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Special Issue 2.2024
Urban Inequalities

This Special Issue intended to wonder about how urban planning can contribute to reduce disparities due to the diversity of access to services, infrastructure and urban places, as well as the origin from a specific territorial area (center vs. periphery) and that could be accentuated by unforeseen global pandemics. Hence, contributions coming from scholars as well as from technicians have been collected around rethinking and redesigning territories and cities to support policy-makers in preventing and reducing socio-spatial inequalities.

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TeMA Journal of Land Use, Mobility and Environment

Special Issue 2.2024

Urban Inequalities

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With ANVUR resolution of April 2020, TeMA Journal and the articles published from 2016 are included in A category of scientific journals. The articles published on TeMA are included in main international scientific database as Scopus (from 2023), Web of Science (from 2015) and the *Directory of Open Access Journals* (DOAJ). TeMA Journal has also received the *Sparc Europe Seal* for Open Access Journals released by *Scholarly Publishing and Academic Resources Coalition* (SPARC Europe). TeMA is published under a Creative Commons Attribution 4.0 License and is blind peer reviewed at least by two referees selected among high-profile scientists. TeMA has been published since 2007 and is indexed in the main bibliographical databases and it is present in the catalogues of hundreds of academic and research libraries worldwide.

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Contents

EDITORIAL PREFACE
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Urban inequalities

A bibliometric review of evolution and knowledge gap of urban inequalities

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1 Aim, scope and methodology

The main aim of this work is to analyse and examine the evolution of the main factors and features behind urban inequalities after the Agenda 2030 publication (UN, 2015) and applying a bibliometric analysis to a worldwide scientific production. Defining the main trend topics, contents, limits and gaps of the academic works, allowed to identify the main research fields concerning which the urban inequality topic can be declined within the broader domain of the governance of urban and territorial transformations. This constituted a preliminary and crucial step in the development of this Special Issue, in order to outline the key aspects and research questions to investigate and answer through the submitted works. Furthermore, this editorial preface can provide interesting insights by complementing existing academic works that seem to deal with specific aspects of economic and social inequalities, leaving out the urban dimension.

Not surprisingly, Sustainable Development Goals (SDGs) are based on the imperative to leave no one and no place behind by building sustainable cities and communities, with the stated aim of reducing inequality within and among countries.

To provide a systematic scientific framework, a bibliometric analysis was developed to study and interpret evolution and relations between documents, to identify the different approaches according to the geographic affiliation of authors and applications and the relationship of co-occurrence between keywords. The progress in sophisticated text-mining techniques has revolutionized the ability to analyze massive collections of scholarly publications. This enables researchers to not only stay current with the latest advancements in their field but also to gain insights into the underlying knowledge structure and evolving trends. Consequently, the past decade has witnessed the development of numerous bibliometric analysis software tools to facilitate these endeavours (Cobo et al., 2011; van Eck & Waltman, 2017).

Bibliometric analysis encompasses extensive literature and offers dependable insights into the development of academic disciplines, compared to other forms of review, such as narrative review and meta-analysis (Carpentieri et al., 2023; He et al., 2023; Sharifi, 2021). As several authors like Aghaloo et al., (2024), Cobo et al. (2011) and Sharifi (2021) describe, bibliometrics is often used for performance analysis, to assess indicators related to various aspects such as authors, universities, journals, and countries, and science mapping to illustrate the structure of a research topic and visualising its thematic evolution. Specific objectives are to identify influential authors, sources,

and countries; to understand major thematic focus areas and methodological approaches, and to analyze the thematic evolution of the field.

In this work, the bibliometric analysis is based on the academic production between 2016 and 2023 from the Scopus database. The temporal range was defined to investigate the possible influence of the publication of the SDGs on scientific research perspectives, while the selected international academic database collects a greater number of documents than Web of Science (28.5 M vs 23.1 M) and has a more effective management of BibTex files than the latter.

The bibliometric analysis was developed through VOSviewer and Bibliometrix software can make statistical and graphical analyses designed by authors' affiliations and countries and provide spatial representations of how disciplines, fields, authors (with related institutions and countries) and papers are related to each other in maps of science. In particular, the former was developed in 2019 by the Centre for Science and Technology Studies (CWTS) at Leiden University (NL); it has a user-friendly interface and its term co-occurrence outputs are more suitable for determining the knowledge structure of a field and its changes over time. The latter works in the R Studio environment to be flexible and facilitate integration with other statistical and graphical packages and was developed in 2017 by Aria & Cuccurullo at the University of Naples Federico II. Bibliometrix proves instrumental in mapping the scientific landscape by developing structured analysis of vast datasets, uncovering temporal trends, dominant research themes, and evolving disciplinary boundaries.

1.2 Bibliometric analysis steps

Fig.1 below sums up the bibliometric analysis flowchart. The first step required to identify a suitable query to guarantee good coverage in collecting relevant publications from the Scopus database. To this end, the search string "spatial inequalities" OR "urban inequalities" was used to retrieve records through their title, and/or abstract and/or keywords. The OR operator was used to identify at least one of the search terms in returned documents, so to retrieve a larger number of works than the AND operator instead finds documents containing all the search terms. Moreover, an English language filter was applied to ensure an international scientific panorama to the review. This query covered both the geographical and economic aspects, in terms of possible disparities among territories (e.g. North vs South countries), the accessibility aspects, in terms of facilities and services distribution, and the functional and organization aspects, in terms of urban asset and planning.

