



## **A Bibliometric analysis of articles indexed in PubMed, 1988-2012, with Bahrain as first author affiliation**

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A review of the literature of bibliometrics as it relates to the Middle East turns up a number of studies and a few articles deploring the paucity of such studies.<sup>1-7</sup> It will also show that, while there have been studies relating to the region as a whole and a few individual countries, there have been no studies specifically relating to Bahrain. It is as an effort to remedy this situation and to be a stimulus to others that this article appears.

PubMed has included the affiliation of first authors as a searchable field since 1988. It is thus possible by searching both Bahrain\* and Bahrein\* to identify some 727 articles where the first author is associated with an institution in Bahrain. These articles have been tabulated in an Excel table of authors, titles, affiliations, citations and subject classification (using the National Library of Medicine (NLM) classification system). An analysis of these articles covering the 25-year period from 1988 through 2012 was then undertaken to determine:

- The number of articles per year (Table 1),
- The authorship characteristics of these articles (i.e., number of authors per article and the number of unique authors) (Tables 2 and 3),
- The affiliation of the authors cited (Table 4),
- The journals where these articles appeared (Table 5) and,
- The subject distribution of the articles cited (Table 6).

### **NUMBER OF ARTICLES PER YEAR AND THEIR AUTHORSHIP**

It can be seen that, while the general trend over the time period has been upward, it has been erratic. After a brief decline (2008-2010), however, there has been a distinct, sharp spurt.

Most of the 727 articles were authored by two writers (165), followed by those with three (143) and then four writers (130). Single authorship accounted for 118 articles. The range of number of authors was 1-13, with a median of 6.5.

Like the number of articles per year (Table 1) the general trend over the time period was upward but erratic, and again a retreat in 2007-2008, followed by a spurt upward from 2011 onward.

### **AFFILIATION OF AUTHORS**

The bulk of the articles during the time period covered were, not surprisingly, produced by authors affiliated with four entities: the Arabian Gulf University, Salmaniya Medical Complex, the University of Bahrain, and the Ministry of Health.

### **JOURNALS WHERE ARTICLES APPEARED**

Among the top five journals where articles were published, three are Saudi: *Saudi medical journal*, *Annals of Saudi medicine*, and *the Saudi journal of kidney diseases and transportation*.

### **SUBJECT DISTRIBUTION OF ARTICLES**

Among the Preclinical sciences, the most heavily represented subjects were:

- Pharmacology, Pharmacy & Toxicology
- Biochemistry, Genetics & Nutrition

**Table 1:** Number of articles per year (1988-2012)

Year	No. of Articles	Year	No. of Articles
1988	10	2001	32
1989	12	2002	30
1990	9	2003	40
1991	10	2004	52
1992	19	2005	47
1993	12	2006	51
1994	16	2007	47
1995	14	2008	35
1996	11	2009	45
1997	16	2010	38
1998	18	2011	52
1999	21	2012	62
2000	28	Total	727

**Table 2:** Number and percentage of articles per author groupings (1988-2012)

No. of Authors	No. of Articles	Percent of Articles
1	118	16.23
2	165	22.70
3	143	19.67
4	130	17.88
5	77	10.59
6	42	5.78
7	26	3.58
8	9	1.24
9	5	0.69
10	6	0.83
11	5	0.69
13	1	0.14

**Table 3:** Number of unique authors per year (1988-2012)

Year	Unique authors	Year	Unique authors	Years	Unique authors
1988	22	1997	36	2006	131
1989	30	1998	58	2007	120
1990	19	1999	61	2008	94
1991	20	2000	48	2009	121
1992	41	2001	86	2010	114
1993	20	2002	77	2011	163
1994	43	2003	101	2012	183
1995	29	2004	119		
1996	35	2005	122		

**Table 4:** Overview of author affiliation (1988-2012) for those with two or more citations

Institution	Number	Institution	Number
Arabian Gulf University	234	Al Khalifa Cardiac Center	7
Salmaniya Medical Complex	209	Bahrain Specialist Hospital	7
University of Bahrain	51	Roayl Medical Services [Hospital]	7
Ministry of Health	46	Al-Areen Wildlife Park	3
Bahrain Center for Studies & Health	26	AMA-College of Medicine	3
Bahrain Defence Force	22	American Mission Hospital	3
Psychiatric Hospital	20	Gulf Air (Bahrain)	3
Al-Jawhara Center	16	KIMS	3
College of Health Sciences	16	BHIC	2
Bahrain Branch of the UK Cochrane Center	15	Bahrain Polytechnic	2
Royal College of Surgeons in Ireland	15	United States Navy	2

\*The remaining citations all have one article in the time period covered; those interested can obtain this list from the writer. Affiliation has been aggregated within institutions. A breakdown is also available from the writer.

