



Article

“News Desertification” in Europe: Highlighting Correlations for Future Research

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Abstract: The Local Media for Democracy (LM4D) project is the first project that explores news deserts in Europe comprehensively. Its final report highlighted challenges and opportunities for local and community media and identified the level of risk of news deserts in the 27 European Union (EU) Member States. As a pilot project, however, its results are still preliminary and open to evaluation, and, thus, they require further discussion and corroboration. Drawing from these results, and applying a multidisciplinary approach, we extrapolated research directions for the study of news deserts in the EU. By cross-analyzing data from the LM4D dataset with other datasets, we provide a preliminary analysis of three promising lines of research: (1) the relationship between public service media quality and news deserts, (2) news deserts and the spread of disinformation, and (3) social media usage and news desertification. We conclude by pointing out the limitations of this preliminary analysis and opportunities for further research on news deserts in the EU.

Keywords: news deserts; local news; public service media; disinformation; EU policy



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1. Introduction

Local and community news outlets play a special democratic role due to their proximity to and the closer relationship that these media usually establish with the people from the areas or communities that they cover compared to national media (Nielsen 2015; Gulyas and Baines 2020; Council of Europe 2023). Trust is facilitated through these channels of communication because place-based and community-based identities facilitate recognition with these outlets and their stories. They build bridges within the community through trust, providing more prominence for their community issues and building resilience against disinformation (Park 2022). Moreover, they usually cover issues, such as local politics and other critical local information, that are under-represented or absent from national media content or they fit national topics into local contexts (Center for Innovation and Sustainability in Local Media 2018; Hess and Waller 2017). However, the local media sector in the EU is also experiencing a crisis, arguably even more accentuated than the general crisis of the traditional media sector, not only from the point of view of its market viability and sustainability but also from the point of view of political independence; the capability of offering socially inclusive coverage of news and events, including the coverage of minorities and marginalised communities; and the risks for local journalists’ safety (Verza et al. 2024).

Academia’s growing interest in local journalism in recent years indicates its emergence as a relevant concern and field of study (Mota 2023). News deserts, in particular, are an increasingly common and concerning phenomenon worldwide. This refers to a situation where in some geographic locations, or even some social communities, people have difficulty or no possibility of accessing relevant, pluralistic information through various forms of subnational media (Centre for Media Pluralism and Media Freedom (CMPF) 2023). The advancement of news deserts is evidently correlated with the decline of proximity journalism. The COVID-19 pandemic has further intensified the crisis of local journalism,

despite simultaneously showing the relevance of the existence of local media in informing communities timely and accurately (Gulyas and Hess 2023).

Recently, the European Union (EU) has supported the project “Local Media for Democracy” (LM4D), led by the European Federation of Journalists (EFJ) and a consortium of partners, including the Centre for Media Pluralism and Media Freedom (CMPF), International Media Support (IMS), and Journalismfund.eu, attempting to identify “news deserts” areas. Through critical examination and hypothesis testing, this article seeks to contribute to ongoing discussions and initiatives aimed at addressing the challenges facing local media and promoting media pluralism and democracy in Europe.

This article is structured into two main sections. Section 1 delves into the state of the art of news deserts in Europe, providing a critical analysis of the LM4D report, aiming to identify both research limitations and opportunities for further investigation. Section 2 first provides an in-depth examination of the indicators utilized in the LM4D report. Following this, it outlines the approach taken in testing hypotheses related to news deserts, which are further analyzed singularly. Finally, this paper concludes with an overview of limitations and suggestions for future research directions.

2. Background

The news desert phenomenon has been primarily elaborated on in the US by academics and policy developers in order to clarify the disappearance of news media at the local level due to various economic and technological advancement factors (Blagojevic et al. 2023). For the mapping of news deserts in the EU, the LM4D project counted on the collaboration of country-based researchers who analyzed the situation of local and community media in their respective countries, indicating the level of risk for local and community media outlets, and consequently signaling the existence or potential emergence of news deserts across the 27 EU member states.

The LM4D questionnaire consists of 55 questions (variables) of legal, economic, and socio-political nature, divided into total of six indicators: granularity of local media infrastructure, market and reach, safety of local journalists, editorial independence, social inclusiveness, and best practices in fostering an open public sphere (this last indicator was used only for identifying and reporting some examples and was not part of the news deserts score). These indicators evaluate various aspects such as the presence and offer of local and community media services, economic conditions, the physical safety of journalists, independence from political and commercial influences, and the quality of news offered for and about minorities and marginalized communities.

The LM4D used a similar approach to the methodology used in the Media Pluralism Monitor that engaged several indicators and sub-indicators to assess particular areas of relevance for a pluralistic environment in the media sector (Bleyer-Simon et al. 2023) (further details in Section 4. Methodology and Research Design). The advantage of employing indicators is that the analysis across countries can be conducted uniformly. However, the downside is that the granularity of information is less visible. Naturally, when analyzing news deserts, granularity is a relevant factor to take into account, especially if particular regions or municipalities need to be highlighted as news deserts. Another issue was the lack of financial and audience data at the local level across many countries, which made the evaluation more qualitative than quantitative for some economic variables. Regardless of these limitations, the results are an important contribution to discovering news deserts across the EU as they include both quantitative and qualitative data and allow for cross-comparative analyses between EU member states.

Analysis of the LM4D Report Indicators

The research on the “granularity of infrastructure of local media” in the EU member states revealed that there was a medium-to-high risk in most of the countries under study (Figure 1). It showed that the situation of news services in rural areas is increasingly problematic due to both issues related to distribution and a decreasing number of points of

sale, as well as to the digital shift coupled with an aging rural population (Verza et al. 2024). Furthermore, newsrooms and journalists are increasingly centralized in the main regional cities, reaching the most remote areas only occasionally or conducting desk journalism exclusively. Public service media, often entrusted with covering the entire national territory, has proven to be crucial in guaranteeing adequate coverage of regional and local areas, both geographically and in terms of offering services in minority languages. The regional presence of Public Service Media (referred to hereafter as PSM) still differs by country. In some countries, they tend to cover regions adequately (Austria, Denmark, and Finland, to name a few) and, in others, due to their difficult financial position, they have gradually closed a number of their regional branches (Czech Republic, Greece) or even all of them, like in the case of Hungary (Verza et al. 2024).

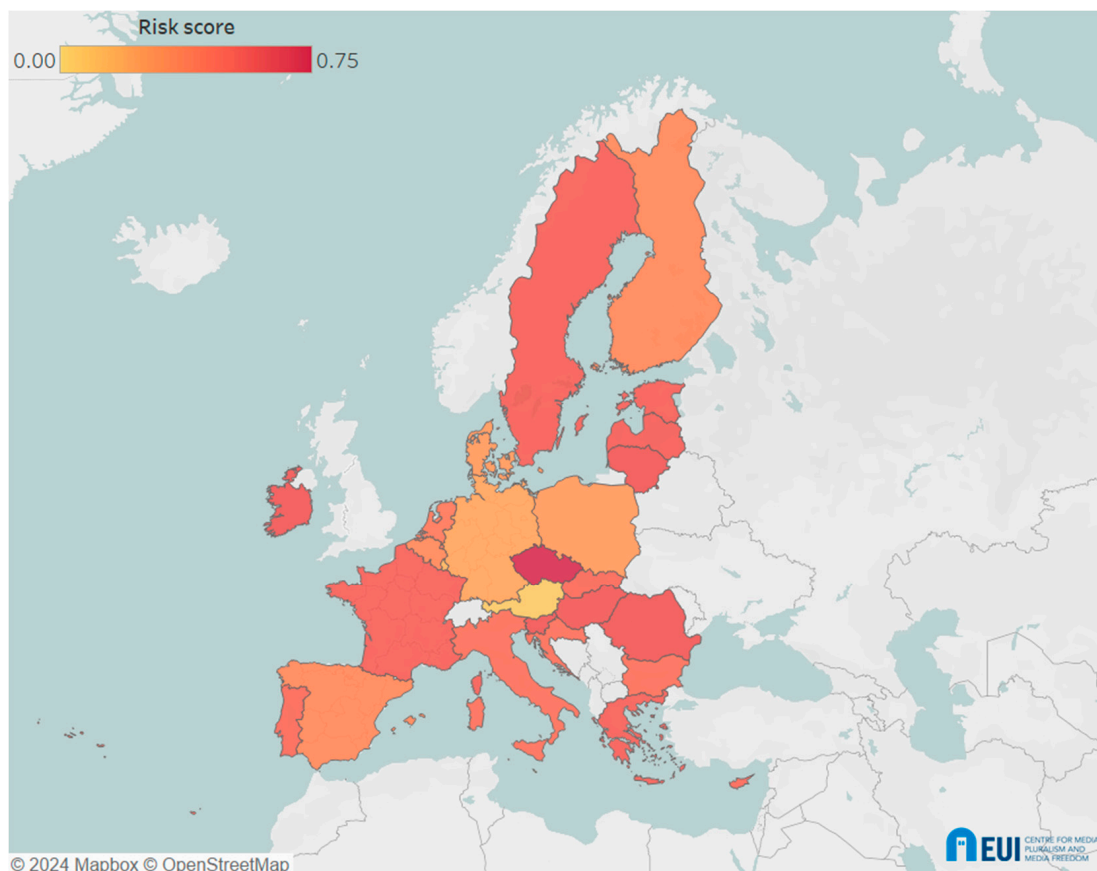


Figure 1. Risk for the indicator “Granularity of infrastructure of local media” in the 27 EU member states.