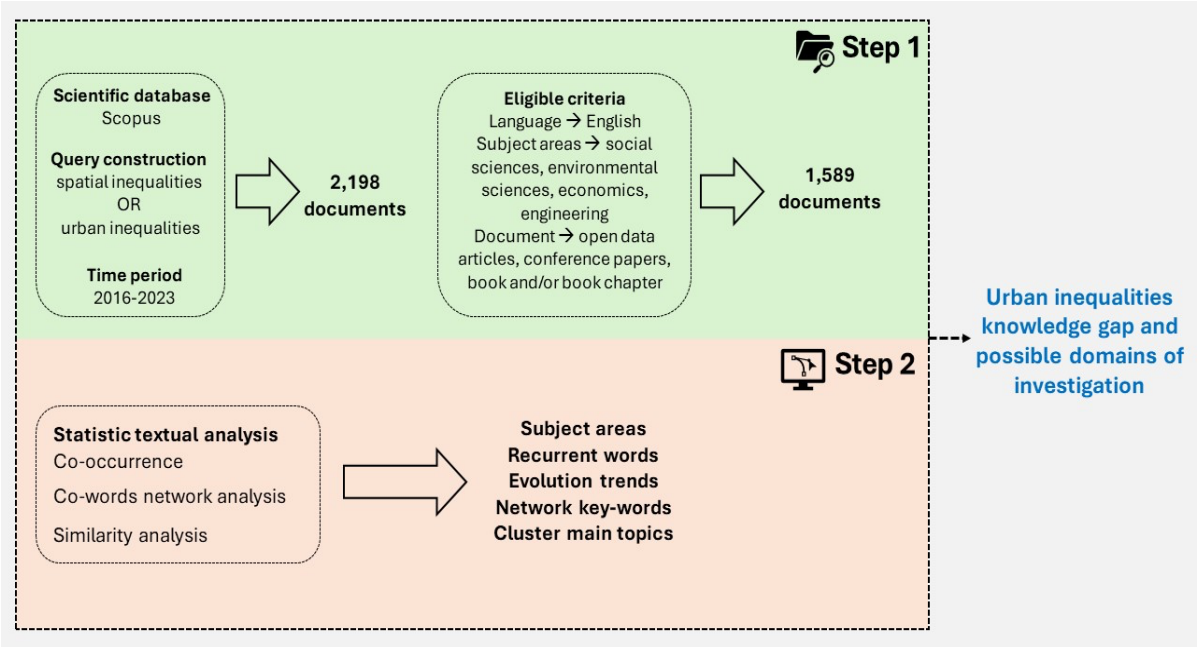


Fig.1 The bibliometric analysis flow chart

The research was limited to the narrow fields of Engineering, Environmental Sciences and All Social Sciences, referring to aspects of interest for the TeMA Journal and its guest editors. Fig.1 shows that this process, based on the PRISMA method (Preferred Reporting Items Systematic Review and Meta-Analysis), (Page et al., 2021; Panic et al., 2013) drew 2,198 documents down to 1,589.

In the second step, different analyses to identify key thematic areas and the relationships among them, both singly and in groups, also according to the different geographical areas of the scientific production were run.

Three key concepts play a central role in uncovering the thematic structure of research fields: term co-occurrence, co-citation, and bibliographic coupling (Van Eck & Waltman, 2022). In this work the term co-occurrence analysis was elaborated as it focuses on identifying and examining the interactions between key thematic areas within a field.

The resulting co-occurrence map visualizes these relationships as a network of nodes, where each node represents a frequently co-occurring term. The size of each node corresponds to the term's overall co-occurrence frequency, while the thickness of the connecting lines reflects the strength of the association between terms. Terms that frequently co-occur tend to cluster together within the map, representing distinct thematic areas. Conversely, terms with weak thematic connections appear more distant from each other on the map.

Co-words network analysis allows to understand the topics covered by a research field to define what are the most relevant and the most recent issues (so-called, research front). It was also helpful to study the evolution of subjects over time.

Then, to draw a conceptual structure of the field and identify clusters of documents which express common concepts, a cluster analysis was developed thanks to Bibliometrix. Multiple Correspondence Analysis (MCA) and K-means clustering techniques were used to obtain a graphic representation of the word clusters along two main factorial axes, allowing identification of their connections. The distribution of the clusters in the graph is based on chi-square values, which determine the significance associated with each variable. This analysis is useful in synthesising large amount of data, and supports the explanation of the relationships between words and word clusters throughout the entire document sample.

2. Results and discussion

2.1 Distribution, temporal trend of publications and spatial affiliations of authors

Fig. 2 shows the percentages of documents by subject area. The three most relevant areas are Social Sciences (45.3%), Environmental Sciences (16%), and Economics and econometrics (7.4%). The results reflect the fact that these fields all directly address aspects of urban life, economic vitality and development, and demography that can contribute to or be affected by inequalities.

The research areas with values near or slightly higher than 4% are Business, Management (4.8%), Engineering (4.8%) and Earth and Planetary Sciences (4.7%). These focus the attention on economic production and organization that can determine equal or not access to facilities and products.

In the engineering field, disparities can be due to the digital divide limiting access and use of Information and Communications Technologies (ICTs), such as ownership of hardware and software, connectivity and lack of digital literacy and skills (Robinson et al., 2015; Ulbrich et al., 2018). It is worth noting that subject areas like Medicine and Energy are among the lowest values of documents, even though health inequities between and within cities have been globally documented. Furthermore, SDGs highlight the critical leadership role of cities in fostering healthier and more sustainable environments (Feritas et al., 2019). This emphasis stems from the recognition that cities represent key settings for addressing the social and environmental determinants of health (D'Amico, 2024; Berhanu et al., 2024). On the energy issue side, this result confirms the renewed and emerging interest in the energy justice topic that investigates energy benefits and burdens within cities. Low-income communities often

have limited access to reliable and affordable energy sources and this can lead to energy poverty, where households struggle to meet their basic energy needs for heating, cooling, and lighting (Apergi et al., 2024; Manaresi & Santangelo, 2024; Nascimento Neto et al., 2024).

