



Open Access Journals and citation patterns

International Seminar on Open Access for Developing Countries

Panel 3: Visibility, accessibility, quality, and impact of journals

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Overview

- What is “Open Access”?
OA Definition from the Budapest Principles

“Free availability on the public Internet, permitting end users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the Internet itself.”

- OA can be archival repositories, Web documents, online dissertations or reports, preprints as well as journals.
- Continuum includes: PLoS Biology, SciELO (Brazil), J-Stage (Japan), SPARC, NIH-PubMed Central, an author web site
- Today’s discussion centers on Open Access journals, indexed by Thomson (ISI)

What can citation analysis tell us about the visibility, accessibility, quality, and impact of OA journals?

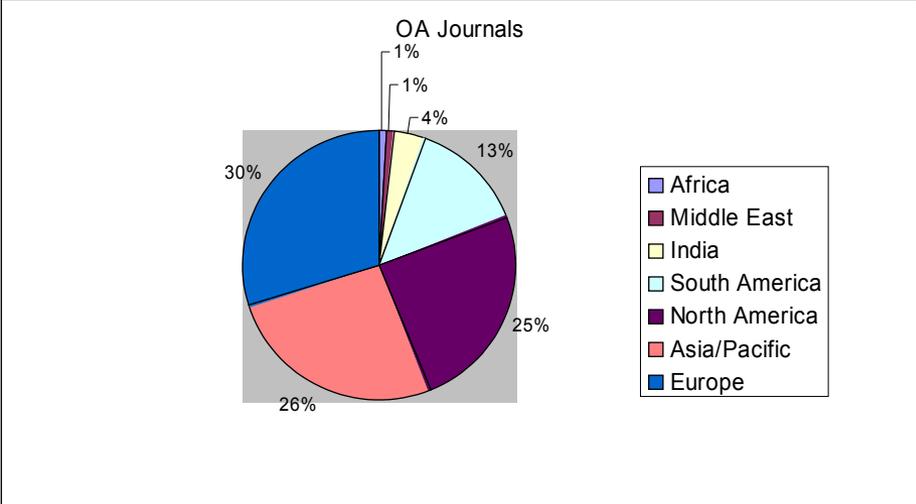
- Are OA journals growing in acceptance by the research community, i.e. are OA journals being cited?
- Are OA journals citing other OA publications?
- What is the impact of OA journals?

Methodology

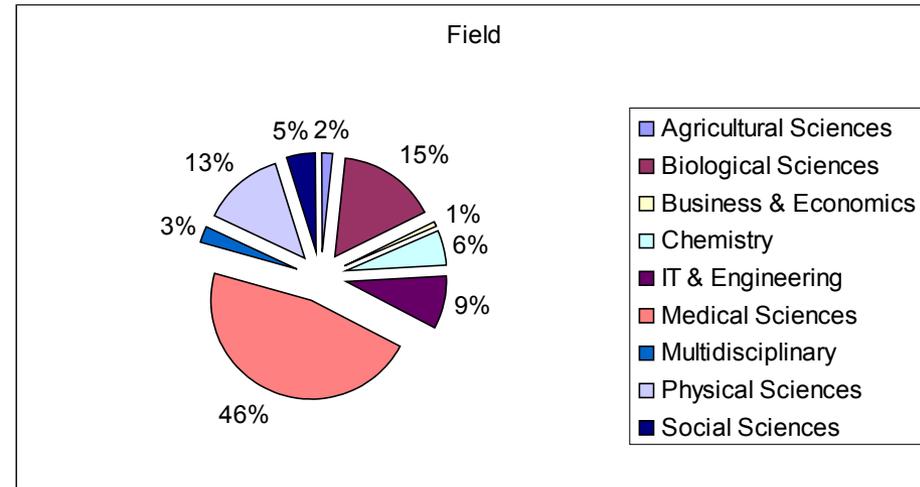
- Examine distribution across regions and fields.
- Consider the field impact
- Sampled selected journals with 5 years of coverage and citation data from the 270 OA journals covered in *Web of Science*
 - Journal summary
 - Citing summary by journal
 - Cited summary by journal

The OA journal landscape

- OA journals are a small percentage of journal but growing in presence
- Regional distribution of OA journal publication
 - 34 countries with OA publications



- Field distribution of OA publications
 - Dominated by Medical Sciences
 - Specific fields pushing forward in OA:
 - Medical (general & internal)
 - Biochemistry & Molecular Biology
 - Mathematics
 - Chemistry
 - Veterinary Medicine



