Digital Ethnobiology: exploring the digisphere in search of traditional and indigenous knowledge and practices

Emiel De Meyer and Melissa Ceuterick

Correspondence

Emiel De Meyer[1] and Melissa Ceuterick[2]

[1]Ghent University, Department of Plants & Crops, B-9000 Ghent, Belgium
[2]Ghent University, Department of Sociology, Health & Demographic Research, Sint-Pietersnieuwstraat 41, B-9000 Ghent, Belgium

*Corresponding Author: Emiel.DeMeyer@ugent.be

Ethnobotany Research and Applications 24:37 (2022)

Notes on Ethnobotany

Abstract

During the last decades, under influence of globalization, the scope of ethnobiological research has expanded. Rapidly developing technology, telecommunication, the internet, and social media promote the occurrence and maintenance of ties within and between communities through multifaceted ways of digital communication. This often gives rise to digital or virtual communities in which knowledge, perspectives and ideas are shared. We want to highlight the significance of these virtual digital social ties and the associated exchange of ethnobiological knowledge among and between ethnic groups, which can lead or has led to an extension of the ethnobiological field of study to a digital or virtual environment. We propose the new term "Digital Ethnobiology" as "the scientific study of dynamic relationships between peoples, biota, and environments in a virtual or digital environment". We support our term with four case studies from the field of urban ethnobotany, sociology, and agribusiness development. We discuss opportunities, concerns, challenges, future perspectives, and raise some relevant questions on good research practices.

Keywords: digital ethnobiology; digital networks; migrant groups; urban ethnobotany

Background

'Ethnobiology' is defined by the Society of Ethnobiology (n.d.) as 'the scientific study of dynamic relationships among peoples, biota, and environments'. It is a transdisciplinary field that integrates heterogenous methods ranging from biological taxonomy over cognitive science to political ecology and indigenous studies (Anderson 2011, Wolverton 2013, Ludwig 2018). Alexiades (2003) argues that the horizons of ethnobiology are broadened by various processes linked to globalization. One of those processes is fast developing communication technology, including social media and the Internet, which promote fast and manifold ways of communication, information seeking and sharing.

An Internet connection and the ability to use it, are the only prerequisites for the creation of a digital environment where knowledge and perspectives are being exchanged, and are becoming less and less rare globally, even in remote areas. In many rural areas, digital networks are now spread and robust. Examples of networking platforms such as WhatsApp, Facebook, and diverse forums are used by farming cooperatives, smallholder farmers networks, trader networks, etc. for communication (e.g. weather forecast alerts, organizational matters, etc.) and knowledge exchange (see Birke & Knierim 2020 (Ethiopia); Coggins et al. 2022 (Sub Saharan Africa, South Asia and South-East

Manuscript received: 07/09/2022 - Revised manuscript received: 18/11/2022 - Published: 26/11/2022
http://dx.doi.org/10.32859/era.24.37.1-8

Asia; Alant & Bakare, 2021). Information on natural resources, agricultural practices and innovations shared through digital networks may contain data of potentially high ethnobiological value.

However, the potential value of digital networks for ethnobiological research is not limited to their use in rural areas, but extends to urban environments, even in the global North. A pertinent example is that of the occurrence of digital social networks within and between migrant communities in (Western) urban settings. Migrant communities settling in urban environments tend to bring along and maintain at least partly their habits and perceptions regarding health and healthcare (Vandebroek and Balick 2012; van Andel & Fundiko 2016; Ceuterick et al. 2017). Since the milestone work of Balick et al. (2000) on medicinal plant use by Latino healers for women's health in New York City some twenty years ago, urban ethnobiological studies have focused on preservation of traditional and indigenous knowledge and knowledge systems in urban contexts, often describing their erosion (Gaoue et al. 2017). However, multiple researchers have found that traditional knowledge is transformed and preserved and can even increase in urban contexts (Gaoue et al 2017; Vandebroek and Balick 2012; Pieroni et al 2008; Ceuterick et al 2011). Nevertheless, mechanisms underlying the transformation and increase of traditional knowledge have hardly been investigated and therefore, remain unknown.

