

## Bibliometric Analysis of Breastfeeding Research in the Middle Eastern Arab Countries

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**Abstract**— The Middle East is a place where breastfeeding is both culturally recommended and socioeconomically needed. The objective of this article was to quantify the research activity about breastfeeding (BF) in the Middle East over the last 10 years. A PubMed search was conducted using medical subject headings and author affiliation to retrieve research articles published from the Middle East between 2007 and 2017 (inclusive). Middle Eastern countries produced only 5% of the total number of BF research articles in the world, with Turkey and Iran ranking at the top of the list. Among the 15 Arab countries probed, Qatar ranked first in the number of BF publications per million people (PMP) averaging 6.61 PMP, while Yemen ranked 15<sup>th</sup> with the least number of 0.10 PMP. On the other hand, Iran ranked first with 39.93 BF publications per US\$1000 Gross Domestic Product (GDP) per capita, Turkey ranked second with 24.19 publications per US\$1000 GDP per capita, while Bahrain ranked 15<sup>th</sup> with only 0.44 publications per US\$1000 per GDP per capita. Although the topic poses as both a religious – cultural – recommendation and a socioeconomic necessity, research activity about BF in the Middle East still lags behind developed countries. Greater productivity levels are expected to emerge to accompany the recent significant investment in research in the Arab world in general, and the Gulf countries in particular.

**Keywords**— bibliometric analysis; breastfeeding; Middle East.

### I. INTRODUCTION

Natural mother's milk has been shown to be a basic and important primary nutritional source for a baby [1, 2]. All while meeting the physiological needs of the baby, breastfeeding is thought to support the psychological development of the neonate through the mother-infant tie [3]. Breastfeeding is a phenomenon that has cultural, social, and spiritual dimensions, very much related to religious doctrines [4].

The recommendations put forth by the World Health Organization (WHO) state that babies should be fed with breast milk for at least two years, with breast milk being the only nutritional supply for the first six months of neonatal age, then additional supplements thereafter [5]. Although the aforementioned recommendations resonate well with the cultural and religious paradigms, only 49% of babies born in 2011 were found to have been breastfed to the age of 6 months, and a fractional 27% to the age of one year [6]. It has also been noticed that the average span of breastfeeding

is shorter in richer countries, compared to longer durations in societies with lower incomes [7]. In a study on breastfeeding in United Arab Emirates, a total of 98% of 593 Emirati mothers included in the study initiated breastfeeding and the mean duration of breastfeeding was 8.6 months [8] while it was 52.3% in Hafr Al Batin city in Saudi Arabia [9].

Globally, a lot of research has been done on breastfeeding, from protein interactions and biomedical effects [10]-[12], to maintenance and weaning strategies [13]-[16], to the psychological underpinning of pre- and post-natal phases [17], to the behavioral development of the neonate [18]. This is particularly related to the variety of interests different researchers have on the topic.

Bibliometric studies have been used to analyze and interpret pertinent trends in medical practice, as well as the evolution of research behavior [19]. The purpose of this report is to probe the trends in published breastfeeding research in the Middle Eastern Arab (MEA) countries. In particular, the purpose of this report is to: (1) Describe trends in number of breastfeeding publications produced by the MEA countries, and (2) inspect the abundance of publications produced by different universities within the MEA countries.

The rest of the paper is structured as follows. Section 2 describes the methodology used in the research. Section 3 displays the results obtained. Section 4 discusses the results, and finally, Section 5 gives some conclusions.

### II. METHODOLOGY

Papers on “breastfeeding” published between 2007 and 2017 in the Middle East were collected from the data-base website PubMed (available from the National Institutes of Health) during September 2017.

In the following bibliometric analysis, PubMed filters were customized to include the following types of articles: case reports; clinical conference; clinical trial; clinical trial, phase I; clinical trial, phase II; clinical trial, phase III; Clinical study; comparative study; Consensus Development Conference; controlled clinical trial; journal article; letter; meta-analysis; multicenter study; randomized controlled trial; review; Scientific integrity review; systematic reviews; validation studies.

