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A Computational Mapping of Online News Deserts on African News Websites

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Abstract

To date, the study of news deserts, geographic spaces lacking local news and information, has largely focused on countries in the Global North, particularly the United States, and has predominantly been interested in the causes and consequences of the disappearance of local media outlets (e.g., newspapers and TV stations) to the social fabric of a community. In this article, we extend the concept of "news deserts" by drawing on literature on the geography of news in Africa, where information voids have long been documented but have not been studied within the conceptual framework of news deserts. Using computational tools, we analyse a sample of 519,004 news articles published in English or French by news websites in 39 African countries. We offer evidence of the existence of online news deserts at two levels: at a continental level (i.e., some countries/regions are hardly ever covered by online media of other African countries) and at a domestic level (i.e., online news media of a given country seldom cover large areas of the said country). This article contributes to the study of news deserts by (a) examining a continent that has not been featured in previous research, (b) testing a methodological approach that employs computational tools to study news geographies online, and (c) exploring the flexibility of the term and its applicability to different media ecosystems.

Issue
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1. Introduction

In recent years, a shrinking of the number of local news outlets, their circulation, and reach, particularly in the United States, has led to a flourishing of academic research on "news deserts," communities "either rural or urban, with limited access to the sort of credible and comprehensive news and information that feeds democracy at the grassroots level" (Abernathy, 2020, p. 18). The technological, demographic, and financial transformations in the local media industry that have led to the emergence of news deserts in the United States have also been identified in other developed economies like the United Kingdom (Gulyás, 2021), Australia (Barnes et al., 2022), or Sweden (Nygren et al., 2018). Despite the differences in the structure of the media systems in these countries (Hallin & Mancini, 2011), research on news deserts in all of them has focused on the changing structure of media ownership in local news (Gulyás & Baines, 2020), its connection to decreasing levels of the plurality of voices in the media (Finneman et al., 2022) and the consequences that these changes have on the social fabric of affected communities (Mathews, 2022). In other words, existing research on news deserts shares the same point of departure: the interest in studying the causes and consequences of transitioning from geographic spaces

(i.e., neighbourhoods, parishes, towns, cities, etc.) with one or multiple news outlets focused on local reporting, to fewer or, in many cases, none. However, many countries in the Global South, including most in Africa, which is the focus of this article, have never seen the establishment of a local press (Krüger, 2022). In such a context, can we still talk about news deserts?

A few exceptions aside (Berger, 2011; Duncan, 2015), a commercial local press was prevented from thriving under colonial rule in most African countries (Newell, 2016) and has struggled to find a fertile environment to grow in post-colonial times (Kasoma, 1995). This has meant that, across the continent, the provision of local information has for many years been the remit of radio stations, particularly community and/or local stations (Heywood, 2020; Manyozo, 2009; Mathe & Motsaathebe, 2023) and, to a lesser extent, television. For decades, radio has remained the main source of news for large sways of the African population. According to data from Afrobarometer (2008, 2022), a pan-African social and political values survey, in 2008–2009, close to 77% of Africans said they listened to the radio every day or multiple times a week. This number has been decreasing over the years and, in 2022, it stood at 69%. As radio listenership slowly decreases, the continent has seen a sharp rise in online news consumption, which stood at 38% in 2022. Around 11% of those surveyed by Afrobarometer in that year said that they never listened to the news on the radio and only read news online. It is within this gradually shifting media environment that this article asks: Given the rise in consumption of online news and the proliferation of news websites across the continent, how much geographic diversity are online readers being exposed to? Are there any traces of the existence of news deserts in Africa's online news media?

This article can, therefore, be understood as an effort to expand the concept of news desserts in several ways: geographically, methodologically, and conceptually. From a geographic point of view, we follow Chakrabarty (2008) who suggests researchers provincialise United-States- and Global-North-centred cases and treat them as particular rather than universal. Our focus is on African news websites, which, as we note above, are a growing source of information across the continent (Conroy-Krutz & Koné, 2020). Conceptually, we engage with literature on news geographies, an area of study that has long been interested in the inclusion/exclusion of geographical spaces in the news media. Instead of understanding news deserts as the consequence of shrinking media environments, by focusing on online news content, we explore whether news deserts might also emerge for other reasons (e.g., financial constraints in news reporting, North–South media dependencies, etc.) in contexts that are different from those described in most existing studies.

Methodologically, instead of dissecting the structure of media ownership or examining the diversity of media sources, which are the prevailing approaches in schol-

arship about news deserts, we study the content of news websites in three dozen African countries using computer-assisted social sciences methods. In so doing, we further our case for the need to widen the geographical scope of research on news deserts to include countries where news deserts might exist in certain parts of the media ecosystem, not because of the vanishing of local newspapers, but because of other reasons. By stretching the applicability of the concept, we shift the focus away from the underlying causes that enabled the appearance of news deserts to the consequences of their existence, regardless of the factors leading to their emergence: News deserts can ultimately affect the quality of the democratic process and affect both social and political engagement (Mathews, 2022).