People with migratory background usually maintain social networks within their (new) community, but also with family, friends and acquaintances in their country of origin through transnational social networks (Snel et al. 2020; Bilecen et al. 2018). Exchange of ideas on health, healthcare and therapies within and between migrant communities, and through these transnational networks in so-called 'transnational therapy networks' play a major role in migrant communities' healthcare strategies (Ceuterick et al. 2008; Krause, 2008; Roosen et al. 2021). Even the (temporary) movement of patients across national borders to receive preferred healthcare, is a significant coping strategy among migrant groups (Ormond and Lunt, 2020).

The COVID-19 pandemic acted as a lever for the occurrence of digital networks and communities, as due to governmental measures to prevent the virus spread, direct social contact and travelling possibilities were limited and social networks had to be organized virtually. From an ethnobiological perspective, digital (and even transnational) networks were maintained in virtual spaces through which new and traditional knowledge was spread and promoted. In an exploratory study published early on in the COVID 19 pandemic, Vandebroek et al. (2020) declared that self-identified traditional healers used social media, Youtube, TV and word of mouth to spread their own cures against COVID-19 based on herbs from their own backyard or local markets.

In this essay, we aim to highlight the significance of these virtual digital social ties and the accompanying exchange of ethnobiological knowledge which has brought about an expansion of the ethnobiological field of study to a digital context. We propose the new term 'Digital Ethnobiology' to introduce a new field of study as being 'the scientific study of dynamic relationships among peoples, biota, and environments in a virtual or digital environment', thus including ethnobotany and the dynamic relationships between humans and plants in a digital sphere.

Below, we describe two cases of urban ethnobotanical studies among migrant communities in Belgium, in which the digital aspect turned out to be of major importance during the course of the studies although this was not the main research topic. Besides, we describe one study which quite contrarily aimed at exploring online discussions about pharmaceuticals on a Belgian forum yet discovered myriad ethnobotanically relevant natural home-remedies. In addition to these cases from the Global North, we discuss an assessment of the Food and Agriculture Organisation of the United Nations (FAO) on the digital readiness of young agripreneurs in East Africa and its opportunities for ethnobiological research to illustrate that the potential of Digital Ethnobiology is global.

Case-study 1: the Congolese community in Belgium

As part of a broad, ongoing study on Congolese ethnobotany in Belgium and the Democratic Republic of Congo, traditional, complementary and alternative plant use and perspectives among the Congolese community in Belgium were studied in the context of COVID-19 (De Meyer et al. 2022). Participants in this study sought traditional, complementary and alternative medicine (TCAM) against COVID-19, information on ways to deal with all aspects COVID-19, and by extension on the pandemic and its consequences through informal social digital networks within the transnational Congolese community. Social media and online communication platforms played an essential role in information dissemination, whereby WhatsApp groups within the Congolese community and acquaintances in Congo were the main information dissemination mode. Stories, pictures and movies were shared through these groups, causing their rapid spread beyond borders and in between communities. Digital social networks allowed

people of Congolese descent to fold back to their own identity, and to use the rapid information disseminated through these media to quickly adapt to the new situation. COVID-19 was considered a disease similar to malaria, so herbal methods traditionally used to prevent and treat malaria were promoted within these transnational networks to prevent and treat COVID-19. According to the information disseminated through social digital networks, TCAM practices were quickly reshaped and adapted to work against COVID-19, and are by definition new TCAM practices, given their use in a completely new context (De Meyer et al. 2022).

Case-study 2: the Moroccan community in Belgium

Furthermore, a qualitative study on TCAM use among people of Moroccan descent in Flanders (based on fifteen in-depth interviews conducted in 2021) also showed that digital technology is often used to maintain TCAM knowledge and practices (postmigration) (Kaesemans et al. 2021). Firstly, interviewees stated that they searched the internet for natural medicines that they knew from their home country, to order and use these in Belgium. In addition, search engines (especially Google) were consulted to inform oneself about herbal medicine. Thirdly, another important way to keep up to date on TCAM was through social media. Multiple interviewees followed diverse TCAM experts on social media to receive advice on how to treat diseases in a natural way. These experts were both traditional Moroccan healers as well as CAM professionals (e.g. an orthomolecular doctor). In addition to following people on social media, Whatsapp was an important channel to stay informed about natural healing methods, for example to be notified when a *hijama* practitioner (a form of alternative medicine in which localized suctions are created on the skin by using heated cups) is in the country. Several interviewees were member of Whatsapp groups in which information and health tips are exchanged about traditional Moroccan medicine. This phenomenon had increased considerably since the start of the pandemic, to advise each other on natural remedies against COVID, yet is not limited to this time period. Although this study shows how digital technology is used to keep traditional practices and knowledge alive, most interviewees in this study were also well aware of the potential pitfalls of these online information channels and reported that they do not simply accept all information, but critically assess the legitimacy of the shared information.

