BIBLIOMETRIC ANALYSIS OF THE SCIENTIFIC RESEARCH ON ENERGY POVERTY

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ABSTRACT

In this work, a bibliometric analysis of the scientific research on energy poverty is performed using the Scopus database for the analysis of scientific publications from the 1970s to 2020. It was found that energy poverty is an interdisciplinary issue, while the most productive journals, institutions, countries were identified. In the last decade we have seen a sharp increase in publications on energy poverty in scientific institutes in developed countries, mainly the USA and the UK, as e.g. in Europe the austerity policies imposed as a result of the economic crisis have set the energy poverty in a major national problem, with various social, economic, political, environmental and health implications. It is estimated that energy poverty in Europe affects between 50 and 125 million people [1], with energy poverty rates varying between Member States and higher in Southern and Eastern Europe. However, the absence of a common European definition of energy poverty and the lack of adequate data do not allow us to make an accurate assessment of the problem at European level.

KEYWORDS

bibliometric analysis; energy; energy poverty

1. INTRODUCTION

Energy poverty is a new, rapidly growing form of poverty and is one of the greatest challenges of our century. Despite its ever- increasing and particularly rapid, scientific and technological development in the modern world, the quality of life does not follow the same pace. More and more households are finding it difficult to meet their energy needs. This problem is observed either by the inability to pay the energy bills or by the limited access to energy and inadequate energy services. It is a trend that is in line with low incomes, high energy costs and homes that are not adequately designed to cope with the new environmental conditions with climate change (greenhouse effect, etc.) [2].

Especially in Europe, the austerity policies imposed by governments in recent years, as a result of the wider economic crisis, have made energy poverty a major national problem, with various social, economic, political, environmental and health implications. It is estimated that energy poverty in Europe affects between 50 and 125 million people [1], while energy poverty rates vary considerably between different Member States [3]. In fact [4], the rate of energy poverty is much higher in the South and the Member States of the Eastern European Union. However, the absence of a common European definition of energy poverty combined with the lack of adequate data does not allow us to make an accurate assessment of the problem at European level.

Bibliometric study or analysis is called a work that quantitatively studies the bibliographic material [5]. These studies classify the material according to various criteria, such as authors, scientific journals, research institutes or geographical identification. The conclusions drawn from such analyzes are very useful in order to identify the prevailing research trends in each field. Bibliometric trends for published works can be found in every scientific area. No bibliometric analysis has been done on the issue of energy poverty since 2013.

2. METHODOLOGY

The data is taken from the Scopus scientific database. This database provides many possibilities and allows a complete record of scientific texts identified with the words “energy poverty”. The only restrictions included in the analysis are the search for trade publications, which are very few, as well as articles that have not been published in English, as more than 95% of the articles have been published in this language. Initially, similar articles were researched using the keywords: energy, poverty and bibliometrics. Then the keywords searched were: energy AND poverty. AND is a logical operation (search for articles that include all terms at once). The number of works per year is presented, per scientific field, by type of text and means of publication, title of journal, country, research institute and at the end an analysis of the keywords presented in the published articles is made.

3. RESULTS AND DISCUSSION

3.1 Investigation of similar works

Search by keywords energy, poverty and bibliometrics gives the results of Table 1. The keywords are the words used in the Scopus search engine.

The number of articles displayed in Table 1 corresponds to the number of search results. However, of the 4 articles that emerge from this search, one is not relevant to the issue of energy poverty, the other is very specialized and the other is very general. The last article is entitled: "Bibliometric Analysis of Energy Poverty" which concerns it and analyzes with the method of bibliometrics the issue of energy poverty for the years from 1981 to 2013 based on the electronic version of the SCI-E databases (Social Care Institute for Excellence) and SSCI (Social Sciences Citation Index) [6].

This article showed that energy poverty is an interdisciplinary issue, and found that the academic level of research on energy poverty in developed countries was much higher than in developing countries, and that England had overall dominance in this area. The top ten most productive writers, institutions and magazines came from all developed countries. India was the only developing country to publish more than ten articles on energy poverty. England's research capacity on energy poverty ranks first and developing countries were all in the fourth tier.

Table 1. Results of initial bibliographic searches.

a/a	***Keywords***	***Number of articles***
1	Energy AND poverty AND bibliometrics	4

3.2 Evolution of publications over time

The search energy AND poverty gives a total of 4,969 articles. Figure 1 shows the number of articles published each year for this search. The first paper was published in 1970. The production of articles was relatively small until the year 2000, while there is an exponential increase to reach 457 articles in 2019, while in 2020 so far (February 2020) 64 articles have already been written showing the great increase of scientific interest in this subject.

The fact that the debate on the issue of energy poverty began in 1970 is explained by the events of that time. In particular, at the end of 1973 the world economy was hit by a huge shock due to the unprecedented rise in oil prices.