In line with previous research on the geography of news in Africa (e.g., El Zein & Cooper, 1992; Kalyango & Onyebadi, 2012), our analysis of the geographic distribution of online news reveals spatial inequalities in news coverage. These inequalities, to which we refer as "online news deserts," are present at two levels: continental (i.e., some countries, regions, and urban centres in Africa are hardly ever covered by online media from other African countries) and domestic (i.e., online news media of country X do not provide any news about large areas of country X). Before describing the findings and methodological approach, Section 2 provides an overview of the strands of research on which our analysis is built and offers a discussion on how the concept of "news deserts" could be applicable to the case of online news about Africa in Africa.

2. Literature Review

The term "news desert" is used to describe "towns and regions that receive very little to no local news coverage" (Ferrucci & Alaimo, 2020, p. 490). More broadly, Ferrier (2014, p. 2), who prefers the concept of "media desert," talks about "a geographic locale that lacks access to fresh, local news and information." This is in line with what Howells (2015, pp. 81–82) calls "news black holes": gaps in local news that are the product of "newspaper closures," a "withdrawal of local journalism," and a "decrease in local ownership" of the media. Other factors that have been identified as causes of the emergence of news deserts include the decline in readership of print journalism, the rise of digital media, and changes in the advertising landscape (Abernathy, 2018). In recent years, the emergence of news deserts has been accelerating in the Global North. For example, Abernathy (2020) found that 1,800 local communities in the United States have gone from having at least one news outlet in 2004 to having none in 2020. In Australia, amidst the Covid-19 pandemic, NewsCorp, a media group, announced that over "125 of its regional newspapers would either be closed or become digital-only" (Barnes et al., 2022).

In most countries in the Global South, a local press never developed to the extent seen in the United States

or Australia. For instance, in Brazil, da Silva and Pimenta (2020, p. 49) explain that a combination of the digital revolution and a persistent economic downturn has hampered the development of a local press, resulting in more than 2,700 municipalities (half of those in the country) not having any locally registered news outlet. The authors refer to these municipalities as "news deserts." While some of these news deserts have emerged because of media organisations closing down, many, particularly in the north of the country, have always been there (Moreira et al., 2021). This is also the case in many African countries where, except for local and community radio stations (da Costa, 2012; Manyozo, 2009) and some isolated cases of local print and digital media (Berger, 2011), news production tends to be highly concentrated in large urban areas, primarily capital cities. This, Krüger (2022) suggests, makes news deserts in Africa rather abundant. And yet, academic research on the presence/absence of news deserts on the continent is lacking.

2.1. News Deserts Online at a Continental Level

Africa has been quite prominent in studies on the geography of news (e.g., El Zein & Cooper, 1992; Kalyango & Onyebadi, 2012), a strand of research interested in the spatial distribution of news content and the way it affects the representation and perception of places (Cresswell, 2004). Initially, studies on the geography of news were focused primarily on the physical distribution of news content, such as the placement of news bureaus and the flow of information between different regions (Galtung & Ruge, 1965). Researchers then began focusing on the logistical aspects of news production, and the ways in which these processes influenced the representation of different regions and communities (Paterson, 1994). More recently, the interest has shifted to the social and cultural factors that shape the distribution of news content (for an overview of some of these, see Gutsche & Hess, 2018). Over the years, most research in this area has converged around the idea that news content is highly unevenly distributed, with some regions and communities receiving much more news coverage than others (Chang, 1998). This is particularly evident in the case of news about African countries, which are routinely underrepresented in the news media, both globally and in Africa (Wu, 2000), and, when featured, they are often reduced to cliché images (Evans & Glenn, 2010).

Scholars have put forward a range of explanations as to why African countries are often absent from the news. Some of these reasons are described as "structural." For example, Chang (1998) has shown that "richer" countries in the Global North get significantly more media attention than "poorer" ones in the South. This is exacerbated by the fact that many news organisations depend on news content provided by news agencies, global and local, to report on what is happening at home and abroad (Paterson, 2011). This includes most African newsrooms,

which oftentimes lack the financial resources to report on domestic and continental affairs and are therefore highly reliant on content produced by global news agencies (Serwornoo, 2019). These agencies, which have long been shown to lack African voices (Bunce, 2010), have also been reducing their operations in recent years (Boyd-Barrett, 2010), thus further limiting their ability to cover the continent at scale. Taking stock of all this, Wahutu (2017, p. 41) concludes that "African news organisations are lagging behind in the production of knowledge about events unfolding in the rest of the continent" and attributes this, partly, to elites' preference for content about and from the Global North, which "places voices from the metropole at the status of the universal standard."