Case-study 3: natural remedies to treat insomnia used by Belgian elderly

As part of the BENZONET study, an online Flemish (Belgian) discussion forum for people over 50 was studied to encounter perceptions on pharmaceutical sleeping medication, in particular benzodiazepines. For this case-study, a total of eight discussions initiated between 2013 and 2019 including 165 postings by 54 different pseudonyms were collected. Quite unexpectedly, this case-study also led to an overview of multiple natural home-remedies that Flemish people over 50 use to treat insomnia. On the forum, members describe personal treatments to sleep better based on their experiential knowledge. For a full list we refer to Ceuterick et al. (2021). These remedies did not only include commercialized herbal preparations, but also recipes for home-made teas based on fresh and dried plant materials, decoctions and combinations of treatments, which were highly interesting from an ethnobiological point of view and provide an interesting new avenue for future research. The discussion threads on the forum do not only show how idiosyncratic, experiential and practice-based information on herbal medicines is shared, for example in the form of simple recipes, but also allow to investigate how this knowledge is 'received' as other forum members subsequently report on their experiences with the suggested remedies (mostly on effectiveness, frequency of use, but also on taste,…). This case-study thus brought new insights into how a digitally shared ethnobiological knowledge base is created and evolves, among a group of people who would otherwise not be the main target of a conventional ethnobiological study. With proper consent, these forums provide potential yet unexpectedly rich digital field sites.

Case study 4: Digital readiness of young agripreneurs in East Africa

Pafumi & Arimbi (2022) (on behalf of FAO) investigated how young agri-entrepreneurs interact with digital technologies in Kenya, Uganda and Rwanda. Young agripreneurs mainly sought information about agribusiness on various forums on the internet, social media (especially Facebook, Twitter, Whatsapp and Youtube). In order to share information and knowledge with other young people, participants preferred Whatsapp groups, social media, and in rural areas with little access to the internet, text messaging, calling and bulk SMS. In addition to financial issues, business management and marketing, topics such as crop production (e.g. mushrooms, vegetable growing), crop protection, value addition (e.g. to grains, legumes, vegetables), agronomic good practices and innovations were in high demand. Although (partly) business focused, it is beyond doubt that digital discussions and information exchange on the above topics can provide valuable region-specific ethnobiological data.

Ethnobiology online: from paradox to potential

It may seem paradoxical that a field of study originally strongly associated with the natural world is expanding into one of the most artificial environments we know today. Yet, to avoid blind spots, the implications of digital knowledge transfers can no longer be denied in ethnobiological studies with communities that have access to the digisphere, or simply put, the Internet. Digital ethnobiological knowledge exchange within and between diverse communities can be seen by its practitioners as a form of resilience. Resilience is about cultivating the ability to sustain development in the face of change (Folke, 2016). Folke (2016) argues that the scale, speed, and connectivity of human actions in a globalized world create new complex dynamics. These dynamics play out in new, uncertain and surprising ways and differently for different people and places. Resilience of a socio-ecological system refers to the ability to maintain human well-being in diverse contexts in the face of such changes, and through adaptation or transformation in response to change (Folke, 2016). Knowledge exchange through transnational networks can take place within an ethnic group, or be tied to a country of origin, or can be broadened to involve multiple communities or ethnic groups, for example, networks within the African, Asian, South American, etc. communities. The exchange of knowledge and ideas from different communities leads to a form of cross-cultural adaptation of the people or communities involved (Ceuterick et al. 2008), where different knowledge systems are combined, adapted and transformed into an integrative approach for specific or general uses and practices.

Points of attention

Based on our experience, we identify the following points of attention with regard to the digital expansion of the ethnobiological field of study.