The findings of the “Market and reach” indicator showed that there is a medium aggregate score for all EU countries, with a risk level varying across countries (Figure 2). The most pressing concerns were the intertwining of decreasing advertising revenues and a biased allocation of state advertising and subsidies to local media. Furthermore, problems were related to the rapid digital transition paired with the unwillingness of the audience to pay for news, exacerbating the challenges to the sustainability of local and community media across the EU. The economic situation of local media also showed some concerning results related to the lack of innovation funding.

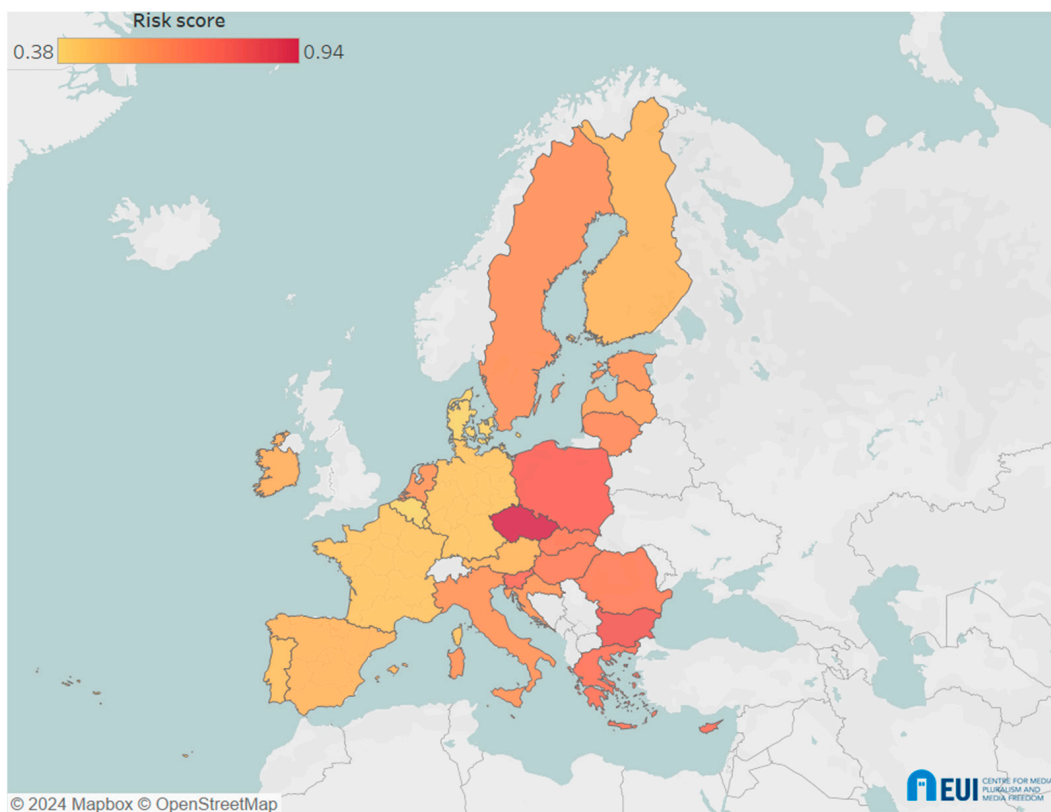


Figure 2. Risk for the indicator “Market and reach” in the 27 EU member states.

The findings of the “Safety of local journalists” (Figure 3). point to issues such as unsatisfactory working conditions, especially for freelancers and self-employed journalists, and that online attacks against them are on the rise. Local journalists are under pressure regarding their independence from local politicians, businessmen, and advertisers. The results of the indicator “Editorial independence” highlighted that Central and Southeastern Europe are the areas most affected by political and commercial control over local media, with a detrimental effect on the trustworthiness and diversity of information sources (Figure 4). There is a reported lack of independence from local politics, and local media outlets are often under the control of local politicians. Both the indicators “Safety of local journalists” and “Editorial independence” are relevant in this analysis as they show the level of safety for journalists to do their work (online safety) on the one hand and, on the other, the level of political and/or commercial capture of local media that can indicate, for example, the independence of PSM local branches.

The results of the indicator “Social inclusiveness” showed the varying levels of risk across different EU member states, with some countries facing higher risks in terms of minority and marginalized groups’ access to information and provision of critical information needs (Figure 5). One of the main takeaways was that in terms of PSM and private media outlets, the provision of news services in minority languages and the representation of minorities by PSM were evaluated to be a few percentage points better than in the private media outlets. Apart from coverage of PSM and private media of minority groups, this indicator also pointed to the levels of trust and engagement with audiences that can be influenced by the spread of disinformation and the use of social media.

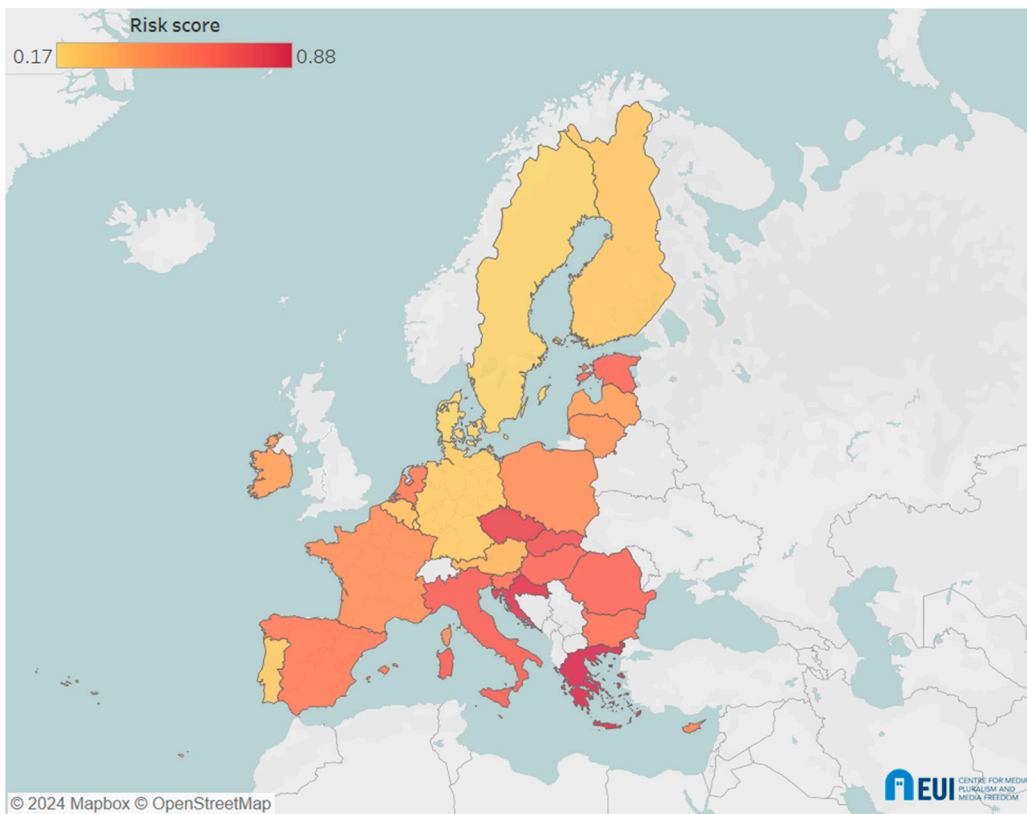


Figure 3. Risk for the indicator “Safety of local journalists” in the 27 EU member states.