Field Impact and OA Journals

	Field Description	# of OA journals in the field	Field Impact within the OA set (C/P)	Total Impact for the Field (traditional & OA)	OA impact relative to field impact (Field Imp of OA set/Total Field Impact)
1	Oncology	1	90.515625	7.18	12.606633
2	Comp Sci, Hardware & Arch	1	5.0746888	1.37	3.70415241
3	Comp Sci, Theory & Methods	1	2.65289256	0.87	3.0493018
4	Env Scis	2	6.90826211	2.94	2.34974902
5	Med, Res & Experimental	7	12.1990358	6.68	1.82620297
6	Law	1	3.27272727	1.83	1.78837556
7	Comp Sci, Software Eng	2	1.96352584	1.24	1.58348858
8	Comp Sci, A.I.	1	2.31654676	1.52	1.52404392
9	Mathematics	9	1.36517467	0.93	1.46792976
10	Telecommunications	1	1.43269231	1.05	1.36446886
11	Public, Env & Occ Hlth	6	4.57857143	3.39	1.35061104
12	Comp Sci, Information Sys	2	1.96352584	1.61	1.21958126
13	Ophthalmology	1	3.95930233	3.4	1.16450068
14	Rehabilitation	1	2.14285714	1.88	1.13981763
15	Demography	1	1.91	1.75	1.09142857
16	Water Resources	2	1.89354839	1.87	1.01259272
17	Family Studies	1	1.91	1.98	0.96464646
18	Infectious Diseases	3	5.46305419	5.75	0.95009638
19	Optics	2	2.43556444	2.61	0.93316645
20	Food Sci & Tech	2	2.12964642	2.29	0.9299766
21	Geoscis, Multidisc	1	2.68456376	2.92	0.91937115
22	Mat Sci, Ceramics	2	1.37355812	1.5	0.91570541
23	Instruments & Instrumentatio	1	1.58796296	1.75	0.90740741
24	Eng, Electrical & Electronic	1	1.43269231	1.6	0.89543269
25	Forestry	1	1.8960396	2.25	0.84268427

Field Impact and OA Journals

	Field Description	# of OA journals in the field	Sum of Cites to OA jrnls (C)	Sum of Papers for OA jrnls (P)	Field Impact within the OA set (C/P)	Total Impact for the Field (traditional & OA)	OA impact relative to field impact (Field Imp of OA set/Total Field Impact)
5	Med, Res & Experimental	7	53139	4356	12.1990358	6.68	1.82620297
9	Mathematics	9	2501	1832	1.36517467	0.93	1.46792976
11	Public, Env & Occ Hlth	6	16666	3640	4.57857143	3.39	1.35061104

- A closer sort of those fields with 3+ OA journals show that the OA journals that are performing better than the combined field of traditional and OA in three fields:
 - Medical fields
 - Mathematics
 - Public, Environmental and Occupational Health

Field Impact and OA Journals

Journal Title	Region	Citations	Sources	Journal 5 yr impact	Field 5 yr impact	Relative impact of OA journal to field impact
Annals of Mathematics	North Amer	964	230	4.19	0.93	4.505
Bulletin of the American Mathematical Society	North Amer	206	56	3.68	0.93	3.957
Electronic Research Announcements of the American Mathematical Society	North Amer	75	60	1.25	0.93	1.344
Nagoya Mathematical Journal	Asia	187	180	1.04	0.93	1.118
Pacific Journal of Mathematics	North Amer	584	590	0.99	0.93	1.065
Journal of Lie Theory	Europe	157	195	0.81	0.93	0.871
TAIWANESE JOURNAL OF MATHEMATICS	Asia	164	222	0.74	0.93	0.796
ANNALES ACADEMIAE SCIENTIARUM FENNICAE-MATHEMATICA	Europe	85	132	0.64	0.93	0.688
PROCEEDINGS OF THE INDIAN ACADEMY OF SCIENCES-MATHEMATICAL SCIENCES	India	79	167	0.47	0.93	0.505

- Review of the Mathematics journals shows:
 - Country distribution: 4 in North America, 2 in Europe, 2 in Asia, 1 in India
 - 5 of the 9 journals perform 6% or better than the total impact for the field
- Questions:
 - Are OA math journals being cited more quickly than traditional math journals?
 - Math papers typically cited older references – is this changing due to increased visibility of OA math journals?

Citation Analysis of Selected OA Journals

- Selected 6 journals:
 - Annals of Agricultural and Environmental Medicine
 - Journal of Occupational Health
 - Salud Publica de Mexico
 - Revista de Saude Publica
 - Leprosy Review
 - Memorias do Instituto Oswaldo Cruz
- Examine the citation summaries as well as the sample set metrics
 - Citing summary by journal
 - Cited summary by journal – are OA using other OA journals?

Citation Analysis of OA Journals, 2000-2004

- Distribution of papers and cites within the sample set

	Cites	Journal	Papers	Average Cites/Paper
	1366	MEM I OSWALDO CRUZ	1064	1.28
	483	LEPROSY REV	450	1.07
	309	ANN AGR ENV MED	206	1.5
	301	REV SAUDE PUBL	607	0.5
	223	SALUD PUBLICA MEXICO	559	0.4
	219	J OCCUP HEALTH	335	0.65
Total	2901		3221	

Citation Analysis of OA Journals, 2000-2004

- Most cited articles from the sample set

	Cites	Expected	Ratio	Field	%	Author	Journal	Vol	Pