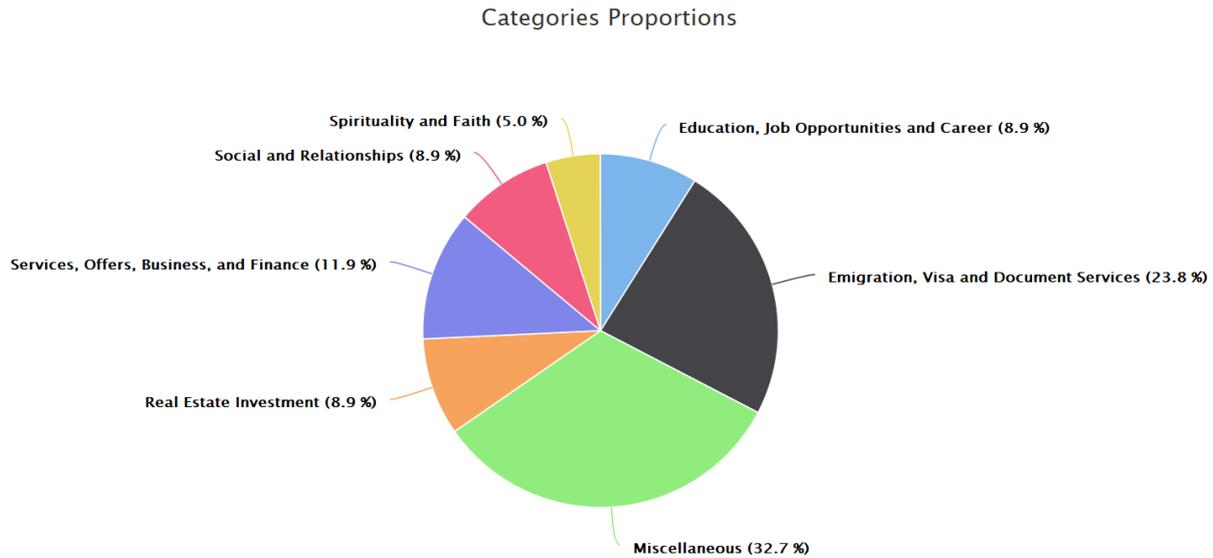
We coded the NMF algorithm to provide us with a list of 30 topics with 10 top words for each topic. We decided to cast a wide net by clustering the dataset over 30 topics instead of the more common 10 or 20 because we did not want the algorithm to omit relevant discussions that we could have missed by 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 natural language. Research assistants cross-checked each other after each task was completed to ensure consistency and congruence over the labels⁴.

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 topics⁵. Figure 3 summarises the distribution of categories in the dataset.

⁴ The initial phase involved closely scrutinizing 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.

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

Figure 3: Categories Percentages



Note: Cumulative Percentages of the 7 Categories of Posts in our dataset.

Emigration, Visa, and Document Services is our main category of interest. It is centered on the theme of migration and international mobility, with posts asking questions 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”; “ Qatar 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 osashi 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”

which are common for Nigeria, Kenya, and Morocco, 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 in some way to migration 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 kilifi area call me on” 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 [sic] and other Schengen countries contact us for more details via call WhatsApp Empintravel [sic]”. 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.

Some posts such as

“quality mattress available delivery are done countrywide payment on delivery size inches nikupe price call text or WhatsApp”; “cash loan business loan emergency loan personal loan message me” 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, for example (Nancheva, 2022) 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. For example, posts like the following: *“hallo all recently moved to Amsterdam and am looking to meet my fellow Kenyans hoping to make some new friends”* show how connected immigrant communities like Kenyans can be and how bond is easily created with one’s fellow citizen in a foreign land. Another example *“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”*

Spirituality and Faith 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 for 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 mzee Juma Ali Kalungu how can help you to solve your spiritual problem...”*.

Finally, Miscellaneous 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*

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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.

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 making 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 amsbb group”; “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 place] center and floor office line call WhatsApp”; “passport application and pushing international job placement visa application travel insurance flight ticketing hotel booking”⁶.

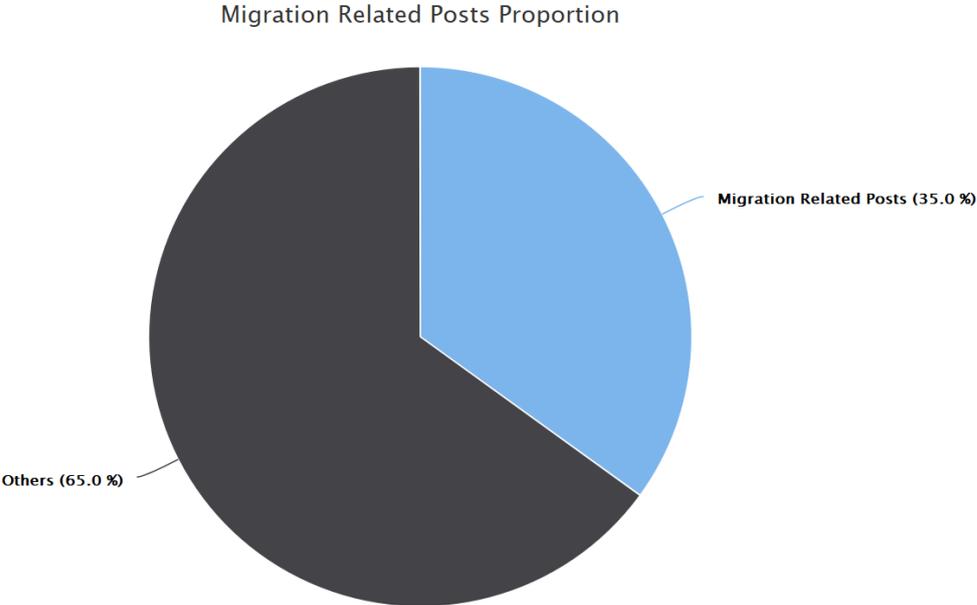
Figure 4 that follows illustrates the distribution of this category across our dataset and shows that roughly a third of our original dataset is made up of posts that discuss general migration per se.⁷

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.

⁶ For more examples of Migration category posts see the Appendix.

⁷ Some information in the example posts in this paragraph were anonymized, as per the specifications between brackets.

Figure 4: Migration Related Posts (Proportions)



Note: Cumulative Percentage of the Makeup of the Dataset across two Categories (Migration versus non-Migration).

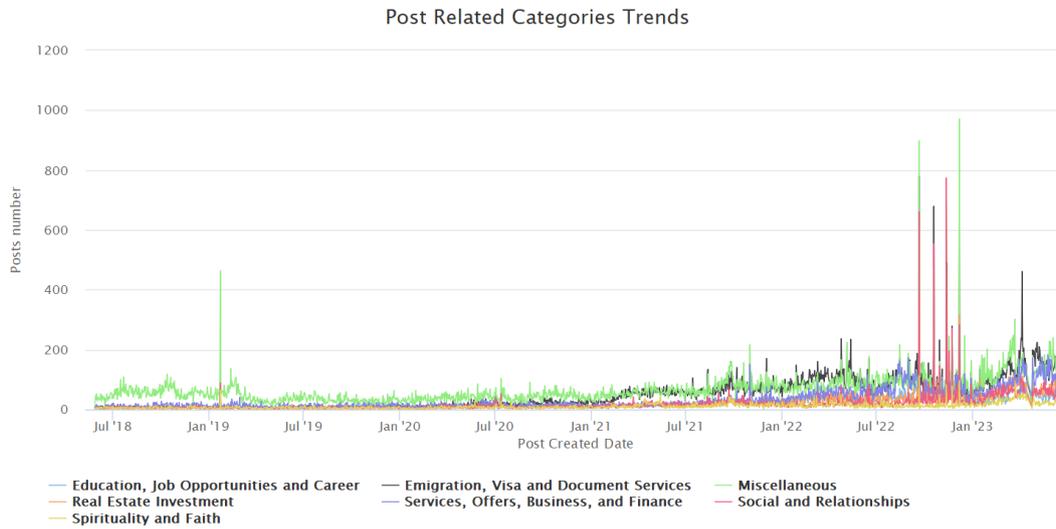
Empirical Analysis

Figure 5 shows the evolution of our time series for each of the seven categories of posts 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, 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 will become 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.

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

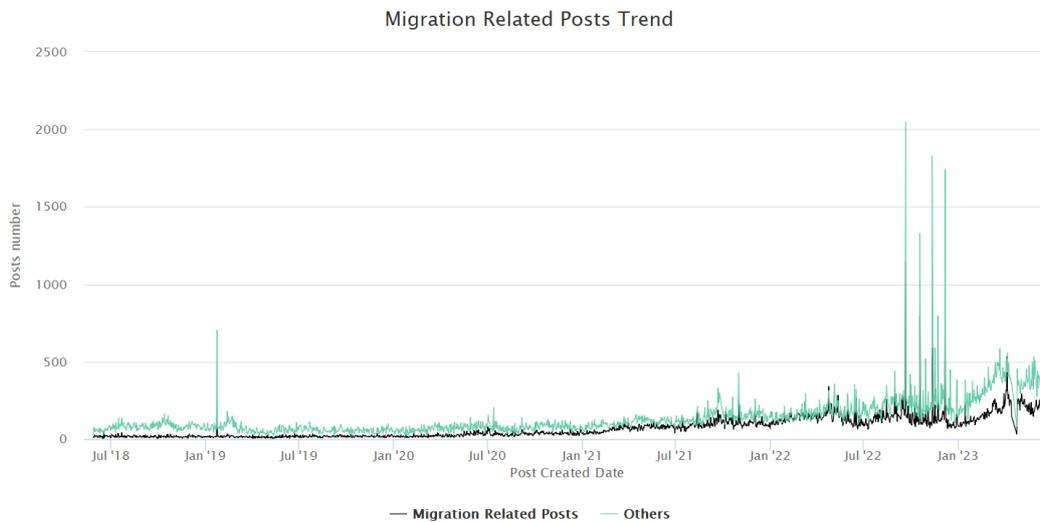
2021 onward, and cross- examination with country-specific time series shows the same trend as the one mentioned above for Figure 6—see Appendix.