As this research is constricted to the Middle East region, the following 15 countries were investigated: Bahrain; Egypt; Iraq; Jordan; Kuwait; Lebanon; Oman; Palestine; Qatar; Saudi Arabia; Syria; United Arab Emirates; and Yemen. Iran and Turkey were

TABLE I. NUMBER OF PUBLICATIONS, POPULATION SIZE, AND GDP PER CAPITA OF THE 15 MIDDLE EASTERN ARAB COUNTRIES, ALONG WITH IRAN AND TURKEY

Country	number of Publications	Population size	GDP per Capita
Bahrain	1	1.425	2.23
Egypt	62	95.69	3.51
Iran	198	80.28	4.96
Iraq	7	37.2	4.61
Jordan	44	9.456	4.09
Kuwait	13	4.053	28.98
Lebanon	28	6.007	7.91
Oman	13	4.425	14.98
Palestine	6	4.55	2.00
Qatar	17	2.57	59.33
Saudi Arabia	47	32.28	20.03
Syria	4	18.43	2.06
Turkey	261	79.51	10.79
United Arab Emirates	23	9.27	37.62
Yemen	3	27.58	0.99

included for comparison as the closest non-Arab neighboring countries.

To search for the specific publications by topic and country, we applied Medical subject headings (MeSH): the National Library of Medicine (NLM) controlled vocabulary thesaurus used for indexing articles for PubMed. The results were collected by applying the Boolean searching technique (a type of search allowing users to combine keywords with operators (or modifiers) such as AND, NOT and OR to further produce more relevant results. For example, searching for publications on breastfeeding in Lebanon would look like this: “Breastfeeding” AND “Lebanon.”

### III. RESULTS

#### A. Data Filtering

Thirteen thousand nine hundred seventy-five “13975” breastfeeding papers were retrieved from PubMed between 2007 and 2017. Seven hundred twenty-seven “727” (5.2 %) were published from the Middle-Eastern countries. Turkey with 261 publications (35.9 %) ranked first in the Middle East, and along with Iran 198 publications (27.2 %), which ranked second, contributed around two-thirds of publications (Table I).

#### B. Data Processing

For technical purposes and a more advanced comparison, the number of publications was corrected by means of population size (Table II) and Growth Domestic Product (GDP) (see Table III). This was made possible by

dividing the number of publications retrieved by the population size of each country (population size according to the data of the World Bank) and by the USD\$1000 GDP per capita, respectively.

### IV. DISCUSSION

Although breastfeeding is considered a social and religious mandate [4], as well as – at times – an economic need [7], in most of the developing countries, scientific research to corroborate the benefits of such a natural phenomenon seems to be still lacking in most of these countries.

The results obtained (Figure 1) are hardly considered eligible for fair comparison; this is due to the vast differences in the population size and economic backgrounds of the countries in question.

For the statistical imperfections listed above, and to get rid of the errors associated with population size, we corrected our results by dividing the number of breastfeeding publications by the population size in millions (Figure 2) [20]. For example: United Arab Emirates have 23 breastfeeding publications within the last 10 years, the population size of this country is 9.27 million, dividing 23 by 9.27 will give us (2.48) publications per million. Applying this formula to the 15 Middle Eastern countries yielded the results shown in Table II and Figure 2. Qatar ranked first with 6.61 publications per million, Lebanon ranked second with 4.66 publications per million, while Yemen ranked 15th with the least number of publications 0.10 per million.