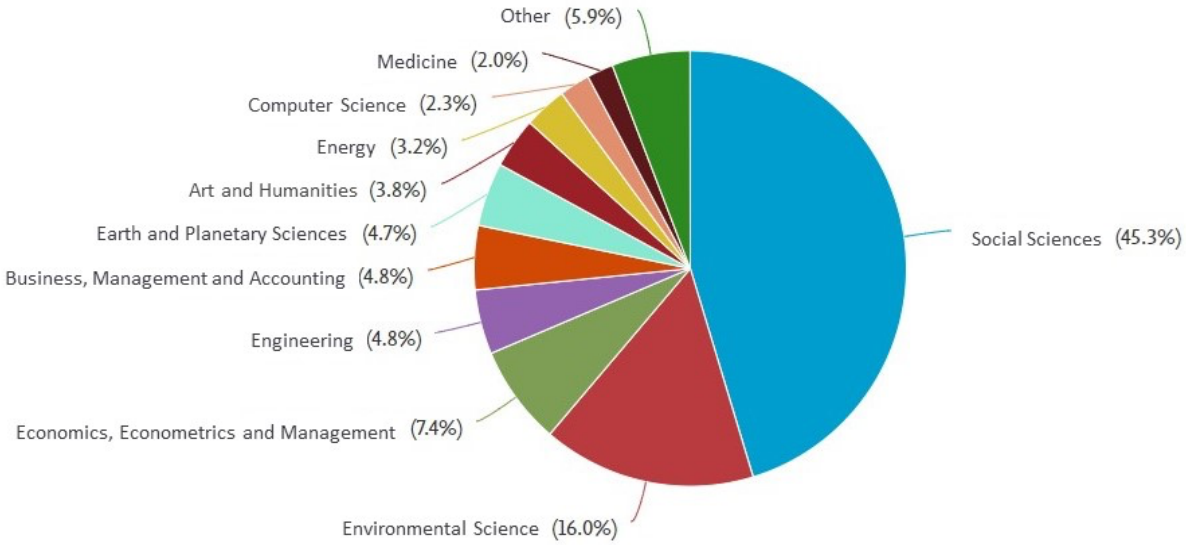
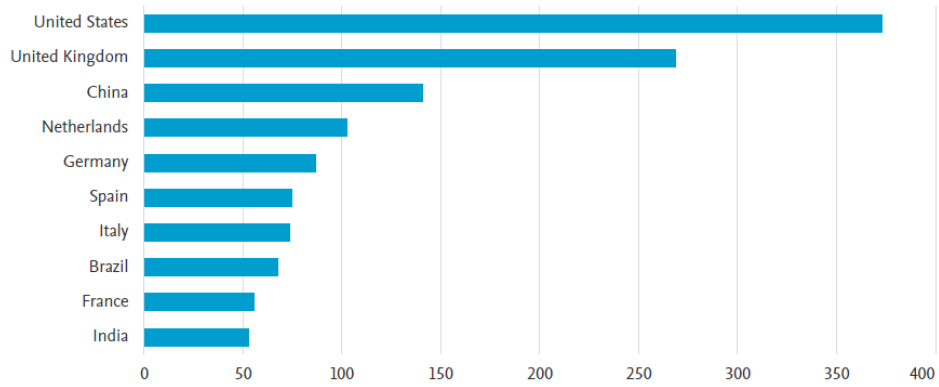
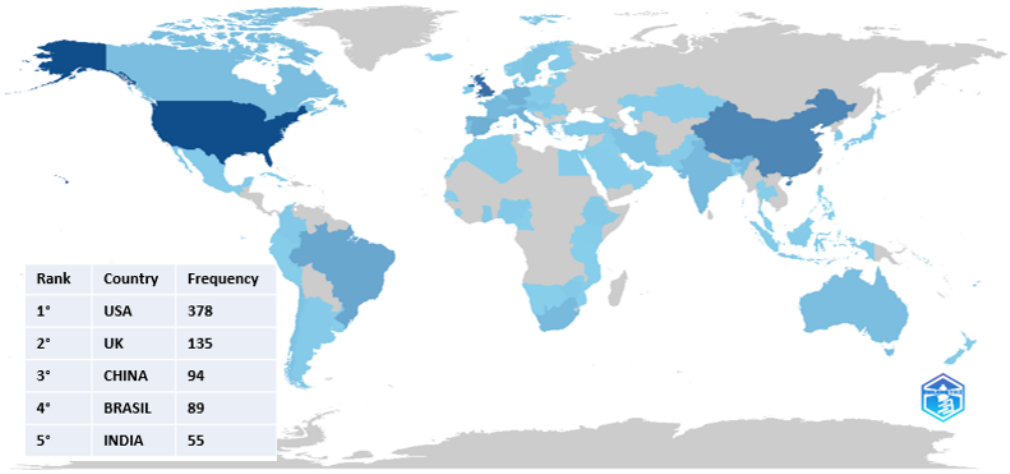


Fig.2 Documents by subject areas



(a)



(b)

Fig.3 Documents by the first 10 countries (a) and related geographical distribution about urban inequalities published in Scopus from 2015 to 2023. Different shades of blue indicate different productivity rate: dark blue means high productivity, while grey means no articles

Among the summarized data provided by Scopus, the geographical distribution of documents is reported in Fig.3. Within the sample of 1,589 articles, 51 were independent publications and 44 articles have an undefined source. The entire sample covers 10 countries, with the bulk characterizing United States (380 - 24%), the United Kingdom (272 - 17.1%) and China (145 - 9.1%), followed by Netherlands and the Germany (Fig.3a). This is not surprising, as in developed and leading countries like USA, China and UK current challenges like climate change, globalization and recovering from pandemics can make it harder for vulnerable people and communities to escape poverty, as price shocks from natural disasters and agricultural production issues reverberate through the national economies (Nascimento Neto et al.,2024).

In addition, by moving to the developing and global South countries side, Fig.3b shows that nations like India, South Africa, Brazil and Saudi Arabia seem to be characterized by a growing interest in the inequalities that have always characterised their regions and territories and that risk is further exacerbated by both phenomena such as climate change and increased awareness of the permanently high vulnerability and disadvantages that these populations face daily (Berhanu et al., 2024; Nascimento Neto et al., 2024; Ngcamu, 2023).