Figure 5: Post Frequencies by Category (2018 to 2023)



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

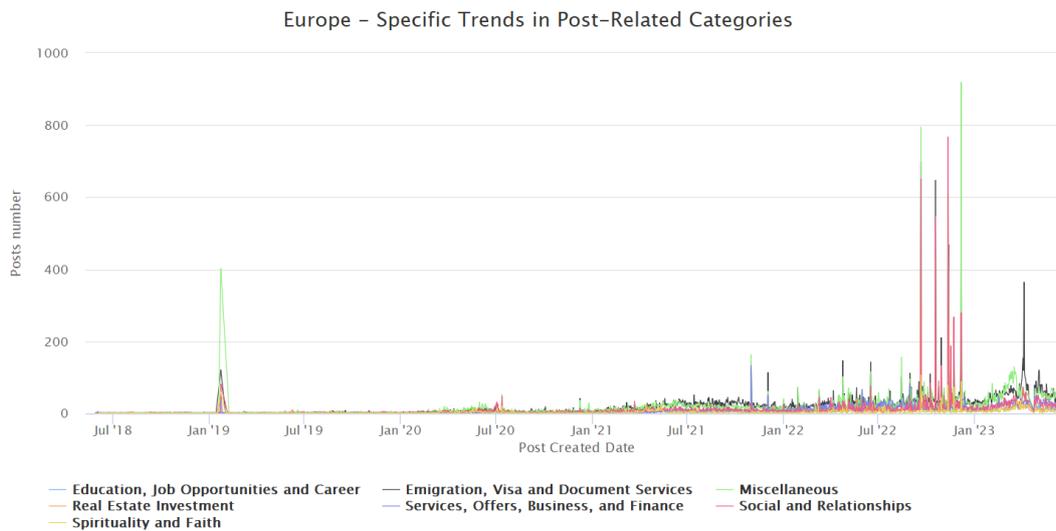
Figure 6: Migration Related Posts (Frequencies, 2018 to 2023)



Note: Evolution of Migration vs non-Migration related Posts (Frequencies, 2018 to 2023).

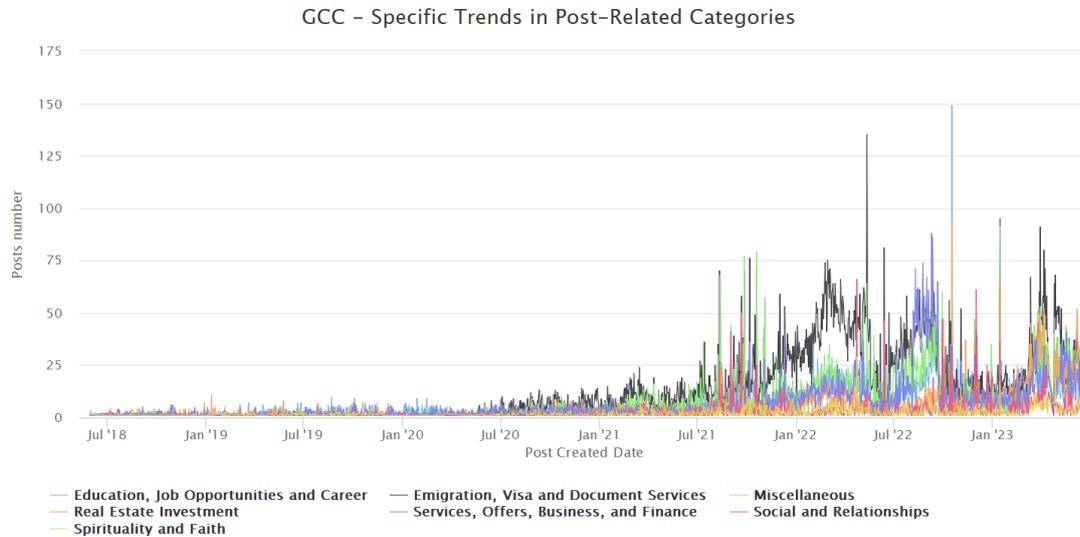
In Figures 7 and 8, we focus on posts for all seven categories in groups aimed at European and GCC countries as destination countries (respectively). Structured in the same way as Figure 6 above, both show a clear trend of gradual relevance of posts about Emigration, Visa and Document services starting 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 the Gulf Cooperation Council, 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 to 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).

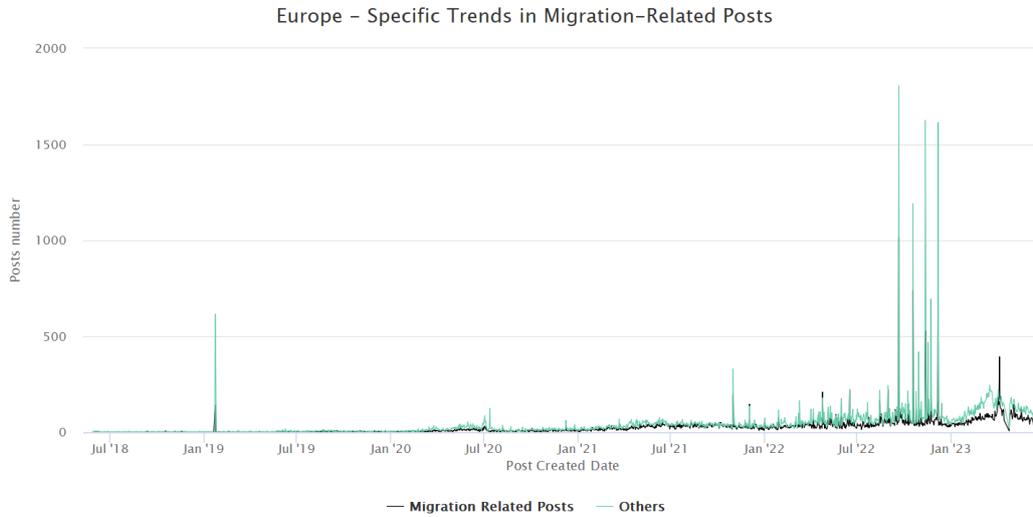
Figure 8: Post Frequencies by Category, GCC as a Destination region (2018 to 2023)



Note: Evolution of Frequency of posts related to each of the seven categories for Meta groups with Gulf Cooperation Council (GCC) countries as a Destination Region (2018–2023).

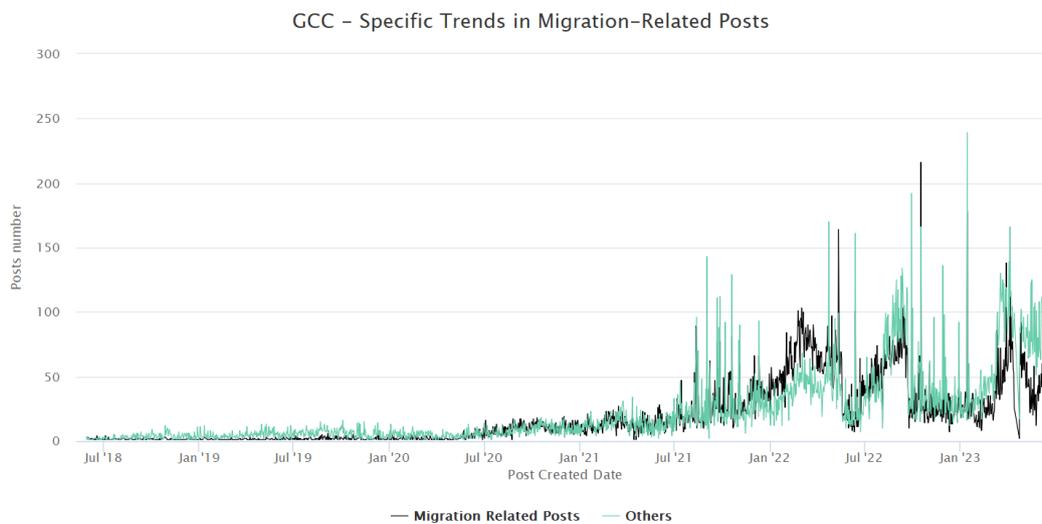
In Figures 9 and 10, we again explore the same dynamic by focusing this time on the general migration category. Even if more moderate, we still notice an overall parity of posts for migration and non-migration-related discussions for Europe-oriented public migration groups on Meta, with some overtakes 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 to 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 to 2023)**



Note: Evolution of Frequency of Migration vs non-Migration related Posts for Meta groups with Gulf Cooperation Council (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 organized for and about migration from Nigeria, Kenya, and Morocco, to a variety of destination regions—especially Europe, GCC countries, North Africa, and North America—and collected posts on these public groups for May 27th, 2018, to April 14th, 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 divide discussions on the public Meta groups into seven categories using Natural Language Processing 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 divide 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 coronavirus pandemic. Indeed, migration aspirations, intentions, and experiences rise 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 and second it adds some new use cases to the table. First, we use 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). Second, 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 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 has 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 starting to be felt, which we suspect is the main mechanism that causes large waves of 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 here and with or without a substantial economic downturn in 2021, interest in legal emigration would also spike up in Morocco and Nigeria because of the individual and societal toll COVID-19 had on individuals. An important consideration in attempting to understand the relationship between pandemic, economic downturns and migration aspirations is that Kenya stands as an outlier case—both Moroccan and Kenyan groups on Meta see a rise in migration aspirations and migration related posts but Kenya noticeably does not. This is very noticeable in Figures B4 to B6 and B9 to B11 in Appendix B: Data Visualizations.

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Appendix

Appendix A : Topic Models

Appendix A1. Topic Modeling and Categorization

Preamble to topic modelling using Facebook posts

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

The topics labels contained keywords that were suggestive of the discussion, still in order to be clear on the content of discussion, the Facebook posts were read manually, after it was clear what the topic was discussing through saturation on the same subject, the Facebook posts were scanned through for any variations from what had already been noted as the discussion keywords. That is authors manually checked and read the posts that are categorized within these 30 topics, in order to understand what each topic refers to in relation to the top worlds 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 centers 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 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 remittance.

Category 4: Social and Relationships

Category 4 centers 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 behaviors, 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, 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. Helps in form of donations, support, prayers, travelling /job

opportunities outside Kenya, likes comment, subscribe and sharing of music, book review, among others are what they talked about. But among this, the need for medical help in terms of donations occurred more frequently. for example: “so heartbreaking why months old Joan is dying slowly she was born with condition called keratoacanthoma ... waiting for well-wishers to come to her rescue to help this child this is her mom’s account details nothing is too small mpesawave tavitha mwangangi mother”.