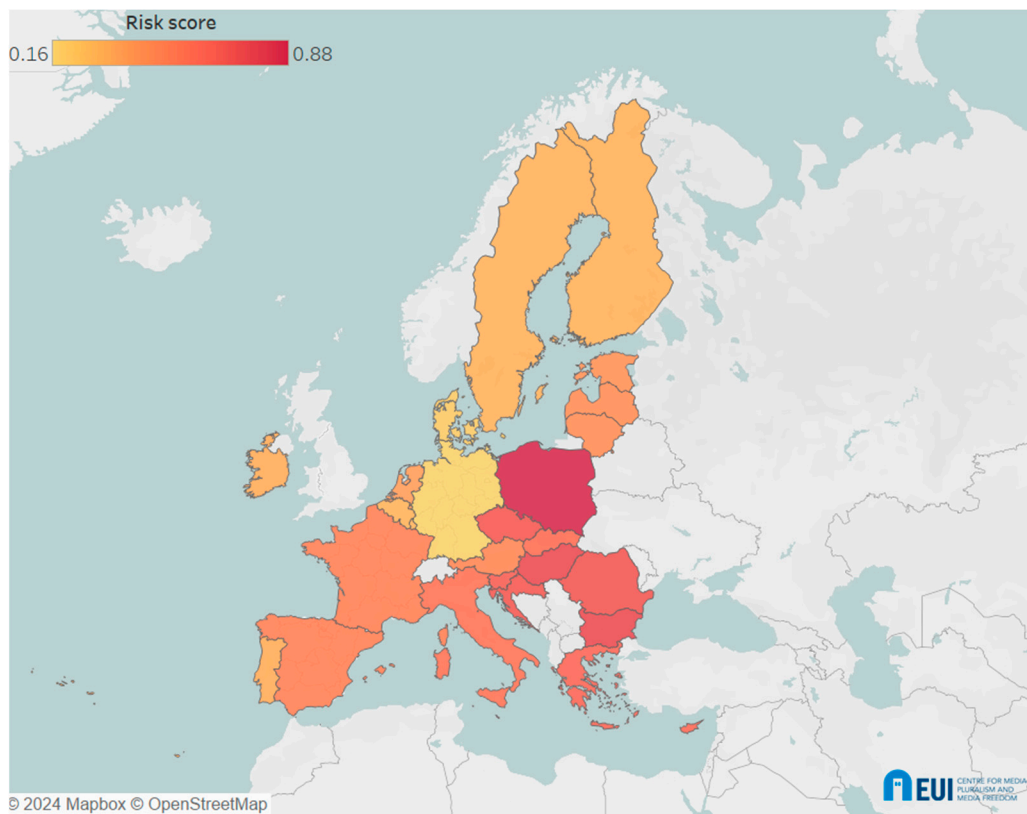


Figure 4. Risk for the indicator “Editorial independence” in the 27 EU member states.

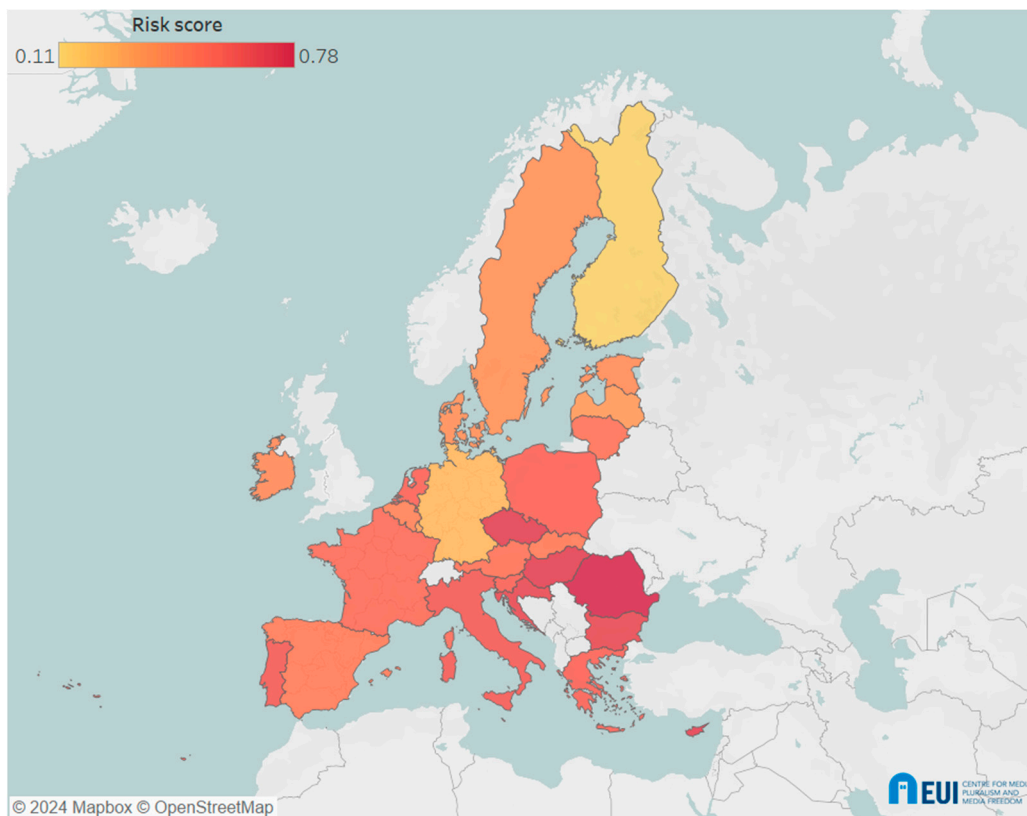


Figure 5. Risk for the indicator “Social inclusiveness” in the 27 EU member states.

To conclude, the LM4D report adopted a holistic perspective, where risk assessments were made based on these five indicators, which aimed to expand recent research on the local media landscape and this phenomenon, not looking solely at the number of local media outlets on the ground and local media coverage (Skender 2023; Jerónimo et al. 2022; Van Den Broek and De Haan 2020; Vannier 2020) but also taking into account the assessments made by other research on the existence of independent local news (Kroková 2022). The analysis of local media infrastructure across EU member states highlighted that there exists a medium-to-high risk in most countries, emphasizing the multidimensional nature of the phenomenon of news deserts, and confirming news desertification across the EU.

3. Theoretical Framework

While the LM4D project represents an unprecedented development in research, given that it is the first study to map the risk of news deserts across the whole EU-27, there is still a limited understanding of the contextual forces driving this phenomenon. We aimed to address this by tapping into the rich pool of MPM data, external data (such as DataReportal–Global Digital Insights and the Digital News Report from the Reuters Institute), and data collected from the LM4D project. Without understanding the nature and risks of this problem, we cannot propose policy solutions to counteract this increasingly pronounced and evident issue. Moreover, the discrepancy between the traditional notion of news deserts in the US and their apparent absence in Europe is noteworthy. Unlike the US, where specific regions experience significant gaps in news coverage, such instances are less prevalent across the EU. This distinction can be attributed to many reasons, among them, and above all, the generally higher population density and the robust presence of PSM culture throughout the EU, which may act as a potential antidote against such phenomena. We therefore employ the term “news desertification” to encompass the gradual decline in both the quantity, quality, and sustainability of local news outlets in underserved areas.

3.1. The Relationship between PSM and News Deserts

One of the key findings of the LM4D project was the integral role of PSM in providing coverage of regional and local areas and offering services to marginalized communities and ethnic minorities in minority languages. Public Service Media “by virtue of their remit [...] are an important public source of unbiased information and diverse political opinions” (Council of Europe 2022, p. 26). They are not solely envisaged to inform the public but actually have an educational and societal purpose for the population for whom they broadcast content (Hutchinson 2017, p. 65). They focus on providing a diversity and pluralism of information targeting the majority as well as various minority groups and, in this way, increase the inclusiveness of the society (European Broadcasting Union (EBU) 2012, p. 5). PSMs “should pay particular attention to the needs of minority groups and underprivileged and disadvantaged social categories” (OSCE (HCNM) 2007, p. 53). MPM results suggest that there are several aspects to be taken into account that affect the media access of minorities and they include country and minority group size, the recognition status of these minorities, resources that the PSM have, and the political and cultural heritage of a country (Gulyas 2023, p. 17). The OSCE High Commissioner on National Minorities provided to member states one of the guidelines related to ensuring support for measures to establish public media at the local level (among other media types), which would cover the needs of national minority groups in these smaller communities (OSCE (HCNM) 2019, p. 53).

Sometimes, PSM can be involved in improving the local media situation more directly. In the UK, through the BBC Local Democracy Reporting Service, journalists were funded by the BBC but worked for local media organizations across the UK (BBC 2021). In America, there are projects that involve the Corporation for Public Broadcasting, which assists local media organizations and helps remedy the news desert phenomenon there (Desilon 2021). Media policy frameworks in the Netherlands also support strengthening cooperation between national and regional public broadcasters (De Swert et al. 2023, p. 20). This cooperation at the local level has been seen as one of the ways to slow down the rapid disappearance of local information (Abernathy 2020; Gulyas and Baines 2020).