Firstly, it becomes necessary to reinterpret the entity of a community in this context. Wellman (2002) argues that the use of digital technology leads to individualism. Whereas physical communities are typically bound to a specific geographical context, digital communities are more scattered geographically. This can be explained by the theory of networked individualism, describing the increasing importance of personal networks, reflecting a decreasing significance of family and communal bonds, supported by technologies such as the Internet, social networks, and communication devices. This is a phenomenon where individuals interact with network resources and information on their own terms (Wellman 2002). It is important to note that physical and digital communities exist together, are often interconnected (and exchange information), and thus cannot be seen as completely separate entities. In an ethnobiological context, the demarcation of a community or ethnic group is helpful and often necessary in setting boundaries to the research scope. The emergence of networked individualism might complicate the previous, as transnational digital networks can detach from nationality into digital networks, giving rise to communities consisting of individuals with a huge diversity of backgrounds. This implies that for online information seeking and selection, the aspect of culture-specific, ethnic, or Indigenous bound uses may fade, becoming dependent only on the searcher's own preferences and selection. Take the example of someone who prefers plants, animals or other natural resources just because they are "natural". In this case, this person's traditional or Indigenous uses and knowledge may be transformed or replaced by complementary and alternative uses, let's say the best considered option, found online outside the practitioner's ethnic boundaries.

Secondly, in Digital Ethnobiology, one has to be aware of alternative sites of fieldwork, i.e. virtual sources or forms of provenance of plants and other biological material. It is no news that the past ten years, online marketplaces have been booming and more and more products are available and can be ordered online. Legal and sometimes illegal trade in organic products happens more and more online, quickly and across borders. The latter also contributed to the digital expansion of the ethnobiological field of study.

Thirdly, a digital ethnobiological study can stand alone and aim specifically at studying ethnobiological practices in the digisphere but can equally be seen as a complement to a traditional ethnobiological study, with relevance depending on the context. Considered the co-existence of online and offline networks, data gathered in both environments most probably adds to each other. In each specific situation, the existence and importance of both types of communities/networks among the group of people studied should be assessed to gauge their relevance.

Challenges and future prospects

Digital ethnobiological studies in rural areas, can be explored as a useful information source for developing adequate biodiversity conservation strategies, and can even be implemented in development projects as a tool for the dissemination of ethnobiological information. Furthermore, being a potentially large source of ethnobiological knowledge, these digital networks can contribute to the preservation and verification of traditional and Indigenous biological applications for different people and ethnic groups. Digital ethnobotanical studies in an urban context

can help reveal underlying mechanisms of how ethnobotanical knowledge is preserved among migrant groups, how it increases, and how it is adopted and transformed. Such studies can contribute to a deeper understanding of development and adaptation of knowledge systems in the face of change, revealing resilience thinking and cross-cultural adaptation among affected communities.

Furthermore, conducting fieldwork in a digital context presents some challenges and raises multiple new methodological and ethical questions. Firstly, taxonomic identification of species recorded in a digital environment can be challenging, as identification based on physical samples will most likely be impossible. Visual identification of specimens based on photographs of the habitus and parts of specimen seems appropriate in this context, however not uncomplicated. The unavailability of physical specimens excludes multiple sensorial possibilities (smell, taste, texture, three-dimensional vision, determination of colour variation, etc.), often helpful and sometimes indispensable to identify (uncommon or rare) species. Another issue in the species identification process might be the use of vernacular names, similar to the offline situation (Mead, 1970). Since vernacular names are usually used outside a scientific context to communicate about specific plant, animal, or other species or taxonomic groups, they might complicate the identification process when no physical species samples are available.

Secondly, to develop innovative strategies to explore online data inspiration can be obtained from the social sciences, and especially the field of nethnography, which offers multiple tools to conduct ethnographic fieldwork in a digital setting, for example on how to collect and analyze data from online sources such as webpages, online discussion forums and other social media (Kozinets, 2019). In addition, entering the digital realm to conduct fieldwork also raises new and challenging ethical questions on research integrity, consent and disclosure. For example: if as a researcher you are invited into a WhatsApp group: how to obtain proper consent? How should the knowledge shared on these forums be protected? For several digital platforms such as online forums, solid guidelines have already been developed for example by Sugiura and colleagues (2017) and more recently by Smedley and Coulson (2021). These guidelines could be explored, adjusted and eventually developed as addendums to existing codes of ethics within ethnobiology. Moreover, we are convinced that the debate on intellectual property rights should be widened to the digital realm. A reflection is much needed on how integrity can be maintained. For example, how can the intellectual property rights of small digital communities such as a WhatsApp group be maintained within existing legal and ethical frameworks?