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 endeavors, with a special emphasis on the real estate industry. To illustrate, “don’t try so hard the best things come when you least expect them to”, “take your first step towards the best life start living your best life at kithimani springs by optiven this project is the perfect blend of tranquility and convenience cuddled in the scenic town of kithimani...”

A huge number of the posts were also centered on real estates. For example: “being landlord is everyone’s dream start your journey today”, “let us make your dream come true home ownership is one of the toughest journey to go through on your own that’s why I’m here to take you through it contact us for any enquiries bookings or site visits online or with the help of someone you trust on ground”

The last part is the study or work abroad. Some examples are: “greetings if you would like to move to Poland Hungary turkey and don’t know where to start contact us for free consultation and guidance we will make your dream come true with our honest and reliable services we also help with visa TRC processing WhatsApp” and “ever dreamed of studying traveling 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 amsbb group”

Topic 2

Most of the discussions under this topic were centered on hustling and means to make extra income via online platforms like WhatsApp, Facebook, through betting and even trading. Some of those messages are: “if show you how to make an extra income without interfering with what you’re doing currently would you be interested if yes ask me how”, “join the channel using the link below and chat admin for odds”, “turn your WhatsApp views into real cash through luxi life here is the verified link lets go”, “turn your WhatsApp views into money pesamoni klimited company is an advertisement company which ...must because you still earn without them WhatsApp the word ready”.

It also centered on posts about job opportunities, however most of the job opportunities were for Kenyans in diaspora. For example: “are you in Saudi Arabia Qatar Lebanon and looking for part time opportunity job that won’t affect your current job comment below info we will get back to you instantly”, “anyone in Europe in need of well-paying parttime job comment me”, “Saudi Arabia house help needed comment ready send you details right away”

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. Some of the

posts are: “just for bedroom house grab our master ensuite units with installments plans perfect for investment as the appreciation rates are high at almost per year customize your unit with dsq and landscaping welcome to the family”, “house construction and renovations call bon constructors were reliable and affordable”, “for those looking for spacious townhouse in Nairobi we got you covered call us on for viewing and more”, “bedroom apartment to let in Mtwara per month amenities balconies spacious open kitchen security for viewing”, “am looking for company which can hire contractor in building and construction directly from Kenya and leads please”, let us build you this bedroom house at pocket friendly budget anywhere in Kenya call or inbox for more information”, “some properties you can check out to purchase with instalments plan call”, “Jayb interior design and general supplies was created in and so far we have created our own interior variety samples for you to follow if you need to design your home or your business check out ...call or WhatsApp to order the wallpapers and epoxy flooring other products and services wallpapers”

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. A selection of the posts includes: “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”, “am so happy that this wonderful and cute girl is now my life partner never wondered if one day would marry the love of my life”.

A captivating aspect that aligns with our research pertains to the abundance of posts discussing the desire for life partners, which frequently leads to online hookups. 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. Notably, a specific name, "Mama Jane" frequently appears in these discussions, seemingly playing a central role in facilitating hookups with white individuals. Many individuals posted testimonials after successfully establishing these connections, as it provided them with opportunities to travel abroad. Here are a few examples of such posts: "am Joyce Mrs vinyl Johnson 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 madam jane with your team here don't rush take your time for more about her online connection find her on WhatsApp via", "hello madam jane have finally decided its the best time to come back and testify coz don't have any regrets my name is Moureen born of Kyengera had tried several sites but didn't get what wanted was even discouraged by some people that talked to about my interest in dating white guy Mbu am too old to find one madam jane bless the day landed on your site it really changed me ... madam jane is the best match maker contact her on WhatsApp number for the very best match making services god bless you all".

Topic 5

The topic is all about real estate investments-buying landed properties, houses, gardens and leasing out buildings and apartments. Some of the posts are: "invest with us now affordable homes and lands", "find out where the people are going and buy the land before they get there book free site visits with us every Wednesday and Saturdays call for more information", "the best investment on earth is earth real estate wealth means having the money and the freedom to live life on your own terms call WhatsApp zippy Willistone homes let's talk investment", "buy our plots this easter enjoy our discounts", "upper bedspace lower bedspace single couple available in flat inclusive of dewanet with gym and pool location is Mankhool road

just bus stop away from Dubai nursery Jaffliya bus stop away from Fahidi and ADCB metro contact”.

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. References were mostly made to names like “Chiefmama zangi”, “Chiefmama rizik”. Most of the post appeared has testimonies to her help or better still an advertisement to boost business. A particular post had some content but the only difference is the name there. This – “my name is edith yrsiam here to appreciate the great work of chiefmama zangi for helping my family after all the pain and sorrows we passed through there was a lot of haters and jealous people around us people did alot of witchcraft and evil things to us because of our success our baking company had collapsed my siblings all lost their jobs marriage issuesi personally could not conceive things were falling apart everyday that passed by we lost our house because of the accumulated bank loans and debts in karen then family friend directed us to mami zangi who brought our smile back after days and as speak nowwe are back on top our business is doing extra wellall my siblings got way better jobs and all happily married mami zangi is our everything ie she means the world to us you can aswell reach her on call or whatsapp” and “my name is grenda yrsiam here to appreciate the great work of chiefmama rizik for helping my family after all the pain and sorrows we passed through there was alot of haters and jealous people around us people did alot of witchcraft and evil things to us because of our success our baking company had collapsedmy siblings all lost their jobs marriage issuesi personally could not conceive things were falling apart everyday that passed by we lost our house because of the accumulated bank loans and debts in karen then family friend directed us to mami rizik who brought our smile back after days and as speak nowwe are back on top our business is doing extra wellall my siblings got way

better jobs and all happily married mami rizik is our everything ie she means the world to us you can aswell reach her on call or whatsapp”

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 for both at home and those in diaspora. Some examples are: “help those who outside Islamic countries like Oman Qatar Jordan Iraq Lebanon Dubai and Saudi Arabia bring back lost lovers stolen home properties boosting man power boosting small business winning bets protecting home or cars and land winning strong court cases political winning successful life getting riches without sacrificing humans broken marriage football talent in higher level job promotions and etc. call or WhatsApp me on distance doesn’t matter will help you wherever you are”, “marriage spells love spells protection spells call spiritual healer with strong working charm or WhatsApp on love portion do as spells divorce partner infertility solutions barrenness lucky spells wine lottery get visa travel abroad attraction spells promotion on job family issues etc. for more details or WhatsApp”, “yes baba is ready to help anyone who needs his help call baba or text me on WhatsApp for help instant money ljebu number family problems court case political power luck of job enemies protection do as say business improvement promotion football problem salvation congratulations call baba or text him on WhatsApp”, “love spell caster in Kenya traditional herbalist doctor mzee Juma Ali Kalungu how can help you to solve your spiritual problem and make sure your issue has solved am advice you that every problem has are solution when you meet right person problem like family affairs issues love affairs get back ex-lovers boy friend girlfriend return your broken marriage within hours return your demanding ... please contact and WhatsApp”

Topic 8

The focus of posts in this topic is majorly on Real Estate investment opportunities. For example: “are you willing to invest here is business idea do you own plot of either or if you don’t have one you can lease for at least two years you can construct such rental houses whereby in plot of you can construct to single rooms such as this and let for to for more call”, “affordable apartments for sale in Mtwapa ideal for an investment of Airbnb renting for rental income and even as your own home for viewing and more reach us on”.

The other major content of the post was on professional services for those looking for jobs or other opportunities that requires setting up CV, recommendations, among others. For example: “are you not getting job interviews maybe lacking the following documentations professional cv modern cv cover application letter recommendation letter certificates and many more all at an affordable price inbox on my messenger for more information”, “interested in professional cv recommendation letters cover letter certificates ecommerce website with listed products and many more at an affordable price inbox for more information”.

Topic 9

This topic contains post that basically talks about social media contents, especially videos. They were mostly comments and feedbacks about some videos and a plea to like, subscribe and watch. Examples are: “omg great video for you like it and you too”, “best video million views amazing funny reels video watch”, “how to humiliate and make the narcissist miserable please watch and subscribe”, “candle blowing challenge hilarious see who won click here to 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. If you're ready to embrace new experiences, these opportunities can be your gateway. Whether you're interested in roles in hospitality, security, or various other sectors, this collection of job prospects offers something for everyone. Examples of the posts are: "work direct work opportunities available for both genders in Qatar security cleaning waiters waitress baristas and drivers needed visa and air ticket provided commission to be paid after the air ticket is out or deducted from first salary if interested kindly inbox WhatsApp here", "we are still looking for both males and females for security drivers food packaging in Qatar for more information", "Bahrain jobs available visa in days food accommodation provided office location Kasarani Biashara center and floor office line call WhatsApp".

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 don't necessarily fit a single overarching theme but rather represent a collection of announcements and messages covering different aspects of life, services, and opportunities. Some examples are: "it's not enough to hustle but making smart decisions that fuel your hustle make conscious effort to make smart decisions as you go into the new week have good week kenmark realtors land for sale real estate investment motivation Monday investing ready Titledeed smart investment", "if you go through red list country on arrival to the UK from Kenya will you be forced to

mandatory quarantine”, “interesting skill and smart ways of working”. There is really no coherence in the posts under this topic.

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. Examples are: “buy and fence direct your land pilot call eld fencing droppers at shillings each call or WhatsApp Nbwe also do delivery also to your place at your own cost at affordable prices welcome we are within Eldoret we do fencing also at affordable prices call or WhatsApp”, “quality mattress available delivery is done countrywide payment on delivery size inches nikupe price call text or WhatsApp”, “your bedroom stones in one trailer pieces we deliver countrywide payment on delivery we are located in Thika Darugo quarry call or WhatsApp”.

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 don't fit a single specific theme but rather represent a collection of announcements, updates, and requests across various topics. E.g. “fully loaded package drip irrigation system installation seedlings and agronomic support call WhatsApp us now”, “the group meanwhile has over members and assists its members in developing their business ideas through counselling and financial assistance”, “hi it's me again have been nominated to win

this pliz pliz I'm asking for your votes by viewing and liking the post on willis raburus wall nyar onagi song is for everybody just go like and share this clip thank you", "hello Kenyans where are you all at been in Italy for months and haven't come across any of you am in turin please would like to connect with y'all".