The limited coverage of African countries, peoples, and issues by most African news outlets could also be conceptualised as a type of "news desert," one that is not characterised by information voids at a local/community level, but one that affects a larger geographic unit: the whole continent. In the existing literature on news deserts, the interest has been in local information or news produced from, about, and for a "community." The dimensions of these communities, however, have never been clearly delineated. We contend that it is possible to think of communities at different levels, from neighbourhoods to cities to nation-states to "ethnoscapes" (Appadurai, 1996), and news deserts might form at any of these levels. What existing research suggests is that, because of a plurality of factors, certain parts of the continent (e.g., entire countries or large urban centres) receive scarce media attention. This limits the ability of citizens across the continent to, paraphrasing Abernathy (2020), access credible and comprehensive news and information, which is an important pre-requisite for a better understanding of individuals and institutions across countries. To put the idea to the test, we ask:

> RQ1: To what extent can we say that online news deserts at a continental level exist in Africa?

2.2. News Deserts Online at a Domestic Level

While research on the news about Africa in African media is relatively commonplace (e.g., de Beer, 2010; Wahutu, 2018), much less has been written on the coverage of domestic affairs (at a national or local level) by news outlets across the continent. In most countries in Africa, local news coverage has traditionally been the remit of community and local radio stations (and, to some extent, television stations), many of which broadcast in vernacular languages and sometimes have a wider reach and impact than newspapers and websites publishing content in English, French, and other languages imposed onto local communities by colonial powers. The impact and importance of local and community radio stations across Africa are well-documented, from helping disseminate agricultural information in Ghana (Zakariah,

2020) to broadcasting relevant news to women in Niger (Heywood, 2020) or contributing to inter-ethnic dialogue in Zimbabwe (Mathe & Motsaathebe, 2023). Radio remains one of the most important sources of news for many Africans, even after taking into consideration that listenership levels have been decreasing slowly in recent years, having gone from 77% of regular listeners in 2008–2009 to around 69% in 2022 (Afrobarometer, 2008, 2022).

Despite playing a crucial role in the dissemination of local news, the distribution of community and local radio stations on the continent is uneven. For example, some parts of South Sudan, to name one country, lack any form of local media, including radio, which puts large areas of the country in a severe media deficit, understood as the ability to access news and information of any sort (Southwood, 2018). Even in countries with a longer tradition of local and community radio, such as Kenya or Zimbabwe, there are limited numbers of stations, and multiple communities and linguistic groups remain unserved. In 2022, there were only 14 licensed community radio stations in Zimbabwe (Mathe & Motsaathebe, 2023), while in Kenya the number stood at 36 in 2017 (Kimani, 2020).

Comparing the impact that the absence/presence of local and community radio stations has on the communities they try to serve is an important research enterprise that has not been undertaken. Many reasons might explain such a gap in knowledge, including the difficulty of systematically gathering data across countries. Such a study would fit within the parameters of existing research on news deserts, as it would focus on local (and hyperlocal) news production and dissemination. However, as noted earlier, in this article, we seek to expand the concept of news deserts to also account for information voids at other levels, including the domestic/national/country level. In other words, when news organisations of country X report on events that are happening in country X, are there certain geographic areas that can be considered "domestic news deserts"? These would be geographic spaces within country X that are rarely reported on. We propose to explore this within the online news space with the following research question:

RQ2: To what extent can we say that online news deserts exist in domestic contexts in Africa?

3. Methods

This article uses computer-assisted approaches to map the extent to which online news deserts exist in the coverage of Africa by African news websites. In doing so, we follow Lindgren and Wong (2012) when they write: "Want to understand local news? Make a map." While this approach is relatively common among news geographers (see Herzog, 2003), it is not equally common in studies on news deserts. In a review of methodological approaches to studying local news deserts, Gulyás (2021) found that case studies, analysis of individual outlets, and media ecologies are predominant. While some studies focus on content, none takes a cross-national comparative approach as we do in this article.

We decided to focus our analysis on online news content for two reasons. On the one hand, focusing on online news offered us the possibility of collecting large amounts of data from multiple countries. On the other hand, there is evidence of the growing importance of online media as a news source across the continent. According to recent survey data from 34 African countries by Afrobarometer (2022), an increasing number of media users are turning to social media and websites to get their news. Of those surveyed in 2022, 38% said they regularly get news online (and 42% said they get news from social media). In some countries, the figures for online news consumption are much higher: 78% in Gabon, 55% in Côte d'Ivoire, or 82% in Mauritius. Values do differ across countries, in part because internet access remains very costly in many parts of the continent and broadband connectivity is not widely available everywhere.

3.1. Data Collection

We compiled a list of news websites from 39 African countries (see Tables A1 and A2 in the Supplementary File) by drawing on existing compendia of news organisations such as those curated by the Media Institute of Southern Africa, those managed by the public through services like Wikipedia, and those available on for-profit websites, such as AllAfrica. We then expanded this list by computationally identifying additional relevant websites with Amazon's Alexa web traffic monitoring tool. The resulting list was then manually inspected to retain only news websites. In selecting sources, a broad understanding of "news websites" was used. Our corpus, therefore, includes some well-established news outlets (e.g., South Africa's IOL), as well as news aggregators (e.g., TUKO) and specialised websites (e.g., GH Gossip). After the manual screening, over 1,200 websites were retained. The list reflects the diversity of media systems. Larger and more media-saturated countries, like Nigeria (150 websites) or Senegal (113), are more prominent than smaller ones (Burundi, for example, with 17 websites, 16 of which are in French and one of which is in English).