TABLE II. RATIO OF PUBLICATIONS TO POPULATION SIZE, IN MILLIONS, IN THE 15 MIDDLE EASTERN ARAB COUNTRIES, ALONG WITH IRAN AND TURKEY

Country	Publications per Million 2007-2017
Bahrain	0.701754386
Egypt	0.647925593
Iran	2.466367713
Iraq	0.188172043
Jordan	4.653130288
Kuwait	3.207500617
Lebanon	4.661228567
Oman	2.937853107
Palestine	1.318681319
Qatar	6.614785992
Saudi Arabia	1.456009913
Syria	0.217037439
Turkey	3.282605962
United Arab Emirates	2.481121899
Yemen	0.108774474

TABLE III. RATIO OF PUBLICATIONS TO POPULATION SIZE, IN MILLIONS, IN THE 15 MIDDLE EASTERN ARAB COUNTRIES, ALONG WITH IRAN AND TURKEY

Country	Publications per \$1000 of GDP 2007-2017
Bahrain	0.448430493
Egypt	17.64125094
Iran	39.93884113
Iraq	1.518569941
Jordan	10.76336737
Kuwait	0.448656447
Lebanon	3.538033864
Oman	0.867687067
Palestine	3.004055475
Qatar	0.286528798
Saudi Arabia	2.34663844
Syria	1.94359682
Turkey	24.19442305
United Arab Emirates	0.611341014
Yemen	3.029293266

To eliminate the economical factor, another correction was introduced; this was made possible by correcting the results with the Gross Domestic Product (GDP) per capita

[20]. Dividing the number of breastfeeding publications by the USD\$1000 GDP per capita for each Middle Eastern country yielded the results shown in Figure 3. Iran ranked first with 39.93 breastfeeding Publications per USD\$1000 GDP per capita, Turkey ranked second with 24.19 publications per USD\$1000 GDP per capita, while Bahrain ranked 15th with only 0.44 publications per USD\$1000 per GDP per capita. Moreover, the number of universities in the country was taken as another factor that may affect the number of publications, so we calculated the ration of publications to numbers of universities. The results showed that Qatar ranked first followed by Turkey then Jordan while Bahrain was at the end of the list with only 0.067 publications per university (Figure 4). Here, it is worth noting that the various rates obtained are the accumulated averages over the last ten years, and are not presented as per individual years.

V. CONCLUSIONS

At the present time, most of the Middle Eastern Arab countries are lagging behind in terms of research outcomes, in general, and breastfeeding research, in particular. While Jordan and Lebanon show some promises in terms of the publication size with respect to the population size, other high GDP countries – the Gulf States for example – are not investing in this type of research as much as some much poorer countries, like Palestine and Yemen. It also appeared that more effort is needed to encourage universities to be involved in such types of research especially for their significant role in leading research activities in their countries. More probes into the growth rate of this research over the last decade will give insights into the trends taken by researchers in this part of the world.