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. E.g., "for home ownership and investment call or WhatsApp", "greetings you have been looking for home to invest with relax Hodari homes we got you reach me via this number friends with future Tujiamini pataplot friends with future". There are services related to immigration, which is our focus, some help Kenyans get VISA, some to get jobs abroad and so on. Examples are: "at Empins travel we help in visa application once you provide the relevant documents choose to travel with the experts today for more information visit our offices at view park towers the floor or call WhatsApp", "new work permits of our satisfied customers from Kenya its now easier to live and work abroad it all starts with getting visa start your process today travel with most trusted experts call WhatsApp".

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. Examples are: "want to own plot come invest with us

favor land properties we have plots in Kitengelatuu and Malindi for more information call or WhatsApp”, “plot size at Kitengelakm from Kitengela town and km from Nairobi cbd each plot has individual title deed selling price is deposit pay balance in years purpose to attend open day this satocall me for more information”, “looking for prime serviced plots exclusive affordable housing development unserviced land and industrial plots within kilifi area call me on”.

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. Examples are: “here’s to thank papa mama ruth in my mum had divorced with my dad so our family got broken there got married then but my husband got fade up with me because failed to get pregnant ... papa and mama ruth”, “will forever appreciate and be great full to mama Haruwa for the rest of my life for all she has done for me and my entire family my name is Allen Mukami resident of Nairobi want to share my joy with all of you my friends am telling about the wonderful gifted mama Haruwa who lifted my entire family from grass to grace ... leave long mama to solve people problem and bring happiness to their souls don’t hesitate to contact her”. Few of the posts were about travelling out for work and VISA applications. Examples are: “clear evidence we are doing Canada application for our clients working in Qatar biometric are done in doha vfs after visa you resign benefits we offer accommodation in Canada for our clients”, “my podcast today is about partner visa which may bring permanent resident pr in Australia please listen below contact us for one consultation please contact us on if you are in Australia call or text or

WhatsApp us on message or email us at gillamhingmidwinterscomau we offer you road map step by step guidance explain the process and answer all your questions about your immigration project we assist you with skilled visas pr or tr partner visas parent visas training visas covid visas graduate visas student visas all refusal visas and many more”.

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. For example: “why worry when you can pray trust in Jesus Christ he will make way for you”, “is now upon you arise and shine in Jesus name god now and manifest in the world in Jesus name you shall do great exploits wherever you go for the glory of god in Jesus Christ mighty name blessed week”, “may god protect his people in Jesus name rebuked every freemason and illuminati in Jesus mighty name the devil hes alier ashindwe katika jina la yesu hana utawala ama guvu kwa maisha zetu”.

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. Examples are: “dark grey machine cut stones size shs per piece we have truck carrying different capacity like pcs pcs pcs pcs nb the above price is in absence of transport name your location tuongezee transport cost call or WhatsApp location thika darugo”, “you require at

least pcs for one bedroom house pcs for twobedroom house pcs for three bedroom house piece goes for shs quarry price then transport charges depend on your location call visit for more of our materials”, “this truck carries pcs each stone pcs cost of stones only without transport you name your location we give you the charges as per distance call WhatsApp”.

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 organizations, which can also be associated with certain forms of promotions or beliefs related to luck and success. For example: “fixed matches total odds stake return source Poland kick off hrs. payment after winning of your won drop your active WhatsApp’s number call or text me via if interested to receive them immediately”, “yesterday the march was big win by VIP in betika by winning big odds WhatsApp or call or text also you can only WhatsApp today th march we also have every league tickets available in mozzart bet Kenya betikasportpesa odibet bet lion at VIP if interested kindly WhatsApp or call or text also you can only WhatsApp only serious people we have big odds don’t pass this”, “another odds have been posted on my telegram group don’t miss it out join quickly before the kickoff starts”, “congratulations today’s games are sure massive winning games don’t miss out contact WhatsApp”.

Topic 20

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. Examples are: “affiliate marketing has made businesses and individuals millionaires join my next batch of student via or WhatsApp via don’t be late simply type interested”, “business opportunity ksh our ngo has open slots for those in search of business opportunity that will help one generate residual income on full time or part time basis requirements must have an id be hard working be open minded self-motivated ready for mentorship if you meet the above you can apply”, “roofing timber supply and ksh Nairobi im dealing with all types of roofing material and we offer free transport reach me on my timber yard located at ruai kamulu kangundo road call”, “it’s the time for investment blessed Sunday as you think of securing your future as always we have something great for you value with love real estate Madaraka homes ltd Kaploti Sunday motivation”.

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.

Examples are: “hallo all recently moved to Amsterdam and am looking to meet my fellow Kenyans hoping to make some new friends”, “mama vick can now smile after long term tears she wanted connection and we took step which made her got married to Stephen joseph harper we do anything to help singles widowed divorced inbox sahii Facebook or WhatsApp”, “looking for serious guy to love me lets chat on WhatsApp”...

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 Twitter, where users share their thoughts, reactions, and observations in a concise and engaging manner. Some of the posts are: “amazing video so good reality and funny reels amazing omg funny good relaxing relax jousudbo”, “omg video so good reality and funny reels amazing funny fyp trending rpvuzvoz”, “funny amazing trending happy”.

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. Some are: “passport application and pushing international job placement visa application travel insurance flight ticketing hotel booking”, “birth certificate replacement passport good conduct pushing services WhatsApp”, “need home teacher to Qatar lady sal qr send cv asap and passport photo at least must have an experience in gulf need men comm bike riders sal send cv”, “passport booking early appointment date good conduct pushing embassy stamp WhatsApp me”.

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. Some are: “my torching story was married for years without getting pregnant the family relatives of the man advised him to get another woman because wasn’t able to give him children loved my man and he loved me too but we lacked peace at home due to my failure to give him ... please WhatsApp or call this Salongo you never know things will change like it did for me and if you are torched please share my story”, “my story is sad but it has good ending had loving and caring man was living very happy life with my family when my friend finished university she looked for job and failed so told her come and start staying with me we work together after months she started to wear short clothes in my house she started disrespecting me and decided to send her out of my house to my surprise ... she gave me number of traditional doctor or but was scared to use it cause always feared witchcraft stayed with it for full month but when the pain was to much called him this”.

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. Some of the posts are: “need people to work with me online in UK company with an attractive salary no much experience required”, “Saudi house helps jobs available intake and training on

next Wednesday and the whole process is free WhatsApp”, “need workers to work in Qatar and Dubai commission to be deducted from the salary jobs available security drivers secretary and cleaners reqcv passport medical certificate and good conduct call WhatsApp”, “looking for Saudi door to door cleaners Dubai Turkey and Lebanon housemaids”, “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 Empintravel”.

Topic 26

These posts involve advertisements related to various property offerings and accommodations. The posts mention available rooms, apartments, bedspaces, 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. E.g., "ladies drivers jobs available in Qatar cleaners jobs available in both genders Qatar receptionist jobs available for both genders for more contact us", “one bedroom available in south with all the amenities Wi-Fi hot shower Netflix elevator kitchenette self-check in with key safe secure parking neighboring two major mall capital Centre and NextGen mall few kilometers from Jkia and Wilson airport for enquiries bookings call charges are per night”, “bedspace for Africans only upper beds available aed and down bed aed hamriyaabuhail road opposite hadeer supermarket next to day and night cafeteria exactly at the bus stop rent includes dewa Wi-Fi mineral water gas all households are provided washing machine microwave fridge kettle heater etc clean and peaceful home contact Sabrinah or omy”

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. Examples are: “cash loan business loan emergency loan personal loan message me”, “school fees loan ni chapchap na chapchap loans instant approval no harassment no crb background checks whatsapp at chapchap loans for loan application”, “Friday offer loan available up to rent school fees business loan teachers loan emergency loan personal loan instant approval within minutes WhatsApp to everyone”.

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, graphics design, legal case, plumbing works among others. They don't necessarily fit a single overarching theme but rather represent a collection of announcements and messages covering different aspects of life, services, and opportunities. Some of the posts are: “new vlog link in below my staycation in luxurious apartment in Nairobi Airbnb staycation tour”, “scam alert please help me report this fraudster using my pictures to con innocent people am in no way related to him/her do not send any money to him/her the Facebook name is Wangai Roseline and in bets its registered as rosa odds mpesa rose njeri”, “our company is urgently hiring workers in the following counties Nairobi Nakuru Mombasa Eldoret Meru and kisii comment with your county for more details”, “traditional photoshop Nani Mwingine Nimuundie WhatsApp”, “welcome for quality plumbing services in

Kenya call or WhatsApp niko nakuru but flexible to move to you are of work”,
“Nairobi court on Thursday march heard that former Nairobi governor mike mbuvi
sonko is mentally unfit to stand trial”.

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. Some examples are: “hello guys am silent heroes and take videos about extraordinary people across the world these videos are so emotional and thought you may be interested in watching other people’s lives”, “am Joan from Munyonyo am giving my testimony on how got rich and marriage through chief Evans was deeply strangled up by poverty and had no body to help me, I also searched for help from different corners but all in vain felt like my life was about to end went to different prophets they would tell me to ...my own happy marriage businesses house cars and other luxuries which never dreamt of now take this opportunity to recommend great chief for everything he did for me WhatsApp call for wonders”, “my name is Adams from Cameroon base in Ghana never thought will become rich in my life but here am today sharing testimony doctor mirror saw his advert on Facebook call him he told what will do in days did as he said after the days my mouth was open and couldn’t close all the bags bought was filled with money today have filling stations am now car owner have houses can travelers to anywhere wish to without any repercussion my life change for good call doctor later mirror today or WhatsApp”.

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

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includes discussions about love, marriage, hookup, and investment, offering insights into personal relationships and romantic endeavors. 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

Centered 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 together a collection of topics that center 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 center for those looking for motivation, knowledge, and direction as they go out on journeys of exploration, development, and transformation across geographical boundaries. Examples of those posts are: “ever dreamed of studying traveling 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 amsbb group”, “anyone in Europe in need of well-paying parttime job comment me”, “am Joyce Mrs vinyl Johnson 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 madam jane 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 Kasarani Biashara center and

floor office line call WhatsApp”, “passport application and pushing international job placement visa application travel insurance flight ticketing hotel booking”.