The results of the LM4D project show that the situation related to the crisis of local and community media is somewhat more positively assessed in the countries with strong PSM (Sweden, Finland, Germany, Austria) (Centre for Media Pluralism and Media Freedom (CMPF) 2024). Secondly, and as already mentioned when it comes to catering to and representing minority groups, PSM coverage is evaluated as less of a risk in comparison to private media outlets (Verza et al. 2024). Ultimately, the “PSM should provide what the commercial media neglects” (Horowitz et al. 2021, p. 845). This points to the relevance of the existence of the regulatory framework that, if properly implemented, can provide more “quality content”.

Like many other media, PSM are also suffering from issues related to their financing and independence (Cushion 2018; Nielsen et al. 2019). In many cases, they are predominantly providing coverage at the regional level, and, sometimes, due to a lack of resources and budget shortages, they are unable to cover them adequately or are forced to close these branches down (Gulyas 2023). The process of the platformization of PSM is particularly challenging, as they should be “developing business models that guarantee online visibility without losing quality and respecting user privacy” (Cañedo et al. 2023, p. 73). PSM should function independently from political or economic pressures in order to keep high-quality standards (Council of Europe 2009). However, the interference of politics in the governance structures of national PSM often replicates at the level of local branches, a situation that is particularly problematic in countries where the private local media sphere is either absent or already captured (Verza et al. 2024). With all this in mind, we can reasonably expect that the quality of PSMs at the country level may have a ripple effect on the local media ecosystem as well.

3.2. *The Relationship between Social Media Usage and News Desertification*

The transition to the digital era is now commonly assumed to have contributed to the crisis of traditional as well as local media. The reasons are manifold (Nielsen 2015; Gulyas et al. 2019; Toff and Mathews 2021; Barnidge and Xenos 2021; Weber et al. 2019; European Commission, Directorate-General for Communications Networks, Content and Technology et al. 2022). Most importantly, online advertising and social media seem to be fundamental contributing factors in the decline of revenues for local newspapers (Nielsen 2015). The LM4D project explored the ambiguous and ambivalent role of social media and online news consumption in news desertification (Reviglio 2023), yet not systematically and holistically. As a matter of fact, the academic literature on the role of digital news and social media in news deserts is still rather scarce (Toff and Mathews 2021; Barnidge and Xenos 2021; Weber et al. 2019). Not only does the opacity of mainstream social media often make it challenging to access valuable data for this kind of research but, most importantly, local news media online elude the definitions of local and community media. For example, there is no shared understanding among audience members on what local news is in the digital environment (Gulyas et al. 2019). Is a short video of a local event “local news”? Is local news “news” even if produced by non-professional journalists? This is also still unclear despite the European Court of Human Rights expressly recognizing that, under Article 10 ECHR, certain bloggers and “popular users” of social media may be considered to come within the notion of “public watchdogs”, and so they exercise a role of “similar importance to that of the press” (European Commission, Directorate-General for Communications Networks, Content and Technology et al. 2022). More generally, the digital transition has expanded the actual meaning of news, journalism, and media—in this context and in local ones—and so their boundaries would need to be redefined.

So far, there is a lot of speculation on what the role of online and social media news consumption could be in mitigating or contributing to news desertification. In theory, these might sustain the informational needs of communities, supporting local media exposure, discovery, and consumption. These could indeed replace local newspapers, partly mitigating news desertification (Collier and Graham 2022; Project Oasis 2023; Husock 2023). Social media, in particular, have become central in local news distribution systems, not only for the distribution of news produced by local media but also for information produced by communities within social groups (such as bloggers, journalists, influencers, Facebook pages and groups, and Telegram and Youtube channels, who disseminate local news directly to their own followers). Moreover, many organizations—especially national—also cover some local news stories, particularly during times when events transcend their local context. By receiving personalized recommendations from various sources on social media, users could cultivate, albeit in a more fragmented and serendipitous way, a local news diet. Even those who are less interested in local media could still be incidentally exposed to local news and become more interested (Yadamsuren and Erdelez 2016). This is nowadays a widespread form of news consumption (Andı 2021). Through social media, local media outlets can indeed reach new audiences—especially young people as well as underserved and disillusioned communities—and explore new (often low-cost) ways to engage communities (see Park 2021).

The reality, however, is more nuanced and challenging. First of all, local and community media seem to trigger less engagement and therefore receive less visibility. Toff and Mathews (2021) found that on Facebook in the US, particular types of content—namely, national, “hard news” stories—generate relatively higher rates of online engagement compared to local “soft news” stories, potentially disincentivizing posts about local affairs covering public interest issues. Similarly, Weber et al. (2019) found that stories about local politics are relatively scarce on Facebook and the reason may be poor interaction performance. Smaller independent organizations seem to have a disadvantage compared to those with resources allowing for more sophisticated audience strategies. Also, news organizations that use interaction metrics (particularly popularity-driven metrics) to deter-

mine which types of stories they produce and then post on social media potentially end up with platform dependency, threatening editorial autonomy (Dodds et al. 2023).

In this context, there is also the risk of “social media news deserts” (Barnidge and Xenos 2021), which occur when people are not exposed to a “high” amount of news and political information because of their social networks and/or personalization algorithms. While local and community media may be key resources for the engagement and integration of minority and marginalized communities living in a given area, the algorithms driving content distribution can be biased and polarized, leading to the mis and/or underrepresentation of minorities (Sargeant et al. 2022).

3.3. *The Relationship between News Deserts and Disinformation*

Disinformation erodes trust by spreading falsehoods, distorting reality, and undermining the credibility of sources (Jennings et al. 2021; Ognyanova et al. 2020). To compound matters, disinformation thrives in an environment of mistrust, thus essentially creating a negative feedback loop. Disinformation exploits and targets suspicions, prejudices, or uncertainties that already exist within a population, amplifying divisions and sowing discord. People who already feel alienated or disillusioned by traditional information sources may resort to alternative sources that confirm their existing beliefs or biases (Ognyanova et al. 2020). For example, a lower level of confidence in institutions was linked to a higher level of belief in conspiracy theories related to the COVID-19 vaccine (Jennings et al. 2021). Proximity journalism is, instead, perceived as trust-building, and this trust relationship is shown to be stronger in traditional media than in new media, such as the internet or social media (Mota 2023). As such, another widespread concern is that disinformation can easily fill the gap caused by the lack of independent local news. As local news outlets vanish, people turn to alternative sources, often driven by social media algorithms. Thus, rather than supporting local news media, social media could contribute to the spread of disinformation and cause local social division (Barclay et al. 2022).

Credible information emanating from local media outlets might provide an antidote to dwindling trust in the media, particularly as they are seen as more trustworthy compared to their national counterparts. At least, this was one of the main findings of the LM4D. This is also corroborated by other research (Lakshmanan 2018; Radcliffe 2018; Fernandes et al. 2022). Indeed, local media are usually far more trusted than national media (Lakshmanan 2018) and have the potential to disrupt the negative cycle of dwindling trust in media and the proliferation of disinformation (Radcliffe 2018). Apart from a handful of studies (e.g., Jerónimo 2024; Fernandes et al. 2022), there is a palpable lack of research examining the effects of disinformation on the local media ecosystem. Fernandes et al. (2022) highlighted the punitive effects of disinformation at the local level during the COVID-19 pandemic, underlining the integral role that local journalism could play in combating disinformation.

With the rife dissemination of disinformation and with no sign of it abating—particularly with the advent of generative AI technologies, making it easier to generate false but convincing media content—a vibrant and flourishing local media could prove crucial in counteracting it. This is because local media are still able to garner much higher levels of trust compared to their national counterparts. By the same logic, the decline of local media can contribute to a lack of trust in journalism and a weakening of democratic processes at the local level, further exacerbating the spread of disinformation (Radcliffe 2018).

3.4. *Hypotheses*

Noting the above, we have thus identified three promising lines of research. First, we have chosen to investigate PSM quality, exactly because one of the main findings from the LM4D project was that PSM had indeed a generally positive role in creating inclusive (social) and granular coverage (infrastructure) of local news. Second, as the digital shift in the news industry is known to have challenged local news outlets and may potentially be one of the main causes of news desertification (Verza et al. 2024), yet also proves to be ambivalent in its effects, we are interested in shedding light on this relationship by testing

social media usage and news desertification. Third, the relationship between news deserts and disinformation has been tested because there is little empirical analysis. Therefore, the hypotheses we tested are the following:

- H1: There is a correlation between the quality of Public Service Media (PSM) and the risk of news desertification within a specific country.
- H2: There is a correlation between the prevalence of social media usage in a given country and the risk of news desertification.
- H3: The disinformation risk in a given country is correlated with the risk of news desertification.

We thus had the expectation that (i) PSM quality risk score is positively correlated with news desert risk score, (ii) social media usage (%) is positively correlated with news desert risk score, and (iii) disinformation risk score is positively correlated with news deserts risk score. While these hypotheses are overly generalizing and simplifying, and, undoubtedly, cannot fully explain the complex dynamics underlying the phenomenon of news deserts, we analyze them and eventually offer insights into the role of news deserts and the most promising research directions in this area.