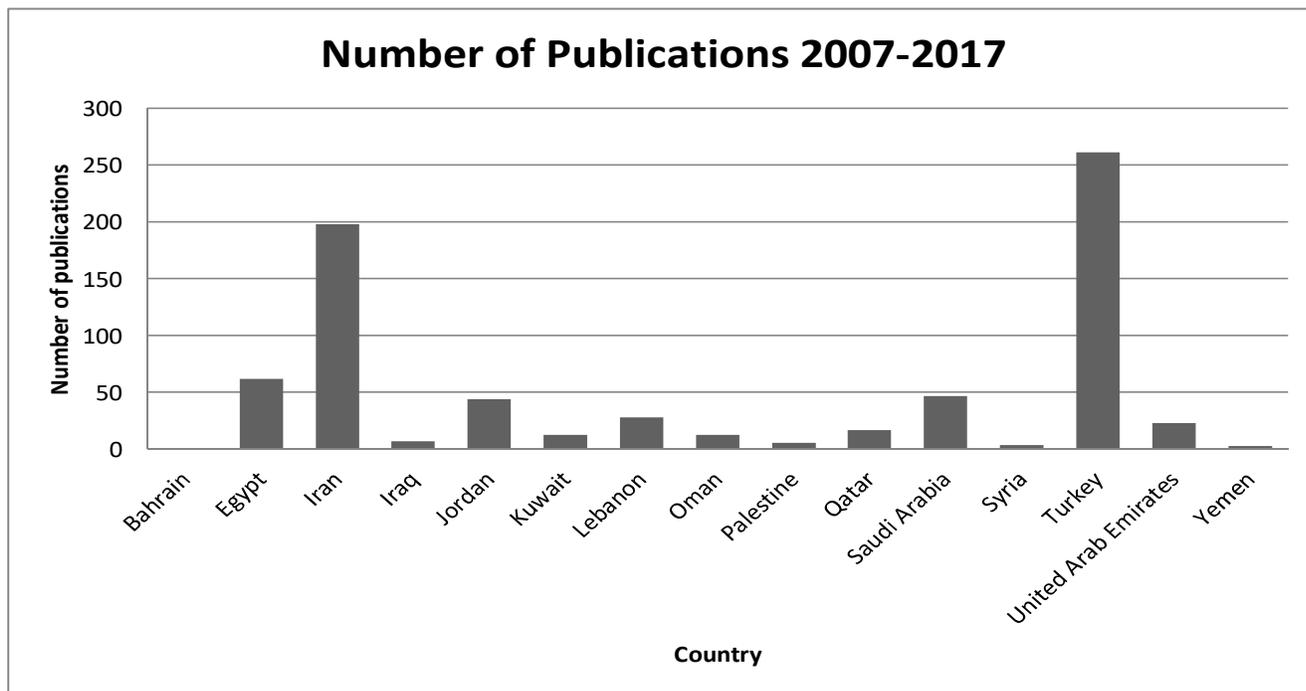


Figure 1. The number of publications per country

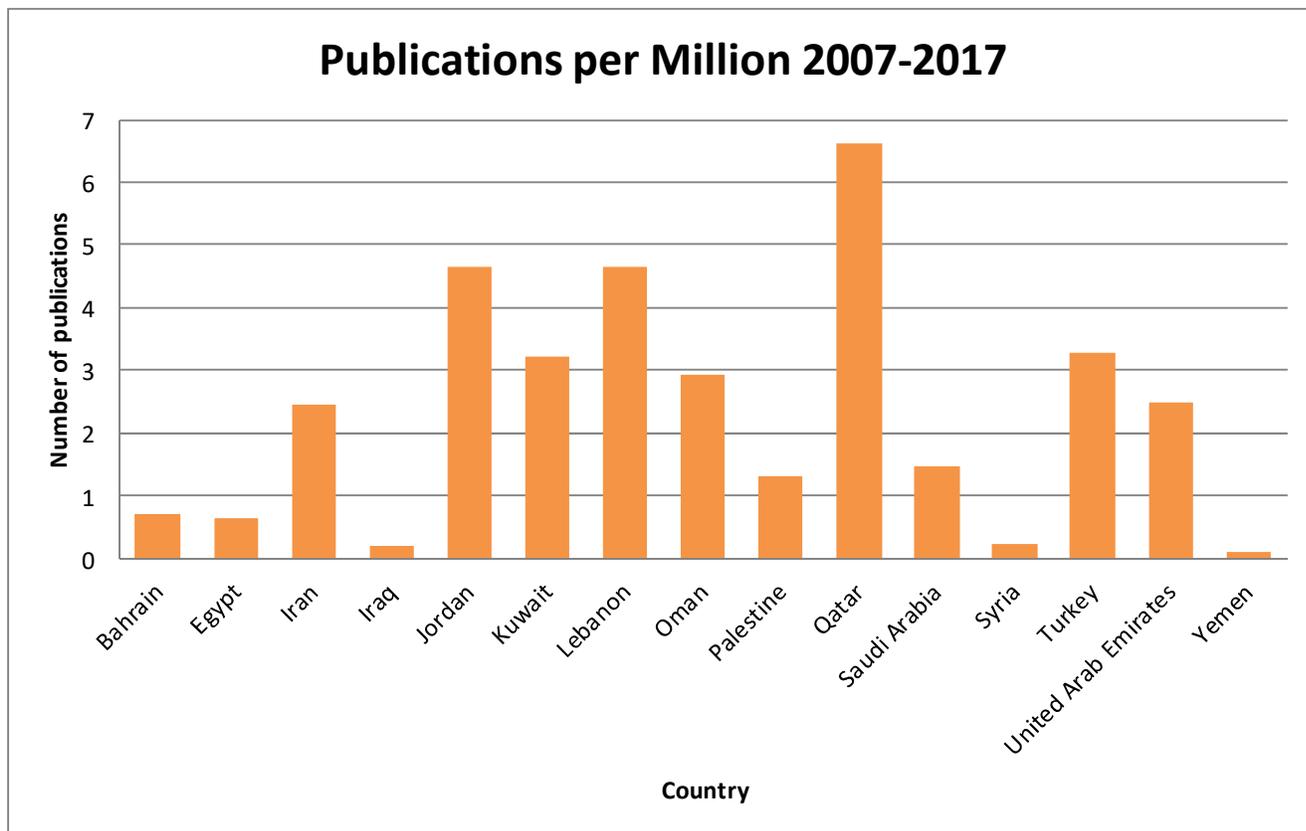


Figure 2. The number of publications with respect to the country's population size