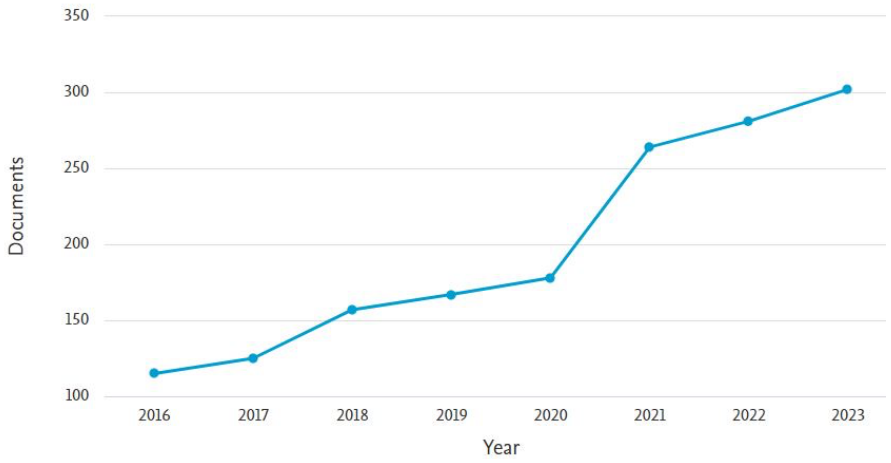


Fig.4 Documents by year

2.2 Overall thematic focus

The graphs in Fig. 5 and 6 show the major thematic areas and the connection between items, where the node's size is proportional to the keyword frequency, while the line thickness is proportional to the strength of the connection between terms. The keywords "inequalities" and "city" were excluded since they are not significant to the scope of the research, as well as the ones of geographical areas of study, as this aspect was investigated in the previous analysis. The wide range of topics reveals the multidisciplinary nature of urban inequalities and explains the systemic and multidimensional/integrated approach used by the academic community. The co-occurrence analysis allowed to identify the most prevalent topics, as such as the undeveloped ones.

Seven disciplinary fields were identified (Fig.6): accessibility and equity (greenish cluster), neighbourhood (light blue), Covid-19 (orange cluster), housing (red cluster), urban planning (violet cluster), human and socioeconomics (green cluster) and climate change and vulnerability (blue cluster). Most of them are characterized by two centroids revealing the strong interrelation between topics that can be considered complementary.

Starting from the accessibility node, scholars have emphasised its relevance in assessing urban facilities' spatial and social equity (Costa & Del Ponte, 2024; Sharma & Patil, 2024; Van Heerden et al., 2022). Improved accessibility is noticeably linked to enhanced participation in essential services, encompassing work, education, recreation, and social activities (Tilahun & Fan, 2014). Conversely, limited accessibility to these services can exacerbate social exclusion, as evidenced by the Social Exclusion Unit (2003).

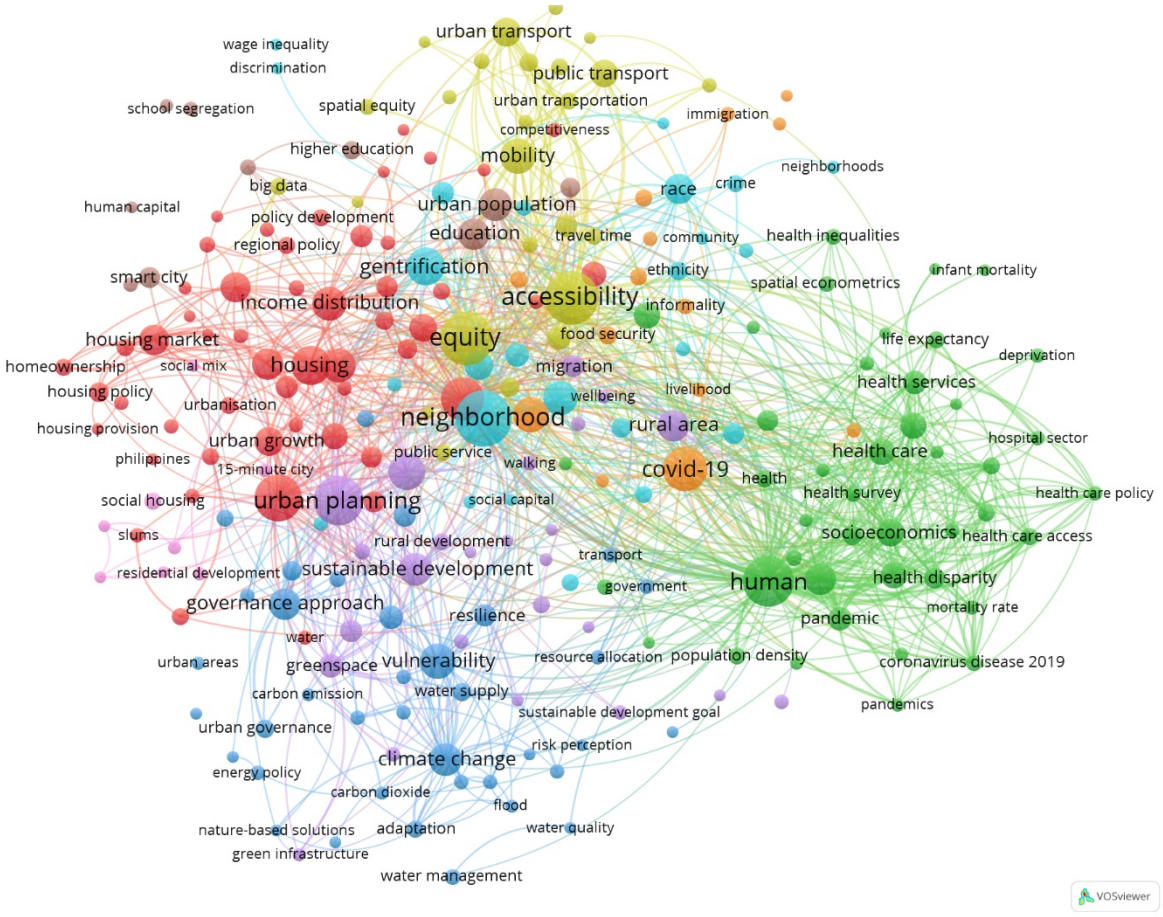


Fig.5 Network visualization of the keywords, divided into different clusters.

From an integrated urban planning and transport perspective, Farrington (2007) argues that restricted access to services poses a significant challenge in achieving social equity within a city. Furthermore, research by Liu & Kwan (2020) and Xiong et al. (2022) suggests that the limited availability of opportunities within a region disproportionately impacts low-income families.

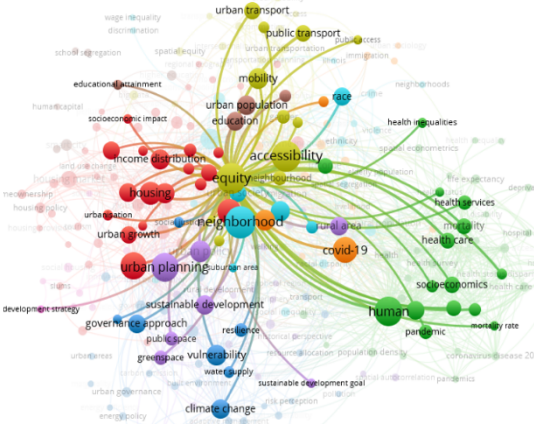
It is not surprising that this first cluster is strictly related to the neighbourhood one: accessibility can vary significantly within short distances, and district-level analysis captures these shades.