4. Methodology and Research Design

Our methodology employed a predominantly quantitative approach, using a basic Pearson's correlation coefficient¹ to begin to explore the pairwise relationships between disinformation, social media usage, and PSM quality and local news desertification. We opted to remove Luxembourg, Cyprus, and Malta from the analysis as these countries do not have local news deserts given their relatively small size and the intertwined nature of local and national information in the media landscape. Furthermore, all these territories, particularly Malta, are reached by national media outlets, covering news across the entire country (Verza et al. 2024). Data were collected from both the Media Pluralism Monitor and the Local Media for Democracy Database covering 27 EU member states over the years 2022 and 2023.

As previously mentioned, the Media Pluralism Monitor (MPM) is a research tool designed to identify potential risks to media pluralism in European nations. The research is based on a standardized questionnaire developed by the CMPF and updated every year. Risks to media pluralism are examined in four main thematic areas: Fundamental Protection, Market Plurality, Political Independence, and Social Inclusiveness. The results are based on the assessment of a number of indicators for each thematic area. The data collection was carried out by the CMPF in collaboration with national researchers. To ensure accurate and reliable results, a group of national experts in each country reviewed the answers to particularly evaluative questions. For a list of selected countries, the final country report was peer-reviewed by an independent country expert. The results for each thematic area and indicator were presented on a scale from 0 to 100%: scores between 0% and 33% indicate a low risk, scores between 34% and 66% indicate a medium risk, and scores between 67% and 100% indicate a high risk.

For the independent variables of our analysis, we drew upon the vast pool of MPM data for the year 2023². As outlined earlier, the disinformation risk for a specific country was calculated by subsuming six sub-indicators of the MPM into one indicator and aggregating their mean scores. In a similar vein, PSM quality is an indicator derived from the MPM database, which is composed of several sub-indicators. The data for social media users (%) were collected from the Datareportal database³. This database uses data on ad reach related to the most used social media platforms in each country. Facebook news consumption data were collected from Reuters Digital News Report (Newman et al. 2023).

To test the hypotheses in our study, we developed proxies from the MPM and LM4D variables. First, PSM *quality* is a normative standard denoting PSM that offer universal coverage that is politically balanced and impartial to a wide variety of audiences, including marginalized groups. Its operational and governance structures ensure independence from government or other political influences, in addition to promoting gender equality.

Additionally, PSMs are supposed to be adequately funded through fair and transparent means. The quality of a PSM is calculated by aggregating the mean MPM risk score of five sub-indicators of the MPM, namely, 'PSM coverage', 'PSM bias', 'PSM governance', 'PSM funding', 'Gender equality in PSM', and 'Representation of minorities in PSM'⁴. The sub-indicator of 'PSM coverage' assesses the legal and practical level of the universal coverage of PSM. 'PSM bias' is related to impartiality in its news and informative programs. 'PSM governance' investigates independence from government or other political influences. 'PSM funding' provides information on the adequacy, fairness, and transparency of the financial situation of PSM. 'Gender equality in PSM' assesses the gender equality policies in place and 'Representation of minorities in PSM' is related to the situation with airtime access and broadcasting for national minorities.

Secondly, social media usage is a straightforward phenomenon that we simply analyzed starting from the percentage of people using social media in a given country. Of course, this may be fundamentally limiting because we should not consider all social media platforms as equal in their consequences on news consumption and we should also consider their usage since their adoption in order to observe their actual effects. Nevertheless, we decided to investigate this relationship as a starting point, as we will further discuss later.

Finally, with *disinformation risk*, we refer to how severe the phenomenon of disinformation is in a given country. The proxy for disinformation risk are variables 191–197 of the MPM 191–197, save for variable 195, which measures trust in the media (MPM-2023).⁵ These variables verify that there is a national strategy to foster cooperation between different stakeholders to tackle disinformation (191); there are fact-checking initiatives with high ethical and professional standards (192–193); there are initiatives that monitor disinformation (194) and, most importantly, the impact of disinformation in a specific country (196) and the effectiveness of the fight against disinformation (197). Altogether, these variables can provide a sufficient overview of how severe the impact of disinformation is across EU countries and, relatedly, their resilience to disinformation.

Regarding the dependent variable, local news desertification, the main method used was the collection of data and information on a country through the answering of a structured questionnaire by designated national researchers (see the "Background" Section 2 of our paper for more information on the LM4D methodology)⁶. After the data collection, for the data analysis, we carried out a Pearson's correlation coefficient analysis to measure the strength and direction of association between the variables mentioned above. Naturally, there are several familiar caveats of this method. Examining bivariate relationships does not account for confounders that might lead to a spurious correlation. Also, an analysis of this kind cannot determine the direction of causality between variables. In some cases, the relationship may be bidirectional, so changes in one variable could cause changes in the other, and vice versa. Finally, the well-known academic adage, "correlation does not imply causation", reminds us that we must temper our expectations from this preliminary analysis.

5. Results and Discussion

5.1. PSM Quality and News Desertification

The correlation of PSM and news deserts was a statistically significant positive one (Figure 6). The countries with stronger PSMs tended to also have more positively assessed situations related to news deserts. However, this may also point to a better situation in the media sector in general. Particularly interesting are the outliers such as the Czech Republic and Denmark. In the Czech Republic, the PSM local branches have been decreasing in numbers year after year, and both their coverage and representation of minority groups have been assessed as high risk as they are not systematically regulated, with the funding of PSM considered particularly problematic. However, on the side of the impartiality of news programs, it is considered to be low risk. In the case of Denmark, the branches are well spread across the country and functional, and PSM has solid impartiality of news programs, apart from some room for improvement in minority media information and medium-risk

state funding practices. It has also been pointed out that, currently, there are no news deserts in Denmark; however, if the problems with local information are not addressed more systematically, news deserts might appear in the near future. It seems quite relevant to research further the relationship between PSM and news deserts. An area of future research could be to follow up on the more granular investigations into regions where the local PSM branches and/or their correspondents are present or absent and the existence of news deserts. It is also expected that countries with worse economic situations might not be able to finance good quality PSM, so economic variables for countries such as GDP, for example, could be considered for further research. Finally, volatile media environments such as, for example, the political capture of media that would include PSMs might also have an effect on their quality of reporting. Therefore, the Corruption Perceptions Index⁷ or World Press Freedom Index⁸ could be variables of interest for follow-up investigations.

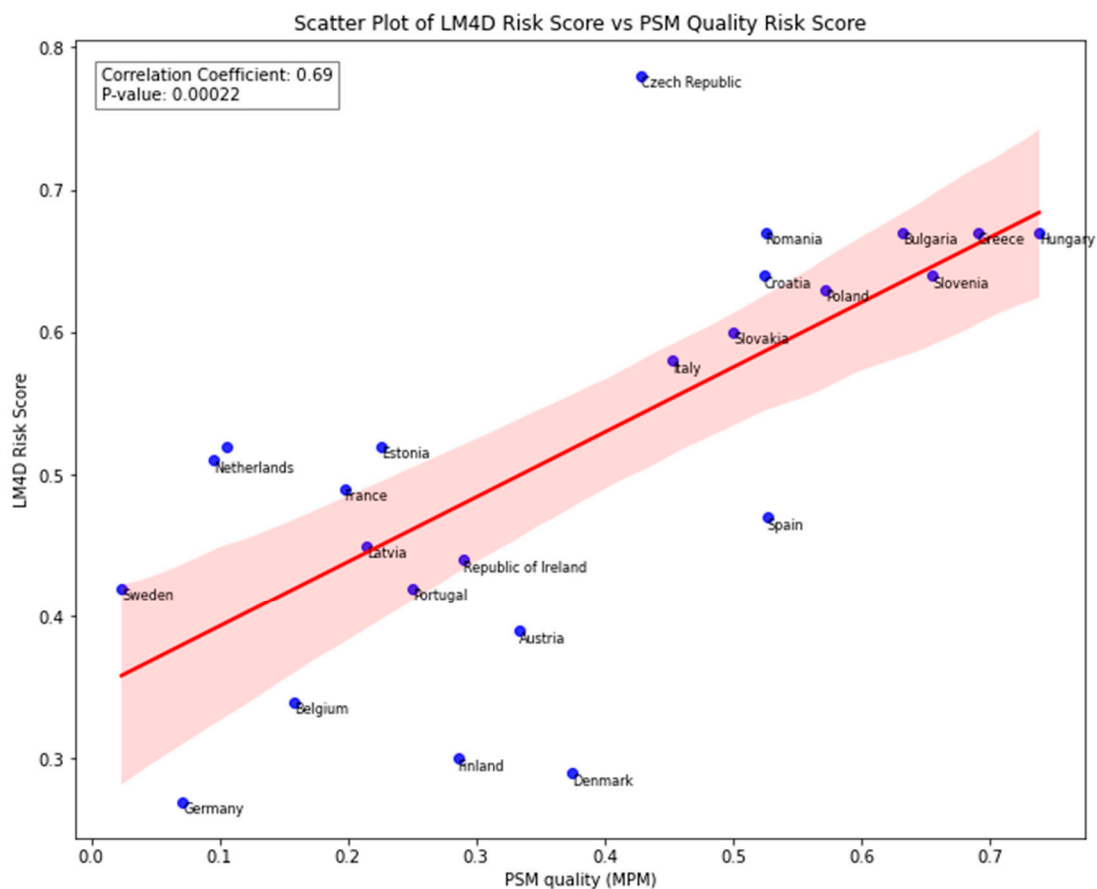


Figure 6. Scatter plot of LM4D risk score vs. PSM quality risk score.