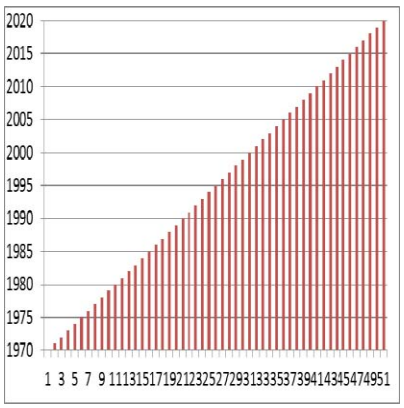

Figure 1. Number of work publications per year.

3.2 Publications by scientific field

The Scopus Scientific Database also gives us the number of articles per scientific field. Note that each paper can belong to more than one scientific field, so the sum of the works in each field gives more work than the total number of published works. We have three fields in the first place, the social sciences, energy and environmental science. Then the second field is that of medicine, after engineering. In the other categories they show a preference in the categories of engineering, economics, etc.

One might expect that the number of publications in the fields of energy and environmental science would occupy the first place with a considerable difference from the field of social sciences, medicine, etc. However, the issue of energy poverty has a very significant social impact and has many health implications.

3.4 Number of posts per text type and per publication medium

The type of published texts was searched. The percentage of texts that are articles 66.89% stands out (almost 2/3 of the texts), followed by the presentations at conferences covered by Scopus 10.75%, the reviews 8.62% and the book chapters 8.06%. The other items make up a very small percentage of the published work. Note, however, that Scopus only covers a small part of the conferences held worldwide, so the total number of papers presented at conferences is much larger.

3.5 Magazine titles

The total number of magazines in which articles have been published in the category we are interested in is very large. We found 2,197 magazines that correspond to a total number of 3,841 articles (out of a total of 8,841).

Table 2 presents the scientific journals that collect the most publications. It is noticed that most of the articles are in Data Planet magazine with a big difference compared to the second one.

Table 2. Number of articles per scientific journal.

Magazine title	***Number of articles***
Data Planet	1791
ICPSR	86
UK Data Archive	58
Zenodo	36
GESIS Leibniz Institut for the Social Sciences	26
Figshare Academic Research System	24
Apollo Cambridge	18

3.6 Geographical distribution

The distribution of publications by country was also investigated. An article can belong to more than one country, so the sum of all articles in all countries is greater than the total number of articles.

There is a relatively large geographical concentration of publications, as in America we have 36% of publications, in England 20%. India follows next with a percentage of 9%, South Africa, Australia and China with 6% after. In Germany there is just a 5% of publications followed by France, Spain and the Netherlands with 4%.

3.4 Research institutions

Table 3 shows the top 20 institutions worldwide. The University of North Carolina at Chapel Hill is the first. It is followed by the University of Manchester, the University of Cape Town, etc. We observe that these first 20 places are occupied by North American and

English institutions with the exception of a South African institution (University of Cape Town), a Swedish (The Royal Institute of Technology KTH), an Italian (Food and Agriculture Organization of the United Nations), an Australian (University of New South Wales UNSW Australia), a Japanese (University of Tokyo). We observe that the majority of institutions are located in English speaking countries.

The evolution of the number of publications per institution or their percentage does not show a clear trend.

Scopus also gives the number of articles by each author, but because this number is relatively small with too many authors, it is not presented here.

Table 3. Number of publications per institute.

Institution	***Number of articles***
The University of North Carolina at Chapel Hill	50
University of Manchester	45
University of Cape Town	43
University of California, Berkeley	41
University of Oxford	41
University of Cambridge	41
The World Bank, USA	41
UCL	38
Columbia University in the City of New York	38
University of Washington, Seattle	36
University of Sussex	35
University of East Anglia	19
The Royal Institute of Technology KTH	19
Food and Agriculture Organization of the United Nations	19
Harvard University	19
Cardiff University	19
University of New South Wales UNSW Australia	19
University of Sheffield	18
Baylor College of Medicine	18
University of Tokyo	14

4. CONCLUSIONS

According to this work, energy poverty has a detrimental effect on health, restricts the development of education, exacerbates local ecological damage and may be the cause of a vicious cycle of lack of economic and social development.

It analyzed energy poverty with a bibliography drawn from the Scopus database to identify publication patterns, range of topics, and academic level of energy poverty research.

It has been found that while there have been reports of energy poverty since the 1970s the largest increase in work on energy poverty has been in the last decade. This was to be expected as the recent economic crisis has resulted in the imposition of strict fiscal measures, mainly in Europe, with the consequent rapid rise in energy poverty. The dominant fields are: "social sciences", "energy" and "environmental science". The majority of works are articles published in scientific journals. There is a concentration of articles in the magazine "Data Planet". There is also a significant geographical centralization, as more than 50% of the articles on the issue of energy poverty have been published in the USA and England. The top 20 research institutions are from North America and England with exceptions from South Africa, Italy, Australia and Japan. In other words, we observe that in developed countries there is more academic

research than in developing countries, which was to be expected since in developing countries the daily problems and difficult living and survival conditions do not leave room for research.

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