N.B.:There is a certain degree of ambiguity here in that some authors have joint affiliations

**Table 5:** Overview of journals where cited articles appeared (with 5 or more citations)

Journal	No. of citations
Saudi medical journal	68
Eastern Mediterranean Health Journal	29
Cochrane Database of Systematic Reviews (Online)	28
Annals of Saudi Medicine	25
Saudi Journal of Kidney Diseases and Transplantation	17
Journal of Laryngology and Otology	13
Medical Teacher	13
Education for health (Abingdon, England)	8
Nutrition and Health (Berkhamsted, Hertfordshire)	8
BMJ case reports	7
Transplantation proceedings	7
Clinical anatomy (New York, N.Y)	6
International Journal of Clinical Pharmacology and Therapeutics	6
Journal of evaluation in Clinical Practice	6
Journal of the Royal Society of Health	6
Journal of thrombosis and thrombolysis	6
Science of the total environment	6
Annals of human biology	5
Annals of throacic medicine	5
International Journal of Gynaecology and Obstestrics	5
Medical education	5
Medical principles and practice	5

\*the reminder are one article only. Again, those interested can obtain the complete list from the writer

- Microbiology & Immunology

Among Medicine and Related Subjects the following topics are represented most:

- Urogenital system
  - General medicine & health professions
  - Hemic & lymphatic systems
  - Musculoskeletal system
  - Cardiovascular system

## OBSERVATIONS

It is felt necessary to point out several incidental observations made during this analysis:

Authors should be consistent in the use of their names. A number of authors have permuted their names, romanized them inconsistently, and used them with varying degrees of completeness. One author's name appears in 11 different forms. This point is especially important for future indexing and searching purposes.

Further, titles should concisely reflect the contents of the article. "This works for us" is not a useful title for an article about "Therapy for pancreatic cysts in childhood;" nor is "The use of levofloxacin and ciprofloxacin as therapeutic adjuvants for the treatment of cystic fibrosis in a children's hospital in the southeastern part of Baluchistan: a cross-sectional study and review."

## CONCLUSION

Bibliometrics has been recognized as a powerful tool in the armamentarium of quantitative research assessment. It provides answers to such questions as: what impact is our research having, in what subject area are we strongest and weakest, who is undertaking it, and at what institutions is it being conducted? The answers to these questions are vital to a nation's researchers and policy makers.

## References

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**Table 6. Subject distribution of articles (1988-2012)**

**SUBJECT DISTRIBUTION OF ARTICLES**

<b>PRECLINICAL SCIENCES</b>		
<b>NLM Class</b>	<b>Subject</b>	<b>No. of Articles</b>
QH	NATURAL HISTORY; BIOLOGY	3
QS	HUMAN ANATOMY	11
QT	PHYSIOLOGY; PHYSICAL EDUCATION; DIET	7
QU	BIOCHEMISTRY. GENETICS; NUTRITION	34
QV	PHARMACOLOGY, PHARMACY; TOXICOLOGY	41
QW	MICROBIOLOGY AND IMMUNOLOGY	30
QX	PARASITOLOGY	3
QY	CLINICAL PATHOLOGY	2
QZ	PATHOLOGY	16
<b>TOTAL PRECLINICAL SCIENCES</b>		<b>147</b>
<b>MEDICINE AND RELATED SUBJECTS</b>		
W	GENERAL MEDICINE; HEALTH PROFESSIONS	42
WA	PUBLIC HEALTH	36
WB	PRACTICE OF MEDICINE	17
WC	COMMUNICABLE DISEASES	31
WD	DISORDERS OF SYSTEMIC, METABOLIC & ENVIRONMENTAL ORIGIN	29
WE	MUSCULOSKELETAL SYSTEM	39
WF	RESPIRATORY SYSTEM	12
WG	CARDIOVASCULAR SYSTEM	38
WH	HEMIC & LYMPHATIC SYSTEMS	40
WI	GASTROINTESTINAL SYSTEM	25
WJ	UROGENITAL SYSTEM	50
WK	ENDOCRINE SYSTEM	30
WL	NERVOUS SYSTEM	21
WM	PSYCHIATRY	22
WN	RADIOLOGY	0
WO	SURGERY	5
WP	GYNECOLOGY	22
WQ	OBSTETRICS	26
WR	DERMATOLOGY	16
WS	PEDIATRICS	21
WT	GERIATRICS; CHRONIC DISEASE	6
WU	DENTISTRY; ORAL SURGERY	13
WV	OTORHINOLARYNGOLOGY	14
WW	OPHTHALMOLOGY	10
WX	HOSPITALS & OTHER HEALTH FACILITIES	3
WY	NURSING	6
WZ	HISTORY OF MEDICINE; WRITING & PUBLISHING; OBITUARIES	0
<b>TOTAL MEDICINE AND RELATED SUBJECTS</b>		<b>574</b>
SF	ANIMAL CULTURE; VETERINARY MEDICINE	6
<b>GRAND TOTAL</b>		<b>727</b>