5.2. Social Media Usage and News Desertification

The research questions we deemed most relevant in this context were the following: How have social media and online news consumption affected local media markets and local news production, dissemination, and consumption since their popularization? How are these affecting news desertification nowadays? By cross-analyzing different datasets, we tried to corroborate the above questions. First, we verified whether social media usage is correlated with EU areas at high risk of news deserts. To do this, we used social media usage data from DataReportal–Global Digital Insights. The result was a strong negative correlation that was statistically significant (Figure 7). This means that where social media usage is higher, the risk of news deserts is lower. Overall, one might assert that there is a positive net effect of social media usage. However, these variables are clearly insufficient to explain the role of social media in news deserts. In general, we can indeed explain this correlation with the fact that social media usage is also arguably correlated with the

development and quality of media infrastructures. So, this relationship shall be further corroborated by analyzing the broader online news consumption, looking more granularly into the high-risk sub-areas identified in the LM4D report and other studies.

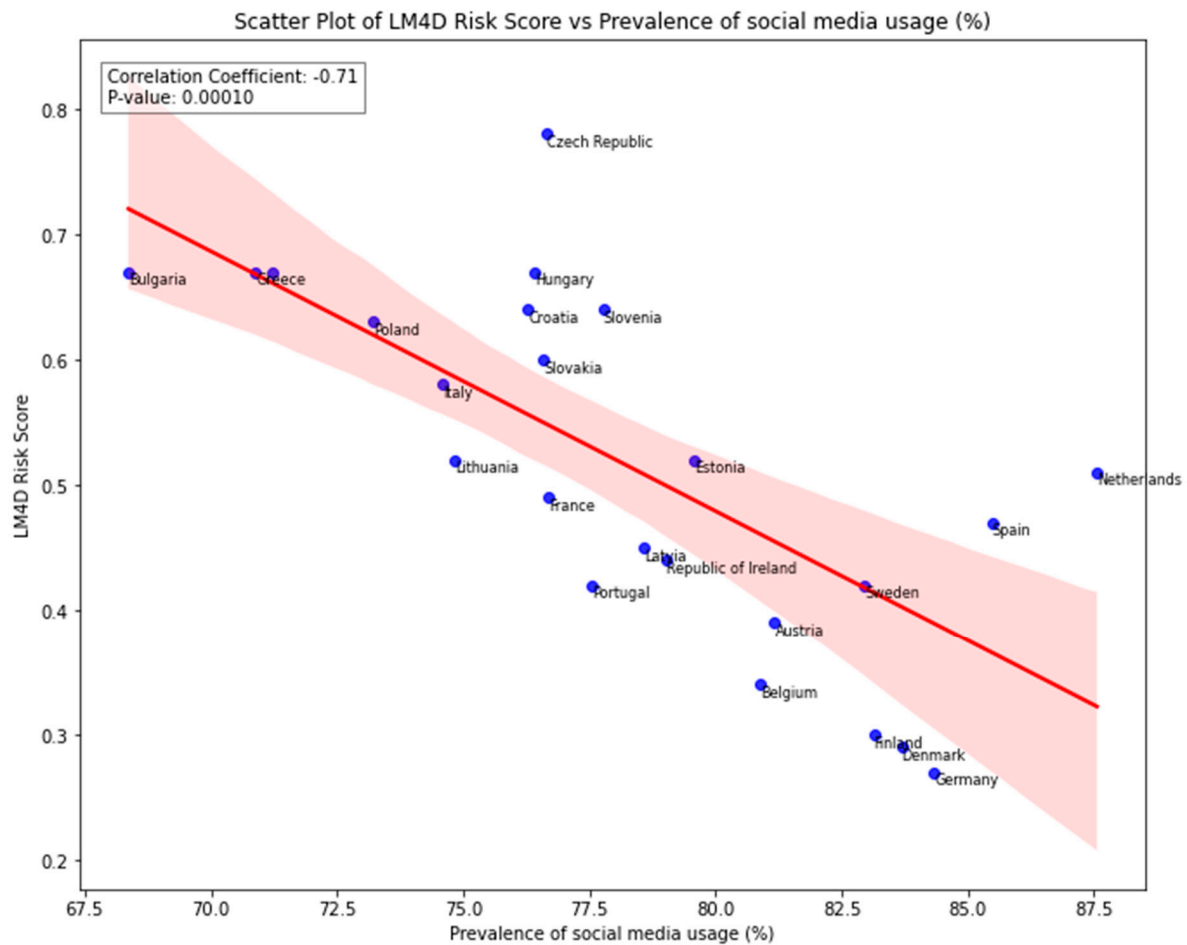


Figure 7. Scatter plot of LM4D risk score vs. prevalence of social media usage (%).

Furthermore, as different social media support different forms of news consumption, they should not be treated as equal. We therefore tested, as a paradigmatic example, how news consumption on Facebook correlates with news desertification. The result was a very strong positive correlation that was statistically significant (Figure 8). In effect, previous studies have indeed already pointed out that Facebook national stories generate relatively higher rates of online engagement compared to local stories (Toff and Mathews 2021), which are indeed relatively scarce (Weber et al. 2019). Facebook's economic incentives and algorithmic logics can indeed influence the visibility of local news as well as drive editorial decision-making, with nefarious consequences such as decreasing visibility and local news quality. Nonetheless, to corroborate this result, we invite future studies to consider the relationship between digital platforms and news desertification by (i) narrowing down the focus exclusively to regional and sub-regional areas, especially where the risk of news deserts is higher, and subsequently analyzing other potentially relevant variables such as (ii) local news consumption on social media platforms to unveil the different effects of different platforms and (iii) prevalent media attitudes and news habits in different areas, especially those related to decreasing local news consumption, such as news avoidance, and other emerging forms of online news consumption that might influence local news production and news discovery; finally, future research should (iv) take into consideration historical trends to corroborate the role of variables.

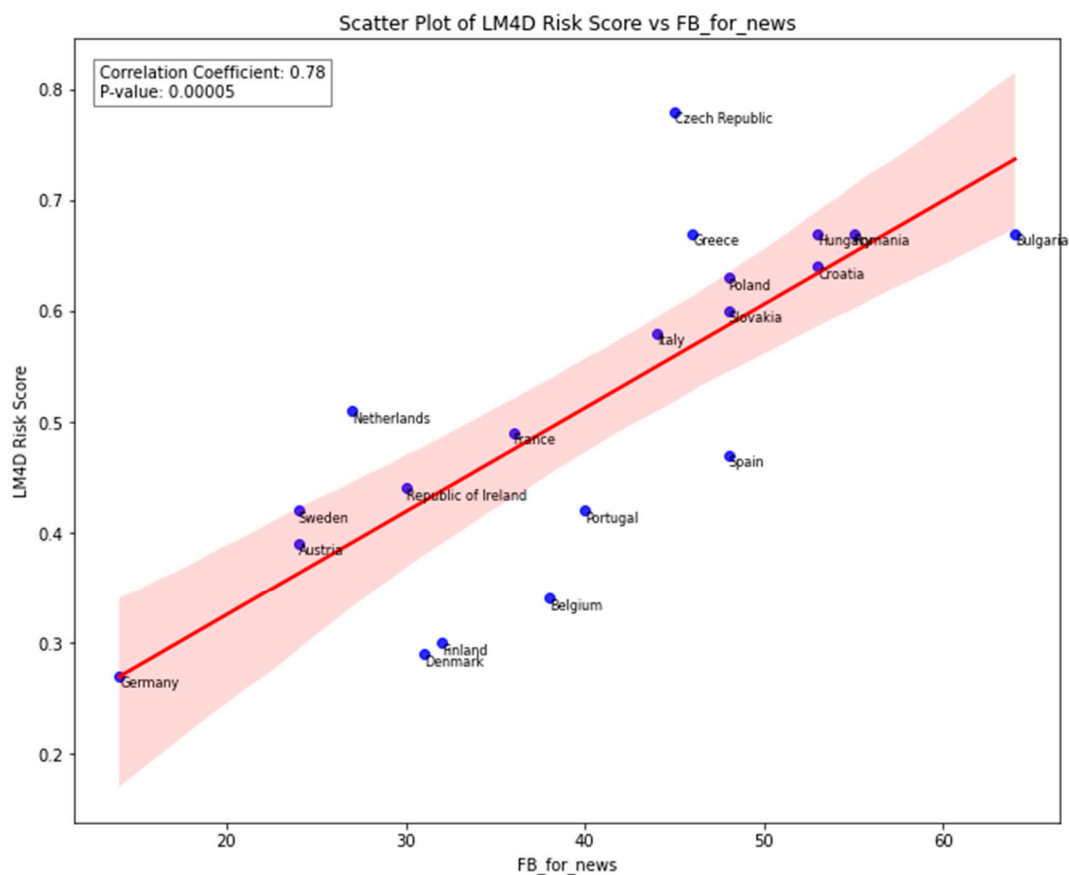


Figure 8. Scatter plot of LM4D risk score vs. Facebook news consumption.