Using the list of websites as a starting point, we built a web crawler in the R programming language to visit each website twice a day to identify newly published content, and a web scraper to download the text of news stories as well as relevant metadata. We repeated the process twice daily over the course of three months, from March to May 2021 for the English corpus, and from April to May 2021 for the French one (for distribution of news over time, see Figure A1 in the Supplementary File). After removing duplicates and stories shorter than 15 words, we ended up with N = 519,004 pieces (47% in

French and 53% in English). When scraping content from these websites, no restrictive criteria were used. That means that our corpus includes both content written by reporters and journalists in the news organisations we monitored and content drawn from domestic, regional, and global news agencies. By following this approach, we can have a more comprehensive view of all content published online by African news websites.

While there are limitations to this approach, including the fact that some relevant websites that were paywalled at the time of data collection (e.g., Daily Maverick in South Africa or Nation in Kenya) cannot be included in the sample, we were able to overcome problems with widely-used news content databases such as Factiva or Nexis, which have a limited range of African news sources (Madrid-Morales, 2020). Other limitations of our approach include the lack of material in languages other than French and English. This might have excluded from our analysis news content that is more localised, less dependent on foreign news agencies, and, potentially, more focused on local news. That said, focusing on English and French allows us to include a larger number of sources, given that those are the two prevailing languages in which news content is published in most of the countries we include in the sample and facilitates cross-national comparisons.

3.2. Data Analysis

We analysed data in three stages. First, and to address RQ1, we used a multilingual lexicon (English and French) of world cities (GeoNames, 2023) with 11,120 entries to count how often cities were mentioned in news stories. To do this, we used a custom-built Python script to identify exact matches of city names. We counted the mentions of cities anywhere in the article. This means that, in some cases, cities might be mentioned in the dateline, while in others mentions can occur in the body of the news story. Second, and to answer RQ2, we focused on Nigeria and South Africa. We selected these countries because they had the largest number of data

sources in the corpus ($n_{Nigeria}$ = 150 and $n_{South Africa}$ = 105) and because they offered contrasting examples. South Africa has multiple local and hyperlocal news websites, as opposed to Nigeria, where news production is highly concentrated in large urban centres. The analysis at this stage used a Lexicon of more specific locative information for each country. Finally, we used 2021 UN population density data to explore the association between geographic mentions and population density.

4. Findings

In line with the two research questions, we structure this section into two parts. First, we present evidence of the existence of online news deserts at a continental level by looking at news about Africa across three dozen African countries. We then narrow our focus on Nigeria and South Africa to describe online news deserts at a domestic level.

4.1. Online News Deserts at a Continental Level

As shown in Figure 1, which presents the location of the most frequently mentioned cities in the corpus (the size of the circles is proportional to the number of times they are mentioned), there is a high imbalance in representations of cities around the globe. Cities in the Global North, such as Paris (10,813 mentions) or Barcelona (4,115), are clearly prominent. There are also some often-mentioned African cities, such as Lagos (14,500) and Johannesburg (2,773), and several African capital cities, like Nairobi (5,037), Kinshasa (4,710), or Harare (2,675). Other cities in the Global South are much less prominent. For example, Buenos Aires (86), Rio de Janeiro (148), Kuala Lumpur (45), and Phnom Penh (23). If we look at mentions of African cities only (Figure 2), cities in the southern part of West Africa, around the Gulf of Guinea, are mentioned more often than those in most of Central Africa. We see a similar pattern in the Horn of Africa as well as in East Africa. Overall, cities in large media markets, such as Nigeria and South Africa, where
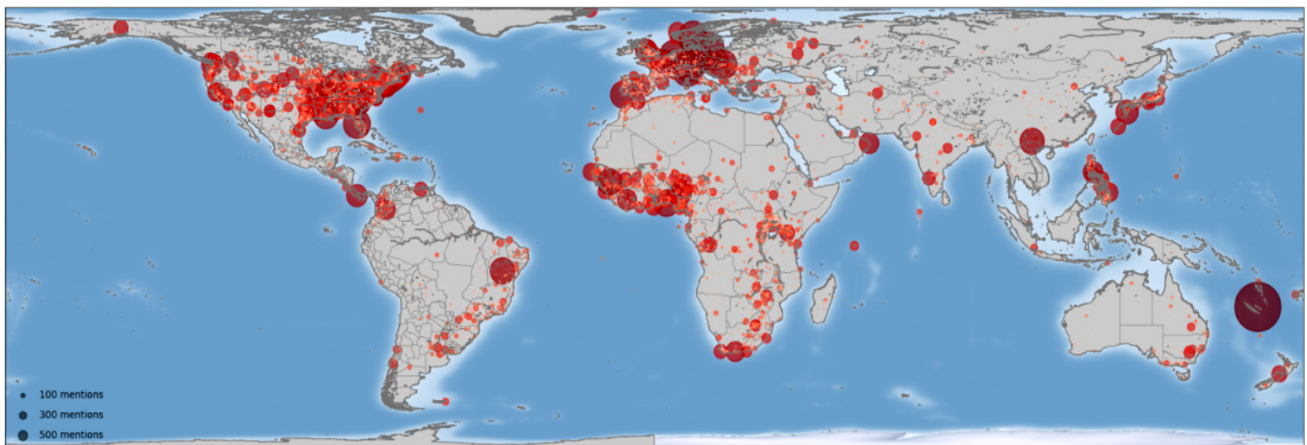

Figure 1. Mentions of world cities in African news websites.