It allows scholars and local policymakers to measure how residents in different parts of the city experience access to vital services like grocery stores, schools and parks (Gül et al., 2024; Scheiber & Mifsud, 2024).

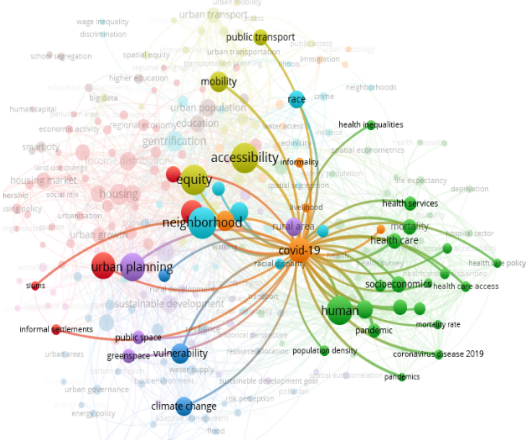
Additionally, neighbourhoods often reflect socioeconomic diversity, unveiling potential inequalities in access to resources between different communities. This knowledge is crucial for promoting socially equal urban planning practices. Gentrification and well-being are minor nodes related to these first topics, even though the former contributes to increased residential segregation within cities, pushing low-income residents further to the periphery and limiting their access to quality schools, healthcare, and job opportunities that can determine low welfare levels (Cole et al., 2018; Zhang & Churchill, 2020).

The unprecedented scale and multifaceted consequences of the pandemic have raised a critical reflection regarding the roles of actors, planning process and interventions aimed at transforming cities and improving living conditions (Gargiulo et al., 2020). This re-evaluation is particularly relevant considering the rapid and profound disruptions to urban organization and the proper supply of resources and services (D'Amico, 2024; Di Ruocco, 2024; Gargiulo & Zucaro 2023). As highlighted by Goldin & Muggah (2020) and Sen (2020), the pandemic has served as a stark revealer of pre-existing inequalities at all levels. It has not only exposed existing disparities but also exacerbated socio-economic, health and political divisions locally, nationally, and globally often overlapping disadvantages based

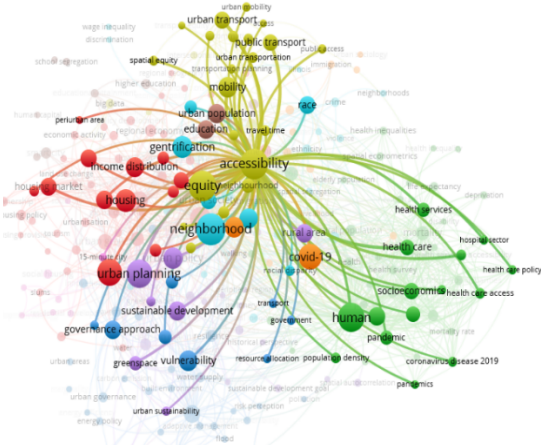
on gender, age, class, sexuality, ethnicity or race. These considerations explain why the third Covid-19 node is strictly linked to the human and socio-economic areas, especially for health aspects, such as urban planning and mobility. Urban planning underlies these areas described so far, as it determines the current and future physical and organization asset of the built environment (Cirianni et al., 2022; Gargiulo et al., 2023; Scheiber & Zucaro, 2023).



neighbourhood

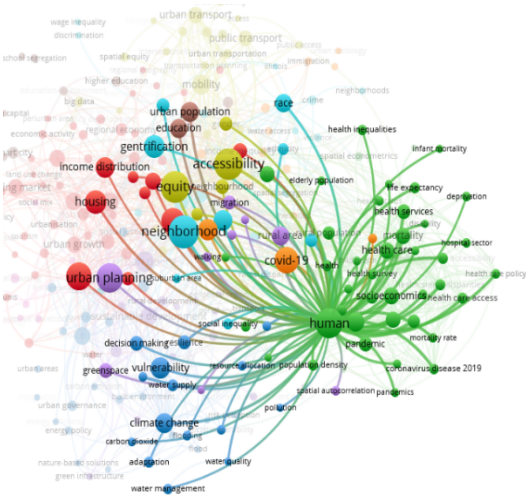


Covid-19

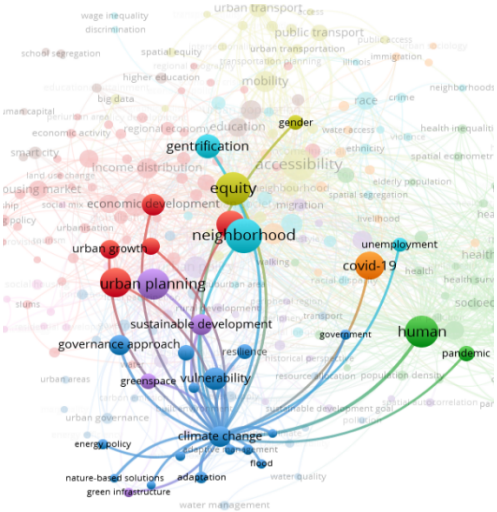


accessibility

urban planning



human



climate change

Fig.6 Single clusters of network keywords

The last cluster has as its pivots climate change and vulnerability, suggesting the vicious cycle linking these topics to inequalities: whereby initial socioeconomic inequalities determine the disproportionate adverse effects arising from climate hazards, which in turn results in greater inequality. By hitting the poorest hardest, climate change risks both increasing existing economic inequalities and causing people to fall into poverty.

In this perspective, it appears clear why this cluster is linked to human area, on one side, and to sustainability and decision process on the other side. Finally, it is characterized by the presence of Nature-Based Solutions (NBSs), green infrastructure and adaptation nodes. A growing number of studies confirm that the mismatch between the spatial patterns of green spaces and population will lead to people in different locations enjoying a different amount of services (e.g. microclimate regulation, carbon sequestration, runoff mitigation) provided by green spaces (Anderson et al., 2019; Chen et al., 2022; Morabaki, 2023).