Finally, a key challenge in online ethnobiological research is likely to be addressing the overload of information available on the Internet (the so-called infodemic) and the potential misinformation that accompanies it (Simon & Camargo, 2021). A major question we as ethnobiologists have to reflect on is: how can ethnobiological data obtained online be valued, evaluated and assessed, given that erroneous information can spread at a much higher speed and to a much broader audience than ever before in the offline realm? From a sociological point of view, all information people take in is of value because it contributes to the formation of people's ideas and perspectives (Goora & Potts, 2019). However, from an ethnobiological perspective, the ethnic aspect risks to be marginalized in this case, as obtained data is no longer necessarily related to a specific ethnicity/nationality. In this regard, (existing) traditional ethnobiological studies can help verify the origins of stories and ideas spread online, and their ultimate connection to geographical, cultural and ethnic origins. This can open up a wide range of research possibilities; one of them mapping the resilience of traditional and Indigenous knowledge systems and resilience thinking by people using them.

Opportunities for new forms of learning within ethnobiological research

Digital ethnobiological studies can offer many opportunities in studying relationships between humans and other species, as they have new and distinctive features compared to offline ethnobiological studies. In conventional ethnobiological studies, data are often collected through (key) informants, whereas in digital ethnobiological studies, data collected on a digital platform become the source of information regardless of who disseminates this within a social network. Consequently, the socio-demographic characteristics of a studied population or community fade into the background and ethnobiological knowledge itself takes center stage. Unlike ethnobiological data collected offline, the (origin of the) data collected is often difficult to verify, as key informants selected for their supposed reliability, as well as physical plant material, are missing. The novelty of digital ethnobiological studies lies in the ways in which traditional ethnobiological knowledge is disseminated (case-study 1-4), contested (case-study 2), reproduced (case-study 3) and adapted (case-study 1) through digital media and social networks. A distinctive aspect here compared to offline social networks is the speed of information dissemination and communication between people living in-situ, i.e. in areas where this relationship between humans and species is based on traditional knowledge and usage, and ex-situ, i.e. in areas where this relationship is new. With the rapid

spread of ideas and the possibility of discussing ethnobiological knowledge that is independent of a specific geographical area or place, new ways of learning are emerging. This offers the opportunity to study the dynamics of ethnobiological knowledge. From a training point of view, digital social networks offer the opportunity to disseminate ethnobiological information and ideas quickly to large groups of people, across large geographical areas, and instead of the one-way nature of training courses and workshops, open a forum for the exchange of ideas between large groups of people through digital discussions.

With this essay, we hope to have opened the door for a more in-depth debate on how data collection in the digisphere can contribute to ethnobiological research, and the opportunities and challenges this entails. With the introduction of the term 'Digital Ethnobiology', we hope to have laid the foundation stone for broadening the scope of ethnobiological research to include research in a digital environment (beyond the mere digital documentation storage), and thus to have contributed to the expansion of the scope of research into a domain that is increasingly relevant in our globalizing world.

Declarations

List of abbreviations: COVID-19: Coronavirus disease 2019; DR Congo: Democratic Republic of Congo; FAO: Food and Agriculture Organization of the United Nations. TCAM: Traditional, complementary and alternative medicine.
Ethics approval and consent to participate: not applicable
Consent for participation: not applicable
Availability of data and materials: not applicable
Competing interests: The authors declare that they have no competing interests.
Funding: Not applicable (no funding)
Authors' contribution: EDM and MC developed the idea behind this paper and coined the new term. EDM wrote the manuscript in consultation with MC. MC contributed substantially to the writing of the manuscript.

Acknowledgements

We would like to thank Patrick Van Damme and Eduardo de la Pena for reading the article and sharing their comments.