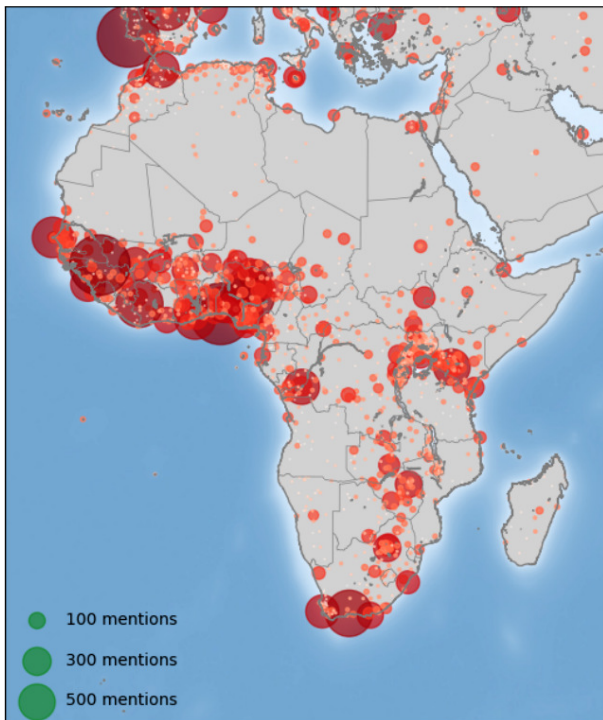a lot of news production is concentrated, are mentioned more often.

Figure 2. Mentions of African cities in African news websites.

With RQ1, which was built on previous research on the geography of news in Africa, we asked whether news deserts exist at a continental level in African news websites. As Figure 2 shows, there are large sways of the continent that remain under-reported. Some of these news deserts coincide with geographical spaces with low population density levels. In some cases, however, highly populated communities (either urban or rural) are largely absent from news coverage. In news about Ethiopia, mentions of cities other than Addis Ababa, the capital, are minimal. We can see the same in the coverage of Mauritania, Botswana, and Sudan, to name just a few examples. There are many factors that help explain these differences. Some of them could be related to our analytical approach, as we discuss at the end of this article, but others could be connected to some of the structural imbalances in news reporting of Africa that we described earlier, including the lack of news websites focused on covering local information. This does not appear to affect only small communities, but also some large urban centres. Regardless of the cause, these data seem to support the idea that, in their news coverage of the continent, African news websites media are contributing to the perpetuation of online news deserts.

4.2. Online News Deserts at a Domestic Level: The Cases of Nigeria and South Africa

To address RQ2, we focus on Nigeria and South Africa, two of the largest media hubs on the continent. In our dataset, Nigeria is the country with the highest number of news outlets and tops the list by total number of news items (105,243). South Africa is not far behind, with 105 news outlets and 76,766 news items (see Table A3 in the Supplementary File). In this section, for each of the two countries, we (a) look at how often they are mentioned in news websites in other African countries, (b) count mentions of cities on Nigerian/South African websites, and (c) examine the relationship between population and domestic news coverage.

4.2.1. Nigeria

We identified 3,268 (0.8%) stories that mention "Nigeria" in the sub-corpus of non-Nigerian websites (*n* = 413,761). There are slightly more mentions in the English-language sub-corpus (69%) than in the French-language one (31%). A significant number of stories in French are published by media in neighbouring countries where French is widely spoken (e.g., 229 stories in Senegal, 171 in Cameroon, 77 in Benin, 29 in Niger, and 18 in Chad). As shown in Table 1, it is in Ghana where most mentions of Nigeria can be found (1,341). In the English-language corpus, Ghana is followed by South Africa (299) and Kenya (212). These mentions of Nigeria, tend to be unspecific (i.e., no city is mentioned alongside the country). Lagos is only mentioned 149 times, followed by Abuja 109. Overall, only 16% of the articles (525) mention a Nigerian city after having mentioned Nigeria. If we look at Nigerian websites only, around 37% of news stories include the word "Nigeria," whereas 41% mention a Nigerian city (see Figure A2 in the Supplementary File).