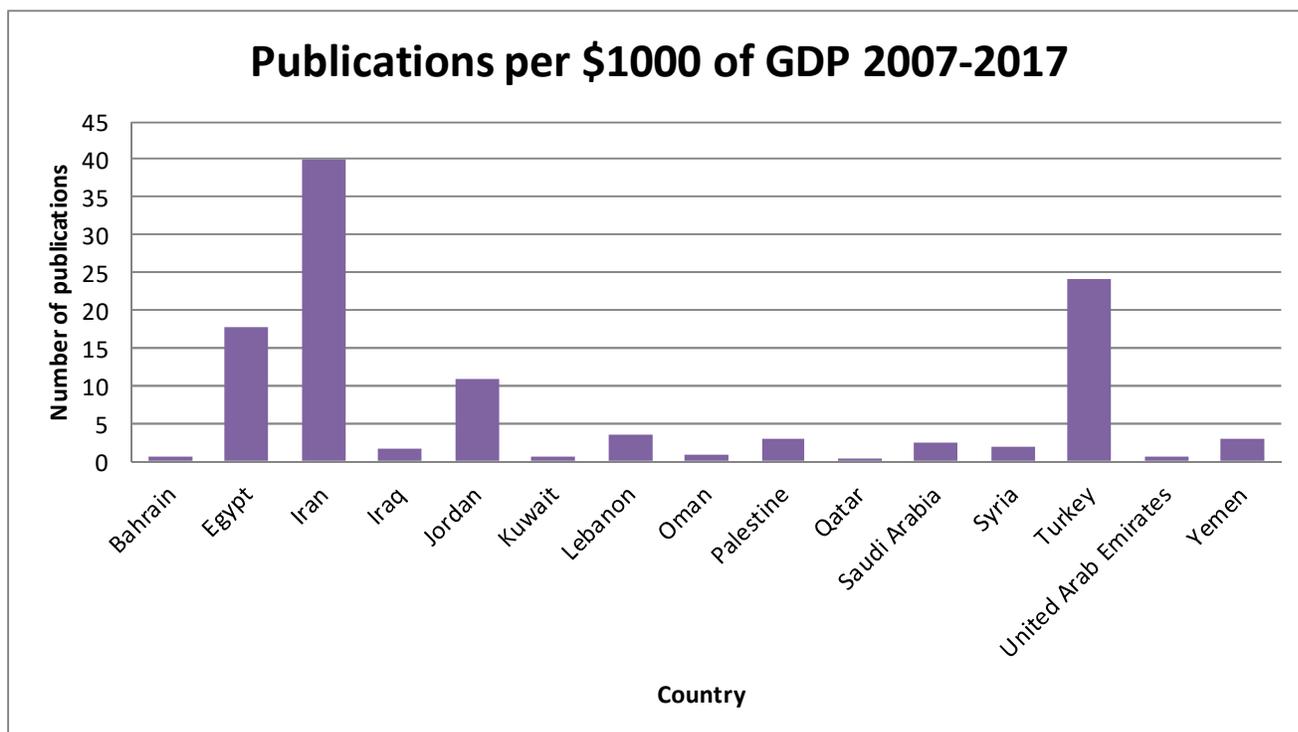


Figure 3. The ratio of publications to the country's GDP

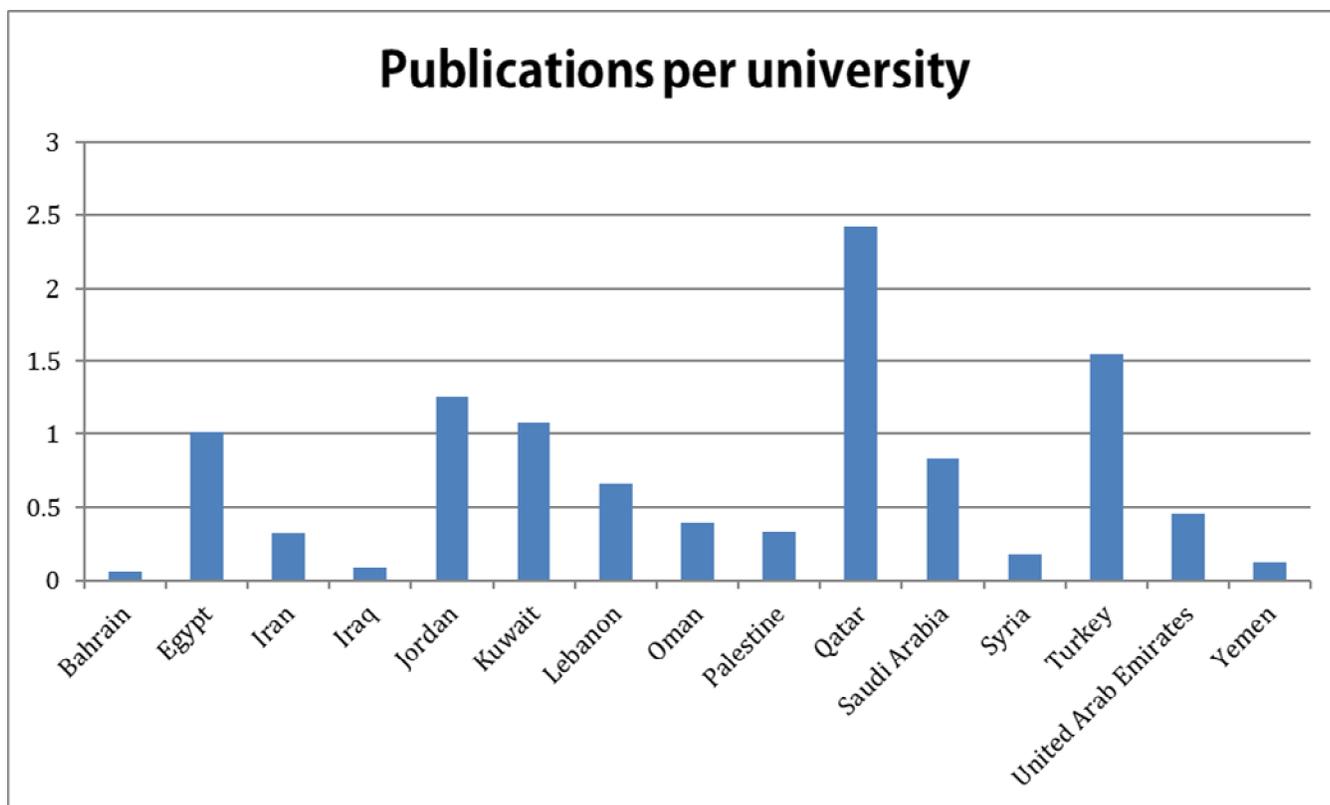


Figure 4. The ratio of the number of publications to the number of universities in each country.

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