Literature cited

Alant BP, Bakare OO. 2021. A case study of the relationship between smallholder farmers' ICT literacy levels and demographic data w.r.t. their use and adoption of ICT for weather forecasting. HELIYON 7(3):e06403. doi: 10.1016/j.heliyon.2021.e06403.

Alexiades MN. 2003. Ethnobotany and globalization: science and ethics at the turn of the century. In: TJS Carlson, L Maffi (Eds). Ethnobotany and Conservation of Biocultural Diversity. New York, The New York Botanical Garden Press.

Anderson EN. 2011. Ethnobiology: Overview of a Growing Field. In Ethnobiology, edited by EN Anderson, D Pearsall, E Hunn and N Turner, pp.1-14. Wiley-Blackwell, New York, NY.

Balick MJ, Kronenberg F, Ososki A, Reiff M, Fugh-Bergman A, O'Connor B, Roble M, Lohr P, Atha D. 2000. Medicinal plants used by Latino healers for women's health conditions in New York City. Economic Botany 54(3):344-357.

Beyhan K. 2019. The Impact of Globalization on Cities. Journal of Contemporary Urban Affairs 3(2):108-113.

Bilecen B, Gamper M, Lubbers MJ. 2018. The Missing Link: Social Network Analysis in Migration and Transnationalism. Social Networks 53:1-3.

Birke FM, Knierim,A. 2020. ICT for agriculture extension: actor network theory for understanding the establishment of agricultural knowledge centers in South Wollo, Ethiopia. 26(3), 591-606. doi: 10.1016/j.gfs.2021.100577

Ceuterick M, Vandebroek I, Torry B, Pieroni A. 2008. Cross-cultural adaptation in urban ethnobotany: the Colombian folk pharmacopoeia in London. Journal of Ethnopharmacology. 120:342-59. doi: 10.1016/j.jep.2008.09.004

Ceuterick M, Christiaens T, Creupelandt H, Bracke P. 2021. And they slept happily ever after: Online interpretive repertoires on the use of benzodiazepines and z-drugs. Health, 13634593211060770. doi: 10.1177/13634593211060770

Ceuterick M, Vandebroek I, Pieroni A. 2011. Resilience of Andean Urban Ethnobotanies: A Comparison of Medicinal Plant Use among Bolivian and Peruvian Migrants in the United Kingdom and in their Countries of Origin. Journal of Ethnopharmacology 136:27-54. doi: 10.1016/j.jep.2011.03.038

Ceuterick M, Vandebroek I. 2017. Identity in a medicine cabinet: discursive positions of Andean migrants towards their use of herbal remedies in the United Kingdom. Social Science and Medicine. 177:43-51. doi: 10.1016/j.socscimed.2017.01.026

Coggins S, McCampbell M, Sharma A, Sharma R, Haefele SM, Karki E, Hetherington J, Smith J, Brown B. 2022. How have smallholder farmers used digital extension tools? Developer and user voices from Sub-Saharan Africa, South Asia and Southeast Asia 32(1):100577. doi: 10.1016/j.gfs.2021.100577

De Meyer E, Van Damme P, de la Peña E, Ceuterick M. 2022. Traditional, complementary and alternative medicine use and perspectives in the context of COVID-19 among the Congolese community in Belgium. Journal of Ethnobiology and Ethnomedicine. 18 (1). doi: 10.1186/s13002-022-00530-y%20

Folke C. 2016. Resilience (Republished). Ecology and Society 21(4):44. doi: 10.5751/ES-09088-210444

Gaoue GO, Coe MA, Bond M, Hart G, Seyler BC, McMillen H. 2017. Theories and Major Hypotheses in Ethnobotany. Economic Botany 71(3):269-287. doi: 10.1007/s12231-017-9389-8

Goorha P, Potts J. 2019. Mechanisms of the Theory of Ideas. In: Creativity and Innovation. Cham, Switzerland : Palgrave Macmillan. doi: 10.1007/978-3-319-94884-3_3

Kaesemans J, Ceuterick M, D'hondt F, Van Rossem R. 2021. Gezondheidszorggebruik door personen met een Marokkaanse migratieachtergrond in België: hoe stemmen ze de verschillende vormen van gezondheidszorg op elkaar af?