Some of the differences in city mentions between African and Nigerian websites (see Table 2) can be explained by the "importance" of a given geographic space, which can be measured in terms of population density, in line with some of the previous work on the determinant of news flows (Wu, 2000). This approach connects the notion of "news deserts" to human geography, via population density, potentially making (news) deserts less of a metaphorical concept. As shown in Table 3, the Pearson correlation coefficient between the number of mentions per city and their population density in Nigeria is around 0.8. Similarly, Figure 3 shows that, if we overlap the population density map of Nigeria (in red) with the more precise mentions of smaller locations, the map shows some interesting connections. Beyond the clear prominence of Lagos, the administrative city of Abuja in the centre of the country, and further north, Kaduna and Kano, the map reveals several densely populated areas where news appears to be scarce online.

4.2.2. South Africa

South Africa, which has three capital cities (Pretoria, Bloemfontein, and Cape Town), offers an interesting case for analysis, given that the most populous city in

Table 1. Top 20 African news websites by number of mentions of Nigeria.

Source name	Source country	Mentions of Nigeria
MyJoyOnline	Ghana	516
GhanaWeb	Ghana	293
COCORIOKO	Sierra Leone	64
GH Gossip	Ghana	63
Tuko News	Kenya	58
YEN News	Ghana	47
IOL	South Africa	41
Ghana Guardian	Ghana	34
Ghbase	Ghana	32
The Herald Ghana	Ghana	29
Briefly News	South Africa	29
South Africa Today	South Africa	29
The Star	Kenya	28
AfrikMag	Ivory Coast	27
BusinessLIVE	South Africa	26
AdomOnline	Ghana	26
Asembi	Ghana	25
Citi Newsroom	Ghana	24
SowetanLIVE	South Africa	23
Graphic Online	Ghana	22

the country (Johannesburg) is none of the three. When looking at news about South Africa on African news websites, less than 0.04% (3,363 stories) include the words "South Africa" or "Afrique du Sud" (Table 4). Those news stories were published in 317 different news outlets, from 27 countries, with Zimbabwe (1,015 news stories), Nigeria (889), Ghana (565), Kenya (259), and Uganda (112) topping the list. As was the case with Nigeria, neighbouring countries also mentioned South

Africa with some frequency: Namibia on 44 occasions, Botswana on 21, and Lesotho on 52. Mentions of South African cities on African news websites do not correspond with mentions within South Africa (see Table 5). For instance, Johannesburg, which is South Africa's financial hub, has more prominence in other countries' coverage than at home. Two of the other capital cities (Pretoria and Bloemfontein) are often mentioned overseas and domestically, but they are not among the top three.

Table 2. Top mentions of selected Nigerian cities in Nigerian and African news websites.

City name	Mentions in African news websites	Mentions in Nigerian news websites
Lagos	460	12,188
Abuja	240	8,321
Kaduna	142	5,913
Kano	103	3,555
Enugu	49	2,718
Owerri	91	1,968
Ibadan	29	1,809
Port Harcourt	20	1,611
Sokoto	22	1,535
Gombe	165	764
Aba	290	592

Table 3. Correlation matrix between population and mentions of Nigerian cities in news websites.

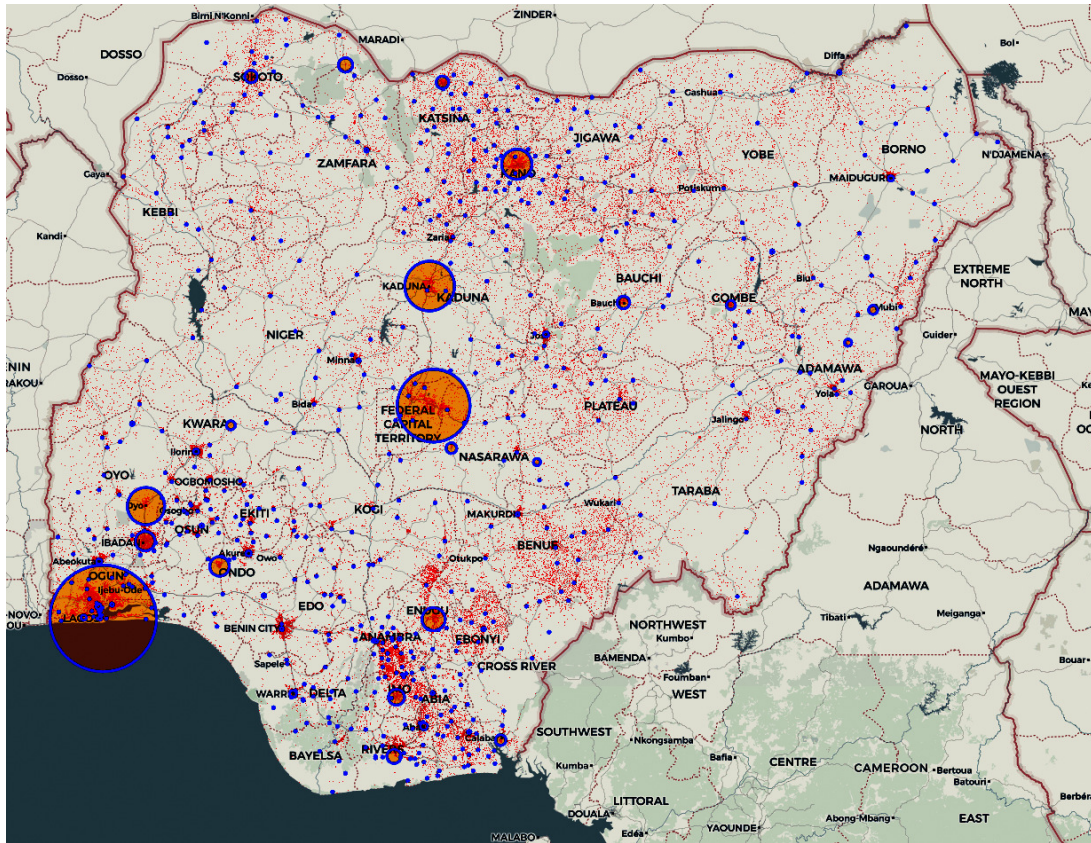|	Population density	Mentions in Nigerian websites	Mentions in other African countries
Population density	1.000	—	—
Mentions in Nigerian websites	0.775	1.000	—
Mentions in other African countries	0.724	0.818	1.000