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. Examples are like: 'امتا غادي يشدو كونجي هاد' القنصلية خلاونا معلقين حسبنا الله ونعم الوكيل', 'عفاكم اخوتي المغاربه ديرو فيا واحد الخير الله يجعله ميزان الحسنات شكون تعاون معي وجه الله يشري ليا جوج خناشي ديال الدقيق بغيت نعجن الخبز ونبيعه الزنقه راه وصلت العظم ما لقيت الحنين رحم وبنتي وتجمع علي الكراء بغيت نخرج نخدم شويه باش نلقى باش نكون الوقت الله يرحم الوالدين الله يجعلها في ميزان حسناتكم تعاونوا معي اختكم ارمله 0627019677 مراکش', 'سلام خوتي الله يرحمكم والدين كنتاب منكوم مساعدة دنيا ضاقت علينا والله العظيم كرا تجمع علينا وميقا ليينا منكلو شي موحسين يعونا مواد غدائية الله يرحمكم الولدين لادمين الله بخلي ليك صححتك قبلي منشور'.

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. ممكن مساعدة منكم - Someone is asking for help with obtaining medication for a chronic illness. "كيعرف شي خدمة فاش ما انا ف نواحي ديال فيرونا الله - يجازيه" - Someone is seeking information or assistance related to services in the vicinity of Verona. " - Someone is looking for advice on whether to continue their education in Turkey or Morocco and is seeking opinions.

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. For example: "لحجز جميع المواعيد القنصليات بالدار البيضاء او الرباط التجمع العائلي العمل الدراسة مرحبا للحجز المرجوا للاتصال الرقم التالي

- "7 7 24 24 0615381743 This message offers services for booking consulate appointments in Casablanca or Rabat. " ساشارك مساء اليوم السابعة والنصف ندوة دولية منظمة " طرف مركز الدراسات والابحاث الاجتماعية بتعاون مجموعة البحث والدراسات الهجرة موضوع الندوة الهجرة وحقوق الانسان اية حماية فعالة للمهاجرين واللاجئين اليوم ستبث الندوة عبر موقع مركز الدراسات والابحاث الاجتماعية" - This message announces an international conference related to immigration and human rights. " حب يريح تجديد الفيزا مرحبا بيه يتفضل الخاص شروط الطلب السن اكثر 23 سنة فيزة زيارة " سارية لاتكون مخالفات للاتصال 0557115920 واتساب 0582046160 الاقامة والكريدت يكلفو 20 يوم" - This message offers assistance with visa renewal and lists the conditions required for the service.

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. For example: " سلام عليكم عندي سؤال فين نقدر نلقا خدمة فمجال الجبص الميكانيك في تركيا " - This message asks for advice on where to find mechanical car repair services for rent in Turkey. " شكون سافر مراكش لتركيا شنو الوراق حتاج " - This message seeks information about travel from Marrakech to Turkey, including airline recommendations. " هاد شيخ انسان طيب يعمل الخير " يساعد ناس وقف معايا الله يطول عمرو كونت مسحورة والحمد لله رجعت بخير نصيحة مني عندي شي سحر شي حاجة - This message shares a personal experience and recommends a person who can help with issues related to black magic or spiritual matters. "00212633665784 يصل بيه الهاتف ديالا " -

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. Examples are like: ' جلب الحبيب رد المطلقة فك السحر زواج العانس رد ' الغائب حل مشاكل زوجيه سحر التفريق الازواج طاعة الزوجة طاعة الزوج العلاج الادمان والمخدرات تسخير القلوب بالمحبة تزويج البنات العانس المتعطلة الزواج جلب الحبيب للزوج خلال 7 ايام ربط الزوج زوجته والعكس الكشف الروحاني بعض الحالات فقط العلاج خلال ايام خواتم روحانية قوية تنزيل اموال عبر الخدام والارواح المسليمة راه كن فكر زواج مشكلة خايف والبيدة تشوف مراتي حاملة ' or للتواصل واتساب مكاملة '00249968918313', غادي تعرف هو فعلة', 'علاج جميع الامراض الروحية باذن الله سحر التفريق سحر التقاف سحر التعطيل زواج وعمل وتجارة سحر الارحام اسحار البيوت علاج العين والحسد المس العاشق رقية البيوت اعشاب الاستفراغ اعشاب الغسل العين والحسد اعشاب لغسل البيت الاسحار المرشوشة والمدفونة خلطات للاستخراج التوكال البطن خلطات للقوة الجنسية طبيعية زيوت الدهن مرقية للمصابين بتشوويه الجمال للتذكير للاشخاص القاطنين المدن البعيدة والبلدان المجاورة او البعيدة الرقية عبر الهاتف او الواتساب الشفاء باذن الله للتواصل عبر الرقم '393206041288'.

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.

Examples are like: متوفر اشتراكات سنة كاملة' القنوات العربية والعالمية والكرة شهر اشتراك '12 or ومسلسلات نتفليكس والافلام المسرحيات العربية الاجنبية باسعار مناسبة للتواصل عبر مسنجر', جميع القنوات العالمية بجودة عالية وبرامج رمضان وافلام مسلسلات نتفليكس امازون للتواصل عبر مسنجر', 'نرتقي دوما للافضل اشتراك قنوات تلفزيونية بسبب ثقة زبائننا فينا يوم عم نقدم عروض جديدة حصرية لانو بهمنا رضا المشتركين 1 ثبات البث دقة عالية عدم تقطيع ضمان طوال فترة الاشتراك نفوت الفرصة سارع بالاشتراك لتستفيد جميع عروضنا لتحصل الالف القنوات العربية الرياضية العالمية اضخم مكتبة افلام مسلسلات الاطلاق لمزيد التفاصيل يرجى التواصل عبر رابط الواتساب 1'.

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.

Examples are like: يتطرق هذا اللافيف للحديث جديد المنتخب المغربي' مقابلة المغرب مصر ايضا لاعب الاهلي يصف فريق الوداد ب الصايغ وفيه غلاسة ويكشف اكبر عيب يجب ' or للاجابة اسئلة المشاهدين', استغلاله '6', 'يتطرق هذا الفيديو للحديث تكهناتي بخصوص المنتخبات المرشحة للتاهل للدور الثاني لنهائيات كاس امم افريقيا 2021 حظوظ المنتخب المغربي ايضا منافسيه المحتملين حالة احتلاله لصدارة المجموعة الثالثة للمرتبة الثانية او للمرتبة الثالثة'. 'يتطرق هذا الفيديو للحصيلة الاسبوعية للاعبين المغاربة الدوري الانجليزي التركي الهولندي البرتغالي البلجيكي المصري كذلك السعودي'.

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. This example is about an individual looking for a job: ' السلام عليكم الله يجازيكم بالخير ابحت عمل و النواحي تيعرف شي حاجة يكتب ' The following one is about someone asking for the procedure to migrate from Austria to Spain: سلام الخوت' بغيت نهبط النمسا لاسبانيا معنديش وراق شي طريقة شي حل مزيان الله اجازيكم بالخير'. 'سلام عليكم اخواني الله يجزيكم خير بغيت نجي ابيدجان ممكن شي مساعدة العمل فاي مجال this post is about the procedure to migrate to Abidjan. وبالاخص البناء شكرا نمنى متبخلوش عليا تجاوبوني',

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 licenses. 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 centered 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 topics 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 Facebook 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. Examples include 'salamo 3alaykom ikhwan we mbark 3ewachrkom... bghit nsewilkom daba ana 3ndi jinsia italia we kanskon fel mghreb mezewja mghribi we bit ndef3 lih visa bach ykhdm m3a charika tadir export hna felice mghreb achnahoma le khatawat li momkin netb3 m3a l3ilm me9ydah fe le consolat y3ni 3e9d zewaj we hta lbnia li tezadt ..we syd li khdam tma galia sahla takhdi lih visa.. fidoni allah yerhm lewalidin' - marriage migration, 'salam ana jaya inchalah sherbrook bélvédér bidabte ila kayn chi had kayskon tama 3andi wahad souaal svp' - seeking help from someone living in the destination.

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. 'salamualikom khuti palms up together handshake lghorba | harraga | flag: Morocco red heart flag: Libya red heart flag: Algeria red heart flag: Tunisia united kingdom / spain / france ramadan fi lghorba

palms up together palms up together star and crescent' - This message is directly mentioning clandestine migration *harraga*.

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. Examples are like : 'kan9lb ela khdma stagionale li kay3rf shi hotel wla shihaja i9dr i3awni', where the poster is asking about job offers, and this one 'slm khoti lah yjazikom blkhir chkon y9dr y3awni bach nkhl5 lkrya dorofi s3iba bzaf', where the individual is asking for help and assistance to pay rent.

Topic #4: This topic encompasses travel plans, visa application processes, especially for Italy, and concerns regarding visas and travel arrangements. Examples are like: 'salam seft passeport patron bach idfa3 lia fhad lkanon walkin passeport ghade isali fchhar 10 chno lmaamol ?', where the user is asking about the procedure to renew their passport.

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 centers 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. Examples are like: 'lkhot kifach tcontrolli wach hadchi madfo3 nit ola la dfa3t contratto lkhoti omazal ma kin walo bach na3rf hadchi mano ola ma mnouch lah yrham lwalidin li 3arf chi haja yfidna lah yrham lwalidin .: ma dakhil fihom la samsar la walo mani lmoul lchi'? Where the individual is asking for help around their housing situation in Italy

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 center 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 center 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.