Kozinets RV. 2019. Netnography: The essential guide to qualitative social media research. Sage. University of Southern California, USA.

Krause K. 2008. Transnational Therapy Networks among Ghanaians in London. Journal of Ethnic and Migration Studies 34(2):235-251.

Ludwig D. 2018. Does Cognition Still Matter in Ethnobiology? Ethnobiology Letters 9(2):269-275. doi: 10.14237/ebl.9.2.2018.1350

Mead GR. 1970. On the improper usage of common names when giving botanical data. American Antiquity 35(1):108-109.

Ormond M, Lunt N. 2020. Transnational medical travel: patient mobility, shifting health system entitlements and attachments. Journal of Ethnic and Migration Studies 46(20):4179-4192.

Pafumi M, Arimbi V. 2022. Ready to go digital? Assessing the digital readiness of young agripreneurs in East-Africa. Nairobi, FAO. doi: 10.4060/cb8026en

Pieroni A, Sheikh QZ, Ali W, Torry B. 2008. Traditional Medicines used by Pakistani Migrants from Mirpur living in Bradford, Northern England. Complementary Therapies in Medicine 16:81-86. doi: 10.1016/j.ctim.2007.03.005

Qualitative Research in Psychology 18:76-103. doi: 10.1080/14780887.2018.1475532

Roosen I, Salway S, Osei-Kwasi HA. 2021. Transnational social networks, health, and care: a systematic narrative literature review. International Journal for Equity in Health 20(1):138.

Simon FM, Camargo CQ. 2021. Autopsy of a metaphor: The origins, use and blind spots of the 'infodemic'. New Media and Society 14614448211031908. doi: 10.1177/14614448211031908

Smedley RM, Coulson NS. 2021. A practical guide to analysing online support forums.

Snel E, Bilgili O, Staring R. 2020. Migration trajectories and transnational support within and beyond Europe. Journal of Ethnic and Migration Studies 47(14),3209-3225.

Society of Ethnobiology (n.d.) What is Ethnobiology? retrieved from: https://ethnobiology.org/about-ethnobiology/what-is-ethnobiology, accessed on 15/6/2022.

Sugiura L., Wiles R, Pope C. 2017. Ethical challenges in online research: Public/private perceptions. Research Ethics 13(3-4):184-199. doi: 10.1177/1747016116650720

Tatjer LC. 2003. 'Multiculturalism in the City: Managing Diversity'. Paper presented to the Congress of the European Regional Science Association, Jyväskylä, Finland, 27-30 August

van Andel T, Fundiko MC. 2016. The trade in African medicinal plants in Matonge-Ixelles, Brussels (Belgium). Economic Botany 70(4):405-15. doi: 10.1007/s12231-016-9365-8.

Vandebroek I, Balick MJ. 2012. Globalization and Loss of Plant Knowledge: Challenging the Paradigm. PLos ONE 7: e37643. doi: 10.1371/journal.pone.0037643

Vandebroek I, Pieroni A, Stepp JR, Hanazaki N, Ladio A, Alves RRN, Picking D, Delgoda R, Maroyi A, van Andel T, Quave CL, Paniagua-Zambrana NY, Narel Y, Bussmann RW, Odonne G, Abbasi AM, Albuquerque UP, Baker J, Kutz

S, Timsina S, Shigeta M, Oliveira TPR, Hurrell JA, Arenas PM, Puentes JP, Huge J, Yesil Y, Pierre LJ, Olango TM, Dahdouh-Guebas F. 2020. Reshaping the future of ethnobiology research after the COVID-19 pandemic. Nature Plants 6(7):723-730. doi: 10.1038/s41477-020-0691-6.

Vertovec S. 2007. Super-diversity and its implications. Ethnic and Racial Studies 30(6):1024-1054. doi: 10.1080/01419870701599465

Wellman B. 2002. Little boxes, glocalization, and networked individualism. In: Tanabe M, van den Besselaar P, Ishida T. (Eds), Digital Cities II: Computational and Sociological Approaches. Springer, Berlin, Heidelberg, pp. 10-25.

Wolverton S. 2013. Ethnobiology 5: Interdisciplinarity in an Era of Rapid Environmental Change. Ethnobiology Letters 4:21-25. doi: 10.14237/ ebl.4.2013.11.