Figure 3. Overlap between population density (in red) and mentions of geographical location (in blue and orange). Notes: Darker shades of red represent higher density levels; bigger blue circles indicate more mentions.

There are 76,766 stories from 105 South African outlets in the corpus. Of these, only 6,158 mention South Africa, while 13,011 mention at least one city. This represents a wider gap than in the Nigerian sub-corpus. Some of the largest news websites in the South African sub-corpus, (e.g., IOL or BusinessLIVE, both of which

Table 4. Top 20 African news websites by number of mentions of South Africa.

Source name	Source country	Mentions of South Africa
iHarare	Zimbabwe	322
MyJoyOnline	Ghana	140
Zimbabwe Situation	Zimbabwe	85
GhanaWeb	Ghana	85
Nigeria Sun	Nigeria	82
Nehanda Radio	Zimbabwe	77
ZimEye	Zimbabwe	66
Xtra	Nigeria	58
GhanaGuardian	Ghana	55
The Zimbabwe Mail	Zimbabwe	51
Punch	Nigeria	47
The Guardian Nigeria	Nigeria	47
The Star	Kenya	44
The Zimbabwean	Zimbabwe	38
ZimLive	Zimbabwe	36
Graphic Online	Ghana	35
Zimbabwe Voice	Zimbabwe	35
Akahi News	Nigeria	33
AdomOnline	Ghana	33
Zimbabwe Star	Zimbabwe	33

Table 5. Top mentions of selected South African cities in South African and African news websites.

City name	Mentions in African news websites	Mentions in South African news websites
Cape Town	325	3,088
Johannesburg	368	1,676
Durban	142	1,541
Pretoria	150	1,226
Gqeberha	—	947
Soweto	81	542
Stellenbosch	56	537
Port Elizabeth	—	528
Bloemfontein	25	367
Uitenhage/Kariega	—	109

Note: Gqeberha and Port Elizabeth refer to the same city and often appear together in the same article.

Table 6. Correlation matrix between population and mentions of South African cities in news websites.

	Population density	Mentions in South African websites	Mentions in other African countries
Population density	1.000	—	—
Mentions in South African websites	0.663	1.000	—
Mentions in other African countries	0.013	0.274	1.000

have a national audience) mention very few South African cities (see Figure A3 in the Supplementary File). This comes in sharp contrast with others, such as MyPE, which is based in the city of Gqeberha (also known as Port Elizabeth or PE) and is an example of a local digital news outlet. To explore the relationship between men-

tions and population size, we generated a correlation matrix (see Table 6), where we can see that there is a Pearson correlation of 0.7 between mentions and population size. We also see these patterns in Figure 4, particularly for cities like Durban and Johannesburg, however not as much in the case of Cape Town.
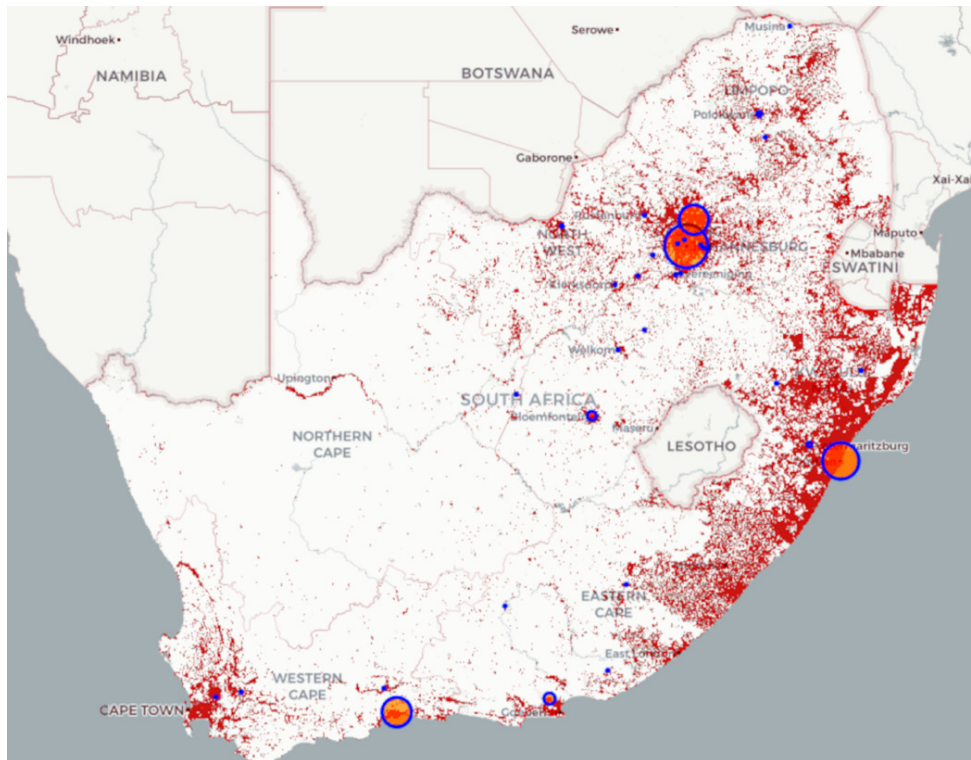