The co-occurrence analysis findings show that:

- overall, the strong cross-cluster linkages like health care, mobility, education and sustainable development demonstrate addressing urban challenges requires a paradigm shift «from silo-based to interdisciplinary and systemic approaches that account for complex, dynamic, and emergent interactions and feedback loops between multiple social, economic, ecological, and technological sub-systems of urban systems» (Batty, 2009);
- themes related, on the one hand, to quality of life and, on the other, to resilience, seem still not well investigated in the scientific debate on inequalities. Indeed, terms such as walkability, liveability, urban spaces, and natural resources (indispensable such as water), flooding are not polarising nodes in the network, showing that much more effort is needed for a sound system for reducing urban and spatial disparities.

In particular, the second consideration is furtherly validated by density map obtained by VOSviewer and which immediately identifies dense areas where many nodes are located close to each other (Fig.7).

It is worth noting that many of the keywords of the density map seem to reflect both explicit and underlying aims of Agenda 2030, demonstrating the value provided by this work and the aim of this special issue of TeMA Journal to detect the current and future research directions about urban inequalities.

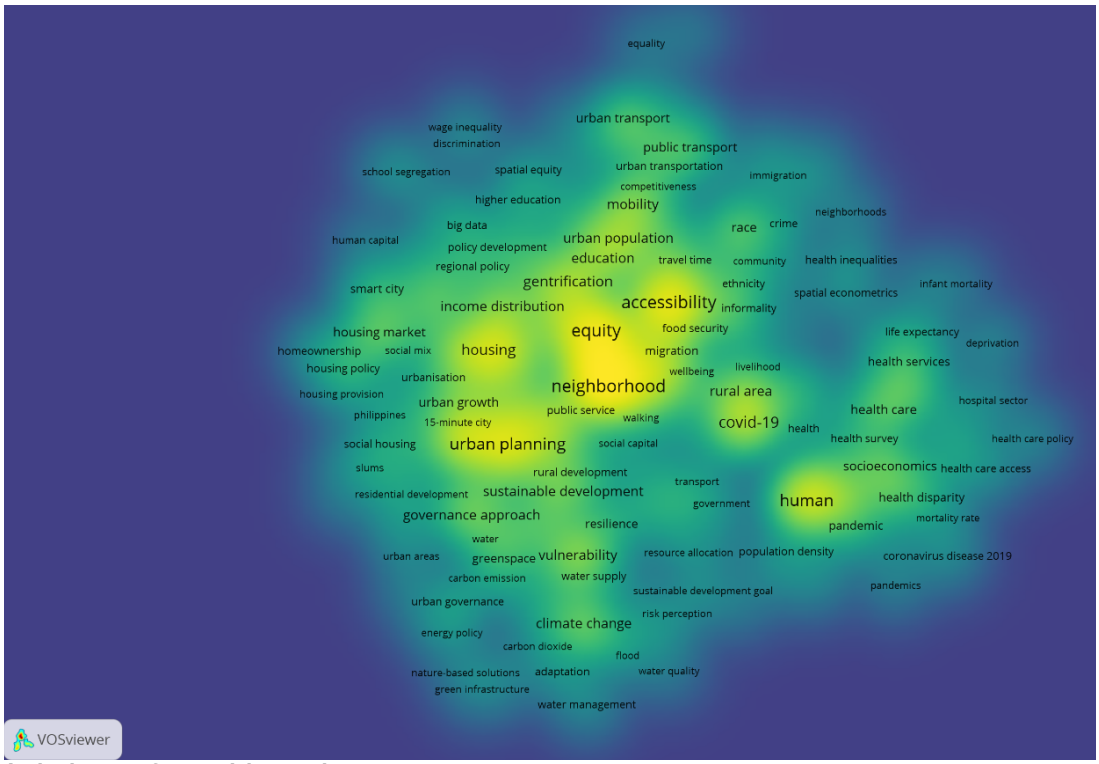


Fig.7 Single clusters of network keywords

Crucial aspects of urban inequalities like income levels, housing, health and urban planning are also part of the set SDGs to reach at worldwide level. At the same time, mobility, walkability, resilience, spatial equity (rationale distribution of urban services and activities), energy saving seem to still stay in the background among the political strategies and the investigated academic sphere.

The study period (2016–2023) was divided into two sub-periods, according to the key milestone determined by the pandemic spread. The Sankey diagram was plotted through biblioshiny to illustrate the intersections and changes in fields of interest in the academic debate (Fig.8). The width of the arrows represents the relative volume of research outputs.

Gentrification and urban planning characterised strongly the first period, while the pandemic reshaped the quality of life in cities but has also provided important lessons for recovery-resilient urban planning and policy. It has also unveiled that the negative impacts of pandemic events on the urban quality of life may not be equally distributed (Mouratidis, 2021). These assumptions can explain the cross-links between these two themes and housing, education and environmental justice, as the distribution of essential services (especially schools, residences and healthcare) can represent the booster to prevent social exclusion phenomena (Cai et al., 2022; LaFontant, 2023). Moreover, urban planning 2016-2021 research period feeds into gender and geography domains, revealing the still ongoing attention to the different needs, perceptions and use of services and places of female population (Scarponi et al., 2023; Williams et al., 2023).

Social exclusion, spatial justice, urbanization and geography mainly flew in geography and sustainability suggesting a growing focus on territorial factors and discrepancy among different parts of the world (North vs. South), maybe concerning disadvantaged communities (Huang et al.,2023; Randolph, 2024).

Overall, the Sankey diagram depicts a dynamic research landscape in which social science scholars are increasingly making connections across disciplinary boundaries to address complex urban challenges. The emergence of COVID-19 and its social and spatial impacts is a clear driver of new research questions such as the accessibility and supply of urban places (especially green areas), the use of technology to facilitate daily life and the new mobility patterns. There is also a growing emphasis on social justice issues, particularly racial and economic inequality, and the importance of geographic context in understanding these issues.