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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 normalized Arabic words by transforming للم to $ل$ 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

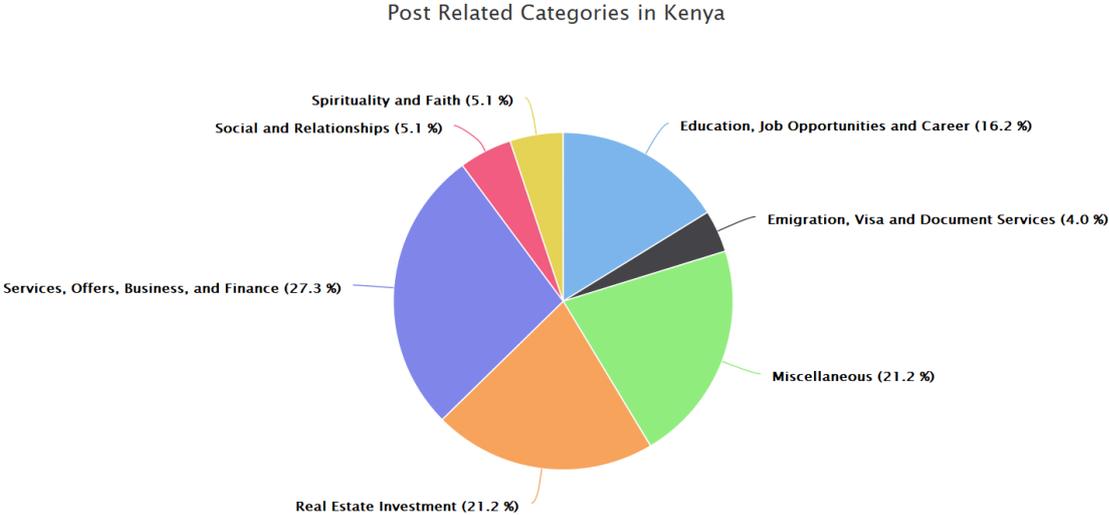


Figure B2

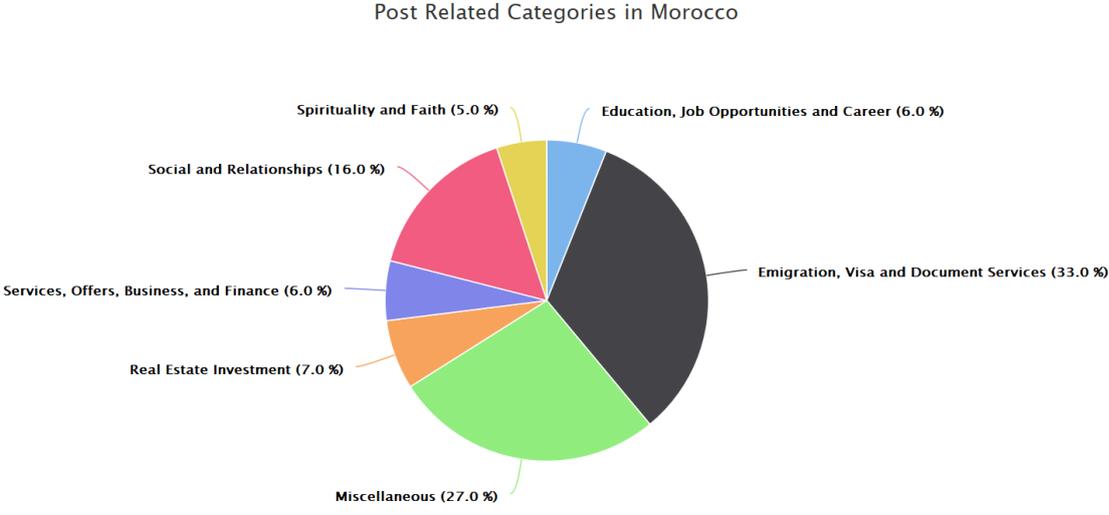


Figure B3

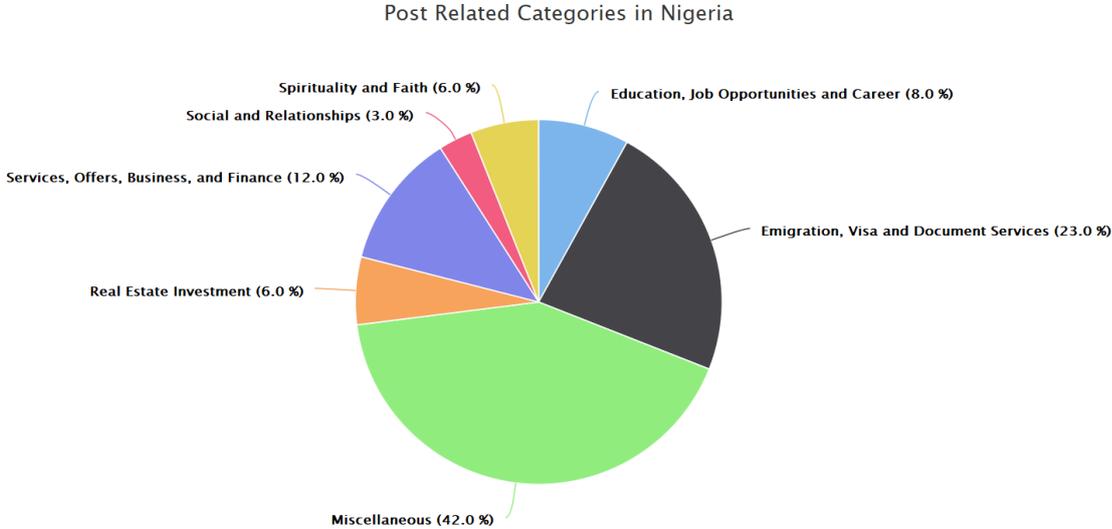


Figure B4

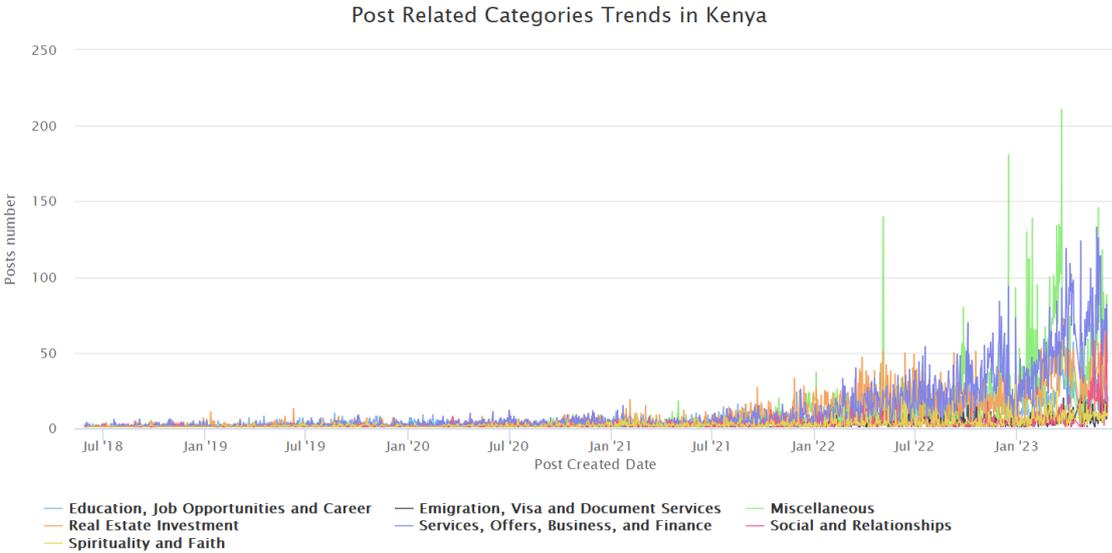