Figure 4. Overlap of population density (in red) with mentions of geographical location (in blue and orange) in South Africa. Notes: Darker shades of red represent higher density levels; bigger blue circles indicate more mentions.

5. Discussion and Conclusions

This article has explored the applicability of the concept of "news deserts" to the context of African news websites by computationally examining their content. In so doing, we depart from existing research on news deserts in three ways. First, we look at a region that has not been explored in previous studies. Second, we infer the presence/absence of news deserts by looking at news content that mentions certain geographical spaces, rather than by looking at changes in the structure of the local media ecosystem. And third, we contend that, while research on news deserts has mostly focused on local news deserts, conceptually, it should be possible to think of news deserts emerging or existing at multiple geographical levels. Our data suggest that, in the coverage of Africa by African news websites, news deserts can be seen at both continental and domestic levels.

At a continental level, large urban centres, such as Angola's second-largest city (Cabinda, population: 739,182) or Ethiopia's (Dire Dawa, population: 493,000), are hardly in the news. At the same time, however, African news websites routinely mention cities in the Global North. The reliance of African news websites on foreign news agencies, whose focus is not on covering Africa, and the lack of financial resources to report the continent, including neighbouring countries can be put forward as reasons for the existence of continental news deserts. These findings connect with Chang's (1998) work on the structural inequalities in global news coverage. These spatial inequalities at a continental level worsen the conditions for the circulation of social information, for the imagining of communities (Anderson, 1983), and for the formation of public political debates that integrate online mediated communication processes with the geographic and physical spaces of social interaction (Brantner et al., 2021).

At a domestic level, we find that both Nigerian and South African media, the two countries we focused on in this article, tend not to mention local cities often, with this pattern being more pronounced in the case of South Africa. This would seem to indicate that, indeed, online news deserts exist at a domestic level, even though further research might be needed to rule out other possible explanations. For example, it is possible that many news organisations with an online presence rely on content from foreign news agencies, which do not tend to focus on local news. It could also be that many publications are focused on topics that are not connected to a specific location (e.g., celebrities and gossip, lifestyle, etc.) or that their focus is outside the country (e.g., sports news might focus on European football). It is important to note that the focus of our analysis is on online news content. This means that our data cannot address the question of whether news delivered via other types of media, such as radio or television, might have a more comprehensive coverage of domestic news than what our analysis of news websites reveals. Future research on this area

should consider cross-media analyses to better understand the presence/absence of news deserts at the local level, in line with previous research on the topic.

Using mentions of cities and other geographic locations to explore the existence of news deserts, as we do in this article, comes with limitations. First, it is possible that the lexicons of city names that we used do not include enough detail about the countries we are studying and, therefore, that our scripts fail to identify mentions of some spaces. Similarly, and particularly in the analysis of data from South Africa, our approach is prone to identifying large numbers of false positives: For example, places like George in the Western Cape, or Discovery, a suburb of Johannesburg, might be flagged as occurring very often, but not because news stories mention the location, but a homonymous word. In our analysis, we employ a semi-supervised machine learning approach to avoid identifying some of these false positives, but a more refined analysis would be useful in future studies.

For a more nuanced picture of the extent to which news deserts exist on news websites on the continent, future studies could benefit from using larger news corpora that cover a wider time span and include content in vernacular languages. Such a rich dataset could then be used to explore other questions that are of interest to news geographers, including: How are these locations talked about in the media? Furthermore, because our focus has been on English and French language content, the findings presented here are only representative of a small fraction of the African media ecosystem, one that is favoured by elites, whose news consumption preferences might differ from those of other sectors of the population. Notwithstanding this and other limitations, we contend that the data presented in this article hints at the need to broaden the understanding of the concept of news deserts to include different expressions of information voids.

Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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