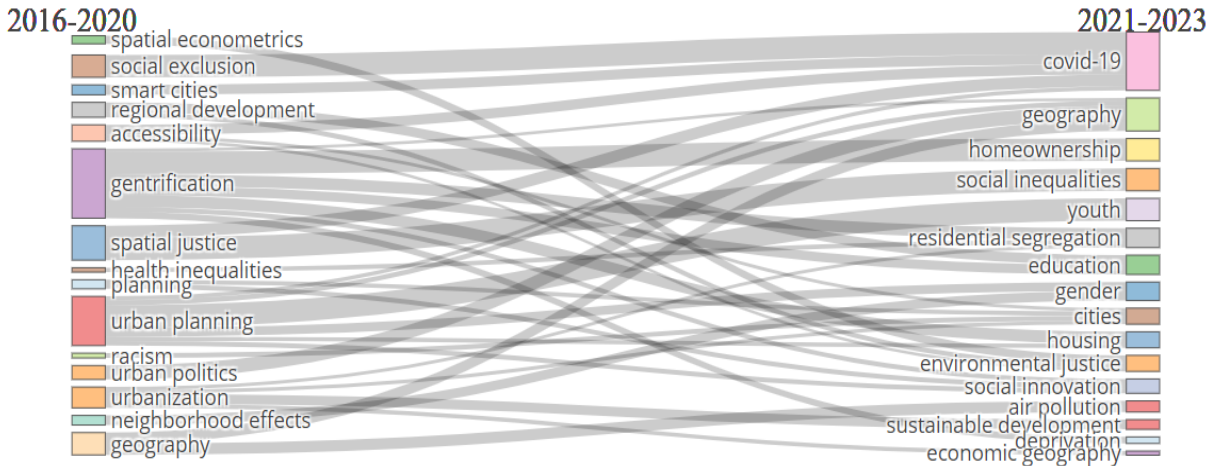


Fig.8 Sankey diagram of thematic evolution

2.2 Factorial analysis

Furthermore, a factorial correspondence analysis (FCA) was employed to visually represent the clusters formed by the most frequent active words. In particular, K-means clustering was used to identify clusters of documents that express common concepts to map the conceptual structure of a framework using the word co-occurrences in the selected scientific database. The distribution of clusters within this space is indicative of their statistical significance

and potential relationships. The keywords are clustered in different areas of the scatter plot, suggesting that they are related to each other based on their co-occurrence in the text corpus (Fig.9). Words that appear closer together in the plot are likely more semantically similar or frequently co-occur with each other.
In the current analysis, clusters 1 and 2, depicted in red and light blue respectively, exhibit minimal spatial proximity, suggesting a lack of strong association between their constituent words.
Dim 1 (32.99%) and Dim 2 (16.62%) refer to the two principal components indicating the proportion of variance explained by each dimension; they have a cumulative percentage of variance of nearly 50%. Higher percentages indicate that the dimension captures a more significant portion of the variation in the data.
It is immediately clear that the two clusters differ in the number of keywords and above all in their multidisciplinary breadth. Cluster 1 includes keywords like poverty, climate change, COVID-19, housing and gender, while words such as mobility, public transport and accessibility characterise cluster 2.
Cluster 1 can be named as *the determinants of inequalities*, as it includes socio-economic aspects, health and well-being aspects, environmental and climate context aspects. Cluster 2, on the other hand, can be named as *the opportunities for use and distribution of resources*, as it is related mainly by the physical and mobility sub-systems of the urban system. In other words, cluster 1 collects the studies linking urban inequalities to the current and near-future challenges in urban areas; cluster 2 reflects the interest of the scientific community in studying the "spatial mismatch" within and among cities, under the umbrella of the consolidated issue of urban accessibility.

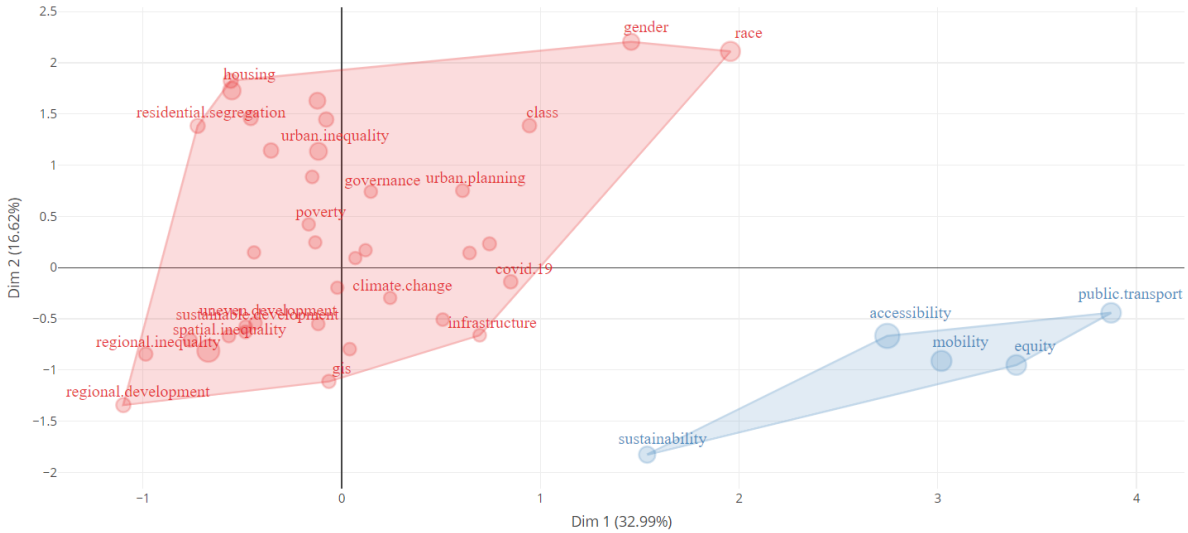


Fig.9 Hierarchical clustering outputs

By applying a clustering algorithm on the keyword network, biblioshiny can highlight the different themes of a given domain. Each cluster/theme can be represented on a particular plot known as thematic map where "Centrality" is a measure of the theme's relevance and "Density" is a measure of the theme's development (Cobo et al., 2011). Fig.10 shows the thematic map of the selected scientific production about urban inequalities, where each bubble represents a network cluster. The bubble names are words, belonging to the cluster, with the higher occurrence value. The bubble size is proportional to the cluster word occurrences.
The centrality of the bubble at the origin of the axes confirms previous findings on the identification of spatial planning as a pivotal element of the subject under investigation. It is no coincidence that the bubbles relating both to urban policies and governance and to planning, organization and land use choices, are located in the first quadrant of the motor themes, close to the basic themes, given that they are among the indispensable aspects of the government of urban and territorial transformations.