Figure B5

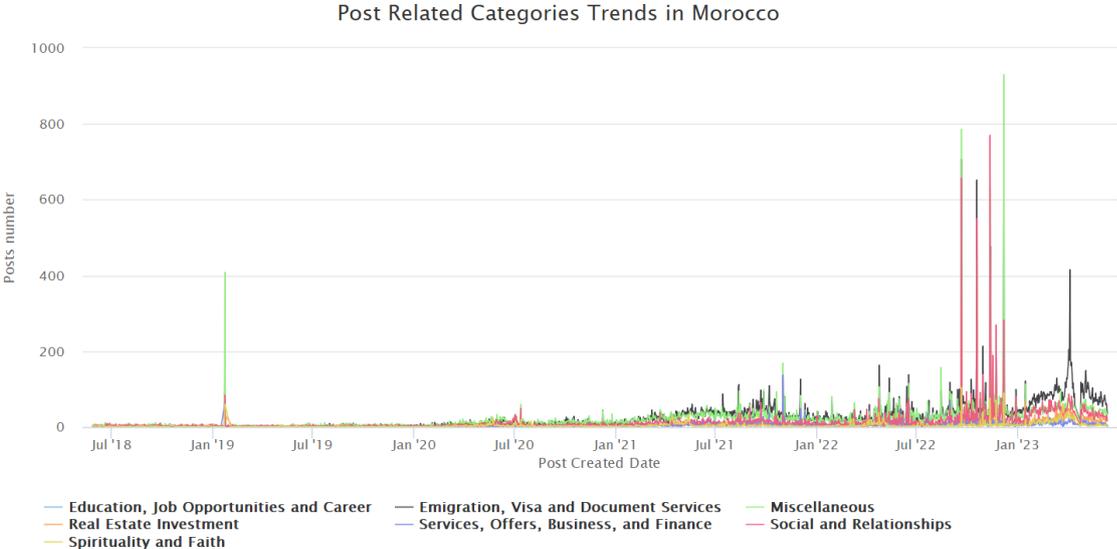


Figure B6

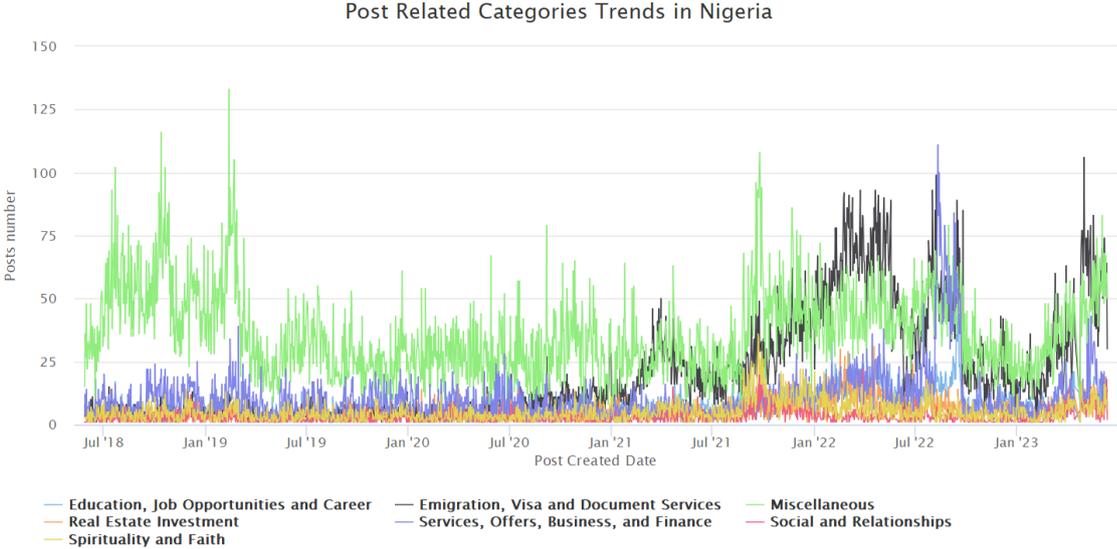


Figure B7

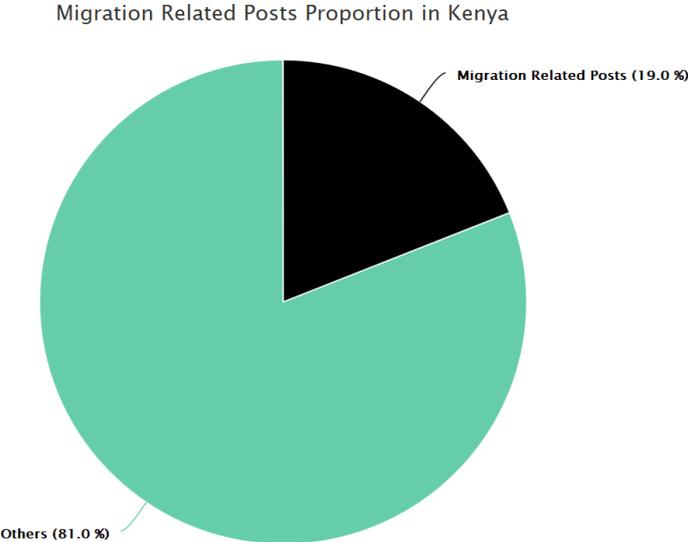


Figure B8

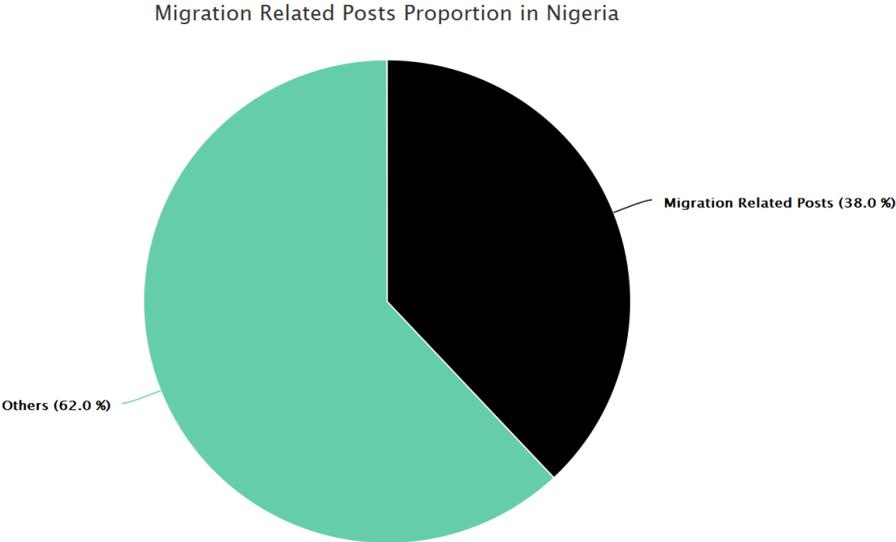


Figure B9

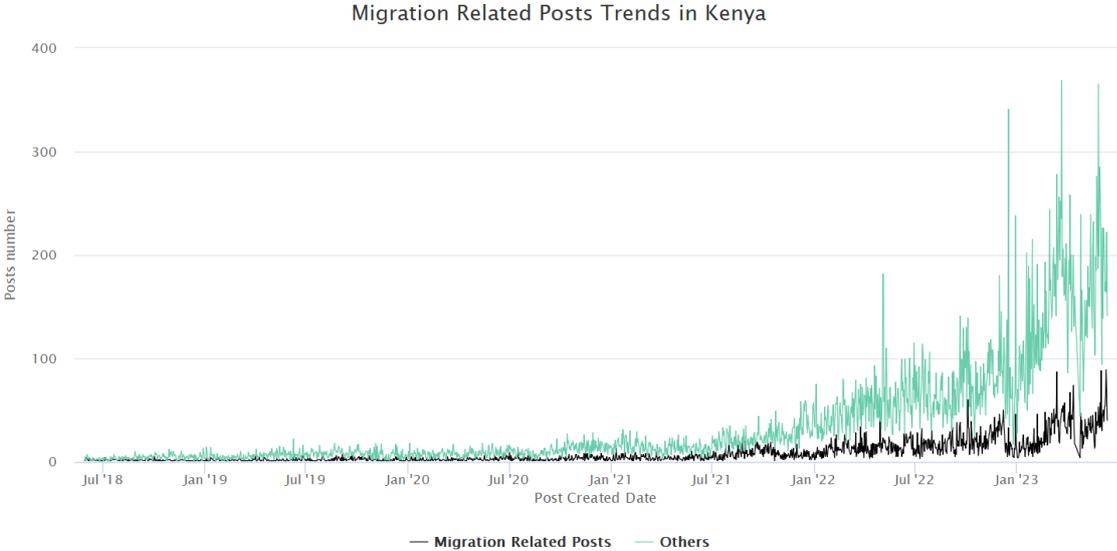


Figure B10

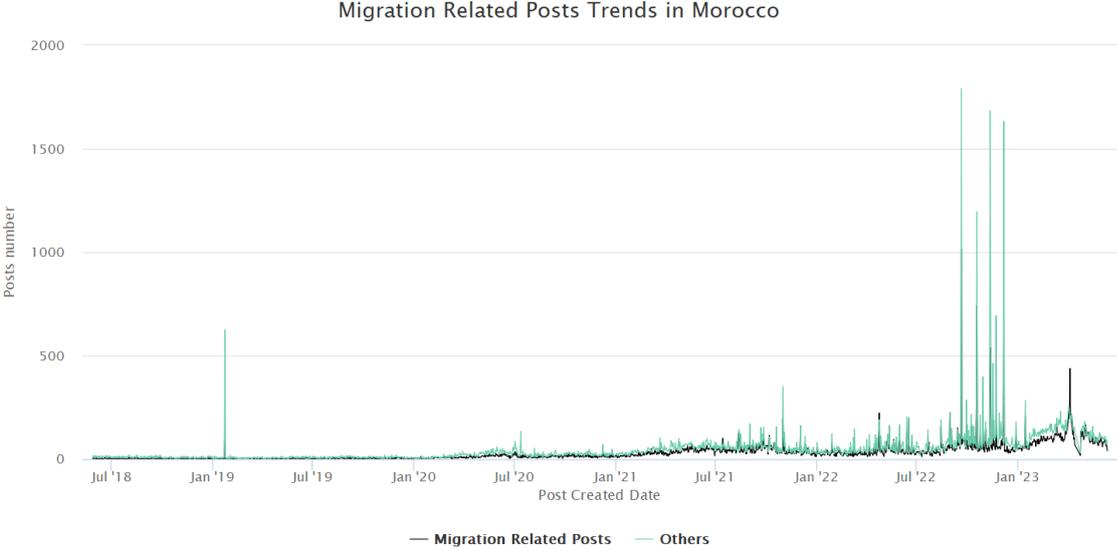


Figure B11

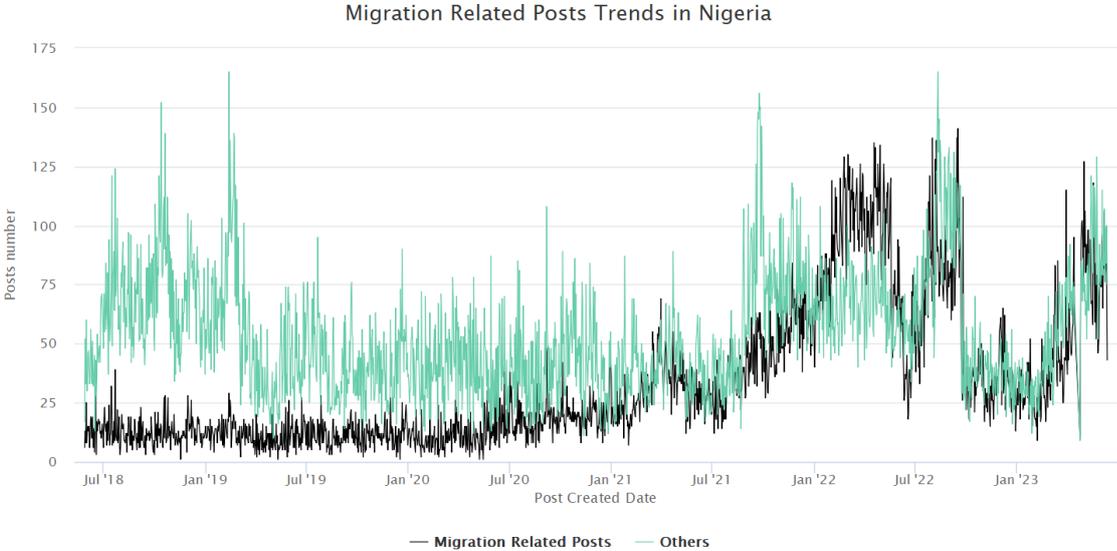


Figure B12