5.3. Disinformation and News Desertification

Due to its entanglement with human psychology, evolving technological landscapes, and sociopolitical motivations, disinformation presents a multifaceted challenge requiring a multidimensional approach that clearly transcends simple causal explanations. This may explain why the preliminary results exploring correlations between a country's disinformation risk profile and news desertification are less remarkable as only a moderate positive correlation was found (Figure 9). However, it should be pointed out that the correlation found was statistically significant. In other words, the null hypothesis that there is no correlation can be rejected. Notwithstanding this, the correlation was clearly much weaker than other independent variables of our analysis. The linear model did not fit the data points particularly well, as shown by the high residual values. As a result, we found several outliers.

Countries in the CEE (Central and Eastern Europe) region—particularly Hungary, Romania, and Slovenia—scored highly in terms of disinformation risk and news desertification. Regarding the former, this is in line with expectations given its historical and cultural ties to Russia. Consequently, the CEE region can be understood as more susceptible to Russian disinformation campaigns (Bokša 2022). That is not to say that the phenomenon derives from Russia alone; however, it has been well documented that Russia is one of the main protagonists in spreading disinformation (European Commission et al. 2023). It is also important to point out that citizens' trust in traditional media outlets tends to be lower in CEE (European Broadcasting Union (EBU) 2018; Bokša 2022). This may partially explain both why disinformation has thrived in the region and why the risk of news desertification was found to be particularly high in CEE (LM4D 2024). As a corollary of this past point on trust in the media, this is indeed something we wish to explore further in future research. Perhaps the crux of the issue is diminishing citizens' trust.

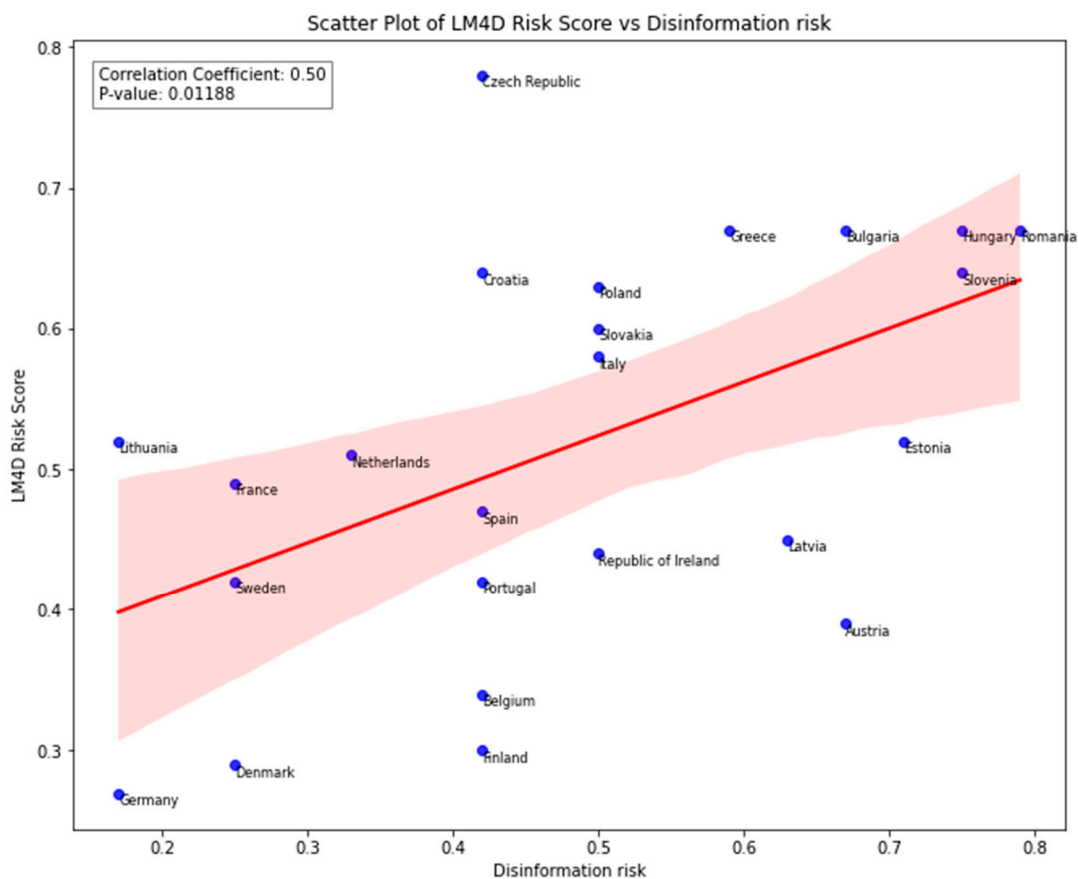


Figure 9. Scatter plot of LM4D risk score vs. disinformation risk.

Notable outliers include the Czech Republic, which registered the worst news desert score in the LM4D project (close to 80%), yet scored close to the median value in terms of disinformation risk (circa 40%). By contrast, Austria scored very high in terms of disinformation risk profile (almost 70%) but was one of the best-performing countries with respect to news desertification (under 40%). The aforementioned countries could be appropriate candidates for a detailed case study analysis to enrich our understanding of the interplay of other variables that we inevitably overlooked, acknowledging the limitations of basic bivariate analysis.

As shown by the scatter plot, the majority of Western European countries clustered in the bottom-left quadrant of the two-dimensional space. In other words, they tended to score lower in terms of news deserts and disinformation risks. This, of course, does not mean that a low risk of news desertification can be explained by a low risk of disinformation in a given country. Indeed, an r -value of 0.5 signals to us that many other variables are at play. Most of the countries that excelled in both metrics are relatively wealthier, more economically developed, and core members of the EU, with a longer tradition of democratic governance. Regarding the latter, it is reasonable to infer that a country's risk of authoritarianism or "democratic backsliding"—and the control over the media and information flows, along with the stifling of dissenting viewpoints, that it entails—may be linked to a higher score for news deserts and disinformation risk (Klatt and Boese-Schlösser 2023). Moreover, as alluded to earlier, trust in public institutions and traditional media outlets is generally higher in Western Europe. Against this backdrop, these variables should be investigated further in a future analysis.

6. Limitations

Despite these insightful findings, there are some methodological limitations, which we set out below. Firstly, given that we gathered aggregate country-level data, we cannot

generalize these findings to the sub-national level. The MPM and LM4D data comprise risk scores at the country level, and, unfortunately, we do not have risk scores for sub-national regions. Furthermore, as already outlined above, the bivariate correlation analysis did not include confounding variables. A follow-up study should thus carry out a multiple regression analysis or a more sophisticated statistical model to control for confounding variables. We should also temper our expectations; correlation clearly does not imply causation; there are multifarious variables at play whose direction of causality is not so self-evident. With this in mind, it would be opportune to pick a handful of case studies to better understand how different variables interact with one another whilst controlling for confounders. It is clear from this exercise that news desertification is a complex and hitherto misunderstood phenomenon. The main challenge remains the lack of data. The data that are available are aggregate national-level statistics based on a structured questionnaire with predominantly qualitative data; nonetheless, our findings can be insightful and provide guidance for further studies as, to our knowledge, no empirical studies exploring the link between these variables exist. Future research should collect relevant data and further explore these links, controlling for confounders and eventually fine-tuning the weights of the variables.