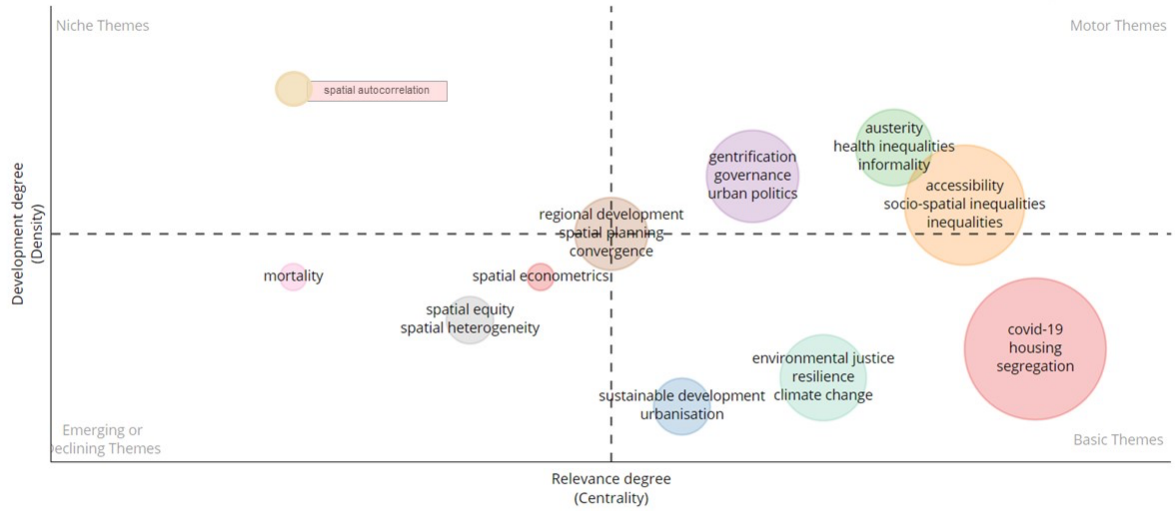


Fig.10 Distribution of main themes based on co-occurrence analysis

If the issues relating to decisions and possible effects in terms of liveability and accessibility of urban places and services are located to the right of the centre of mass of the diagram (first quadrant), diametrically opposed are those emerging or declining (second quadrant) relating to how public spaces are distributed and restricted, used and made unusable, and the different outcomes that result for different communities, i.e. spatial equity.
Finally, it seems that the study of urban inequalities is still strongly embedded in phenomena both exogenous to the urban system, such as pandemics and climate change, and endogenous, such as urbanisation and social segregation (fourth quadrant, basic themes). It is worth noting that although resilience and climate change are among the core themes, they are not yet as well established as those related to the human health sphere, as anticipated by previous density network findings obtained through VOSviewer.

3 Conclusions

The United Nations World Social Report (2020) underscores a concerning trend: over two-thirds of the global population is hosted in nations where urban inequalities have escalated during the past three decades. Traditionally viewed as an economic concern, "contemporary" urban inequalities operate on a broader, even global scale. They are embedded within cross-sectoral determinants such as socio-economic status, accessibility, and health. This interconnectedness between the urban context and the extent of inequality is a growing area of scholarly investigation (Lawrence, 2002; Nelson et al., 2023). High levels of inequality demonstrably impact the; social and spatial organization of cities (Sitaraman et al., 2020). Notably, reducing inequalities within and among countries is a core principle of the Sustainable Development Goals (SDGs), a global commitment adopted by nearly all nations with a target achievement date of 2030. Research suggests that societies with significant inequality are less effective at poverty reduction (United Nations, 2020:4). Disparities in health, education, and access to essential social and economic resources create barriers to escaping poverty and perpetuate disadvantage across generations (Nijman & Wei, 2020). Cities are particularly susceptible to the rapid intensification of social and spatial unevenness (Nijman & Wei, 2020; Pultrone, 2024). Scholars are actively exploring urban inequalities across diverse thematic areas, including housing ownership (Dewilde & Waitkus, 2023), access to opportunities (Pereira et al., 2021; Bittencourt & Giannotti, 2023), energy poverty (Middlemiss, 2020), internet access disparities (e.g. Singleton et al., 2020), the influence of digitalization, and the analysis of policies for inclusive urban development (Omole et al., 2024). Their findings reveal that the cumulative impacts of inequalities manifest across multiple dimensions of well-being (social, economic, political, and environmental), and are fundamentally linked to issues of resource distribution and accessibility (Logan et al., 2021). Advancements in computational power and access to new data sources further

emphasize that the urban disparities can be exacerbated by the inner vulnerabilities of the territories, linked both to natural and climate risks. Consequently, urban inequalities can no longer be considered independent of the urban and territorial contexts and their evolution dynamics. This requires new cross-sectorial studies investigating new domains of interest, in addition to the economic, accessibility, and health ones that seem to be the main research fields related to urban inequalities.

This Special Issue aims in this direction and, through a bibliometric review of the scientific framework of reference, many research gaps still to fill were identified, by raising significant questions like the following:

- How can adaptation to climate change help reduce social inequalities? To what extent do the effects of climate change contribute to widening inequalities in already fragile territories?
- How can urban mobility/accessibility contribute to reducing social inequalities by improving the use of places and services?
- How to define new governance approaches and processes that can reduce social inequalities?

This special issue aims to answer these questions in order to provide interesting insights useful both to enrich the scientific debate on urban disparities and to support political decision-makers in defining strategies, measures and actions aimed at guaranteeing equal opportunities for participation and access to services, activities and places of interest in different urban and territorial contexts.

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Fig.1: Authors' own elaboration;

Fig.2: Scopus elaboration;

Fig.3: Scopus elaboration;

Fig.4: Scopus elaboration;

Fig.5: Authors' elaboration - obtained by VOSviewer;

Fig.6: Authors' elaboration - obtained by VOSviewer;

Fig.7: Authors' elaboration - obtained by VOSviewer;

Fig.8: Authors' elaboration - obtained by biblioshiny;

Fig.9: Authors' elaboration - obtained by biblioshiny;

Fig.10: Authors' elaboration - obtained by biblioshiny.