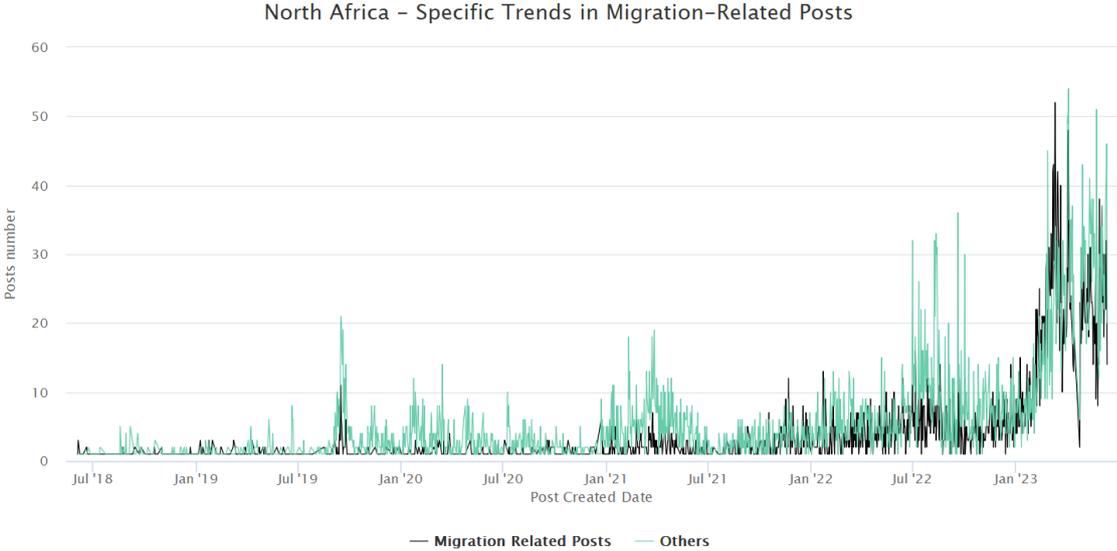


Figure B13

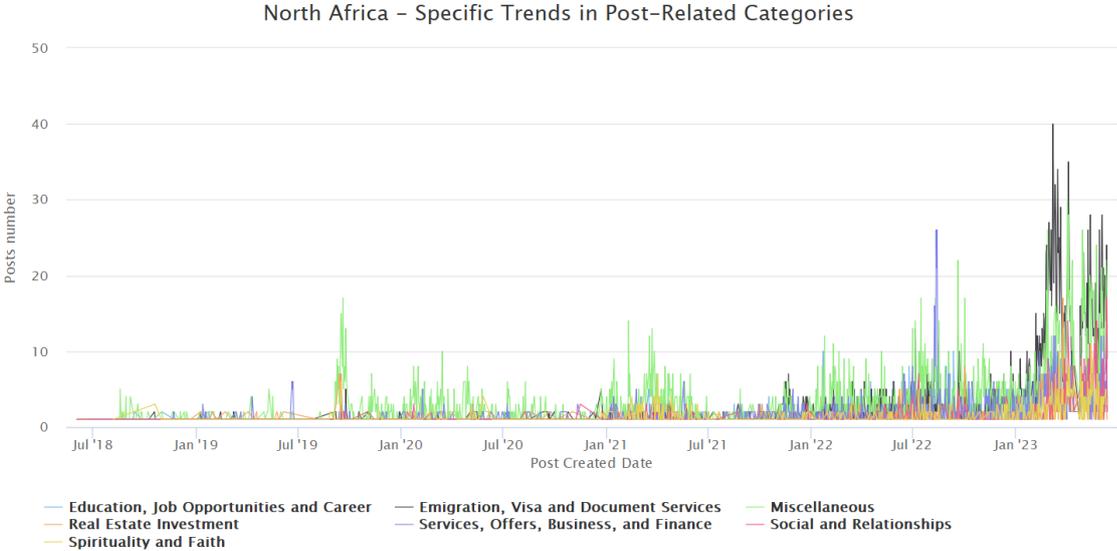


Figure B14

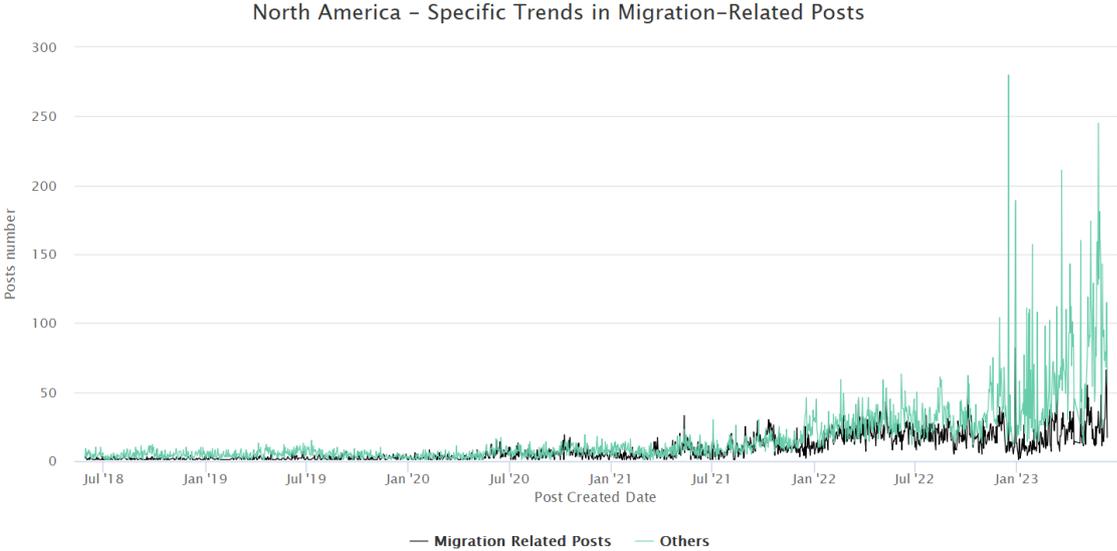


Figure B15

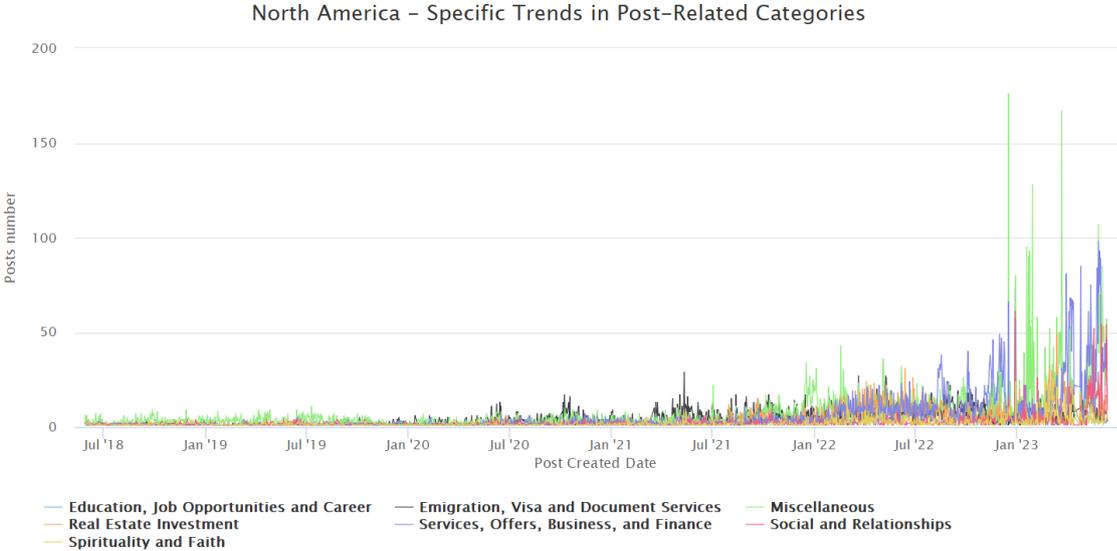


Figure B16

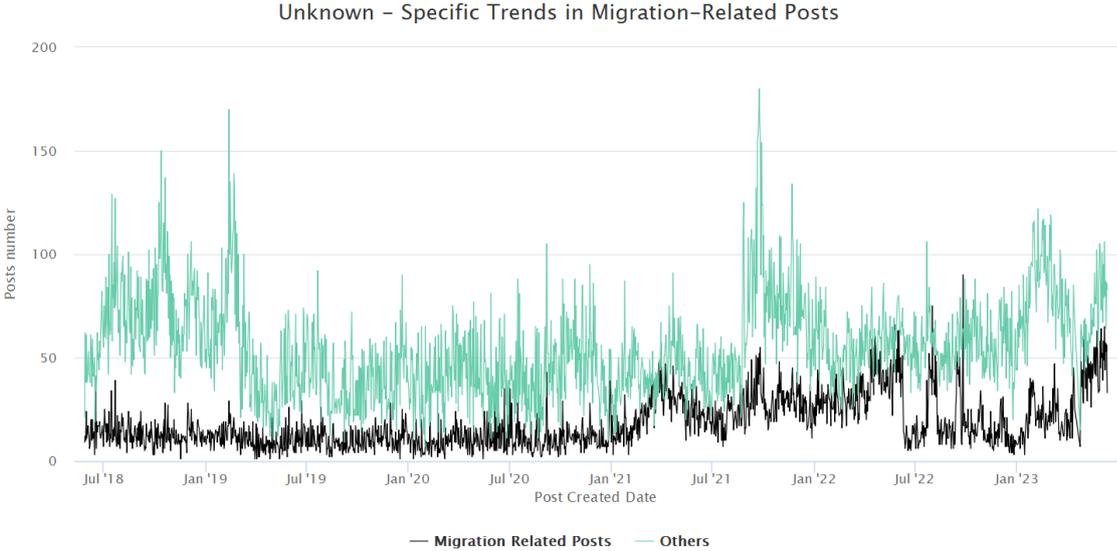
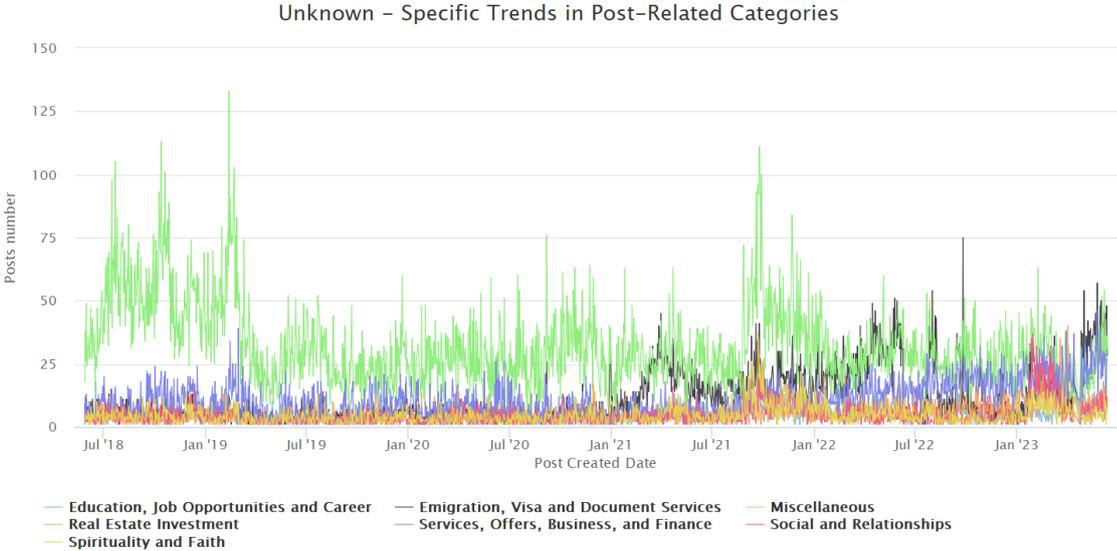


Figure B17



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



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