Naturally, at this nascent stage of analysis, there is a myriad of methodological refinements that are still required to enable us to have a more granular and comprehensive understanding of the factors that might be driving news desertification or, vice versa, what might be the ramifications of news desertification for the wider information ecosystem. In particular, it is necessary to identify and control for potential confounders, such as inter alia, economic performance including average per capita income (Saiz-Echezarreta et al. 2023), democratic performance (the EIU Democracy Index), the Corruption Perceptions Index, education and media literacy levels, levels of trust in the traditional media and public institutions, and demographic trends (Negreira-Rey et al. 2023), which can also be reasonably expected to be correlated with both the independent and dependent variables of our analysis. In practical terms, we wish to develop a multiple linear regression model to better understand the interplay between these variables in addition to adding other contextual factors that were overlooked in this paper.

Furthermore, we also plan to select a handful of case studies to obtain more detailed and granular data. This is particularly necessary with respect to disinformation, which is notoriously elusive due to the complexity of detecting, quantifying, and understanding the underlying causal dynamics underpinning it. Suitable candidate countries for more in-depth case study analyses are the countries that scored particularly high or low for the bivariate of interest. In addition, it would be beneficial to examine clear outliers that did not conform to the model. Of course, case studies entail a “depth over breadth” tradeoff. By utilizing case studies, we can delve deeper into specific instances and consider more variables. However, this often comes at the cost of generalizability, as findings from case studies may not be applicable to broader populations or contexts. Several research methodologies should be exploited to elucidate these complex phenomena. Moreover, it should be acknowledged that the dataset we used for our preliminary investigations into news deserts was rather small. Future analyses would benefit from longitudinal data in order to track changes in desertification over time.

7. Future Research

To advance the study of news deserts, there are other related and relatively new phenomena that the LM4D project did not tackle and are worthy of further investigation. First is the role of malicious or unprofessional actors in worsening news desertification by leveraging the crisis of local news outlets to gain economic and/or political advantage. There is also the phenomenon of “pink slime journalism”, that is, outlets that imitate local news but disseminate poor-quality, unbelievable, biased, and fabricated information, which can now be AI-generated (Zickgraf et al. 2023; Aguiar 2023). These sites aim to appear trustworthy by adopting names and formats similar to legitimate newspapers, exploiting

the trust people have in local news, and tending to proliferate in particular during key moments like elections, aiming to spread provocative content, thus further exacerbating information disorder (Murphy 2024).

Another relevant phenomenon that has emerged in the US is that of “ghost newspapers”, local news outlets that have lost their ability to provide in-depth and comprehensive coverage of their communities (Abernathy 2020). In essence, they retain the name and form of a traditional newspaper but lack the substance to truly fulfill their role as a pillar of local democracy. This occurs mainly because weekly newspapers have merged with bigger dailies and, as a consequence, they have lost their focus on local news and now primarily function as shopping guides or cover specific topics like lifestyle or business. Metro and regional papers often have reduced staffing, so they provide much less coverage of local government and issues affecting different areas within their reach, like inner-city, suburban, and rural communities. In the EU, there is no research on these two phenomena yet, and, within the LM4D project, we receive indications that these phenomena might exist, and so they are worthy of investigation.

Secondly, mainstream social media platforms has significantly disrupted local media business models, shifting the focus of media content to popularity metrics and engagement optimization, often at the expense of high-quality, public-interest journalism. As they are designed to monetize user attention by selling data to advertisers, they do not align with the traditional values of local journalism. And yet, the decline in local media’s reach and financial support may not solely result from changing business models; it could also reflect inadequacies in the local media’s offerings. Further research could explore, using content analysis, what kinds of topics and information is being reported on by successful local media that record high viewership figures to better understand what kinds of information local audiences would be drawn to or be prepared to pay for.

Relatedly, the role of users must not be understated. Their adaptation to the digital transformation requires further attention in this context. Indeed, the state of news consumption presents a rather discouraging picture that certainly contributes to the crisis of local media. Surveys indicate that interest in news continues to decline, following a stable negative trend (Newman et al. 2023). News avoidance and news fatigue remain significant concerns. The proportion of news readers who trust news is also steadily decreasing in most European countries and, unsurprisingly, newspaper subscriptions remain stagnant and the willingness to pay for local news is low (Newman et al. 2023). Moreover, users’ news behaviors, attitudes, and perceptions are constantly changing and, eventually, become very heterogeneous across demographics. In the social media context, there is a widespread passive attitude and trustful delegation to algorithms and overconsumption that may contribute to “information disorders”. Research focused on local news consumption from an audience perspective—especially within social media—is needed.

Last but not least, there is the role of social media and its algorithmic logics. As the strong correlation between news consumption on Facebook and news desertification highlights, the role of social media’s algorithms in local news production, dissemination, and consumption deserves more research. The recommender systems employed to curate content online can indeed play a fundamental role in nudging users’ behaviors, contributing to the spread of disinformation and providing visibility to local news (Reviglio 2023). Yet, these are very heterogeneous in their functioning as well as in their effects—indeed, they function differently for different groups of users and across time, space, and cultures—and, ultimately, they are also opinion power tools as well as the economic engines of large big tech corporations, so it is very hard to make them accountable and unveil how they might affect news desertification. On a positive final note, however, it is expected that the European Digital Service Act (DSA) will make these systems more transparent, accountable, and controllable (Art. 27 DSA). The DSA also promises to allow data access and research on local media. In particular, social media data that can explain these dynamics are supposed to be accessible to researchers (Art. 40 DSA). Access will be granted for “systemic risks” including any current or foreseeable negative effects on the exercise of fundamental rights,

including media freedom and pluralism, and any current or foreseeable negative effects on civic debate and electoral processes, as well as on public safety. Researchers of local media and news deserts would be therefore granted access.

8. Conclusions

Our exploration of local media within the European context underscores its critical democratic role, facilitated by its proximity to communities and the trust it garners through its local reporting. The crisis in the EU's local media sector not only threatens its economic viability but also jeopardizes its capacity for independent reporting, social inclusivity, and journalists' safety. Against this backdrop, the emergence of news deserts represents a pressing concern, exacerbated by the COVID-19 pandemic's impact on local journalism. While the LM4D project represents a significant step forward in understanding the crisis of local media and the emergence of news deserts in Europe, our analysis reveals the need for a deeper comprehension of the contextual forces driving this phenomenon.

By testing hypotheses, we aimed to fill this gap in understanding. Our findings suggest a positive correlation between the quality of Public Service Media and the risk of news desertification, highlighting the important role PSMs play in inclusive and granular news coverage, being aligned with LM4D results. Additionally, preliminary results indicate a significant link between a country's disinformation risk profile and the extent of news desertification. However, the relationship between social media use and news desertification appears less straightforward, warranting further investigation.

Despite the insights gained, our study faces methodological limitations, primarily stemming from the aggregation of data at the country level. Future research should delve into sub-national variations, employing more sophisticated statistical models to account for confounding variables. Moreover, case studies can provide nuanced insights into the intricate dynamics underlying news desertification. In essence, our research underscores the complexity of news desertification in Europe and the urgent need for comprehensive, granular data and nuanced analyses to address this multifaceted challenge. By refining our understanding of the interplay between various factors, we can develop targeted interventions to safeguard local journalism and promote media plurality, thereby bolstering democratic discourse and societal resilience.

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Notes

¹ Pearson's correlation coefficient measures the direction and strength of linear relationship between two variables, which is represented by the *r*-value which ranges from -1 to 1 . A number close to 1 or -1 indicates a strong positive or negative correlation and a number close to 0 indicates a weak correlation. The *p*-value indicates the statistical significance of the correlation coefficient. In more technical terms, the *p*-value is the probability of obtaining a test statistic at least as extreme as the one observed, if the null hypothesis (i.e., no correlation) is true. The commonly accepted threshold for statistical significance is 0.05 . A linear model operates under the assumption that the relationship between variables is linear and data is normally distributed. It is important to acknowledge that the model's sensitivity to outliers can significantly impact the results, so we should exercise caution when interpreting the results.

² Media Pluralism Monitor 2023-CMPF (<https://www.eui.eu/en/home>, accessed on 27 May 2024).

- ³ DataReportal–Global Digital Insights.
- ⁴ These are sub-indicators of the 2023 Media Pluralism Monitor. For more information, please refer to this link: <https://cmpf.eu.eu/wp-content/uploads/2023/07/questionnaire-MPM-2023.pdf> (accessed on 27 May 2024).
- ⁵ CMPF-Variables-2023 (<https://www.eu.eu/en/home>, accessed on 27 May 2024).
- ⁶ <https://cmpf.eu.eu/wp-content/uploads/2023/06/questionnaire-final-05.6.23.pdf> (accessed on 27 May 2024).
- ⁷ Transparency International. (2024). *2023 Corruption Perceptions Index*. Transparency.org. <https://www.transparency.org/en/cpi/2023/> (accessed on 27 May 2024).
- ⁸ Reporters without Borders. (2023). *Index | RSF*. Rsf.org. <https://rsf.org/en/index> (accessed on 27 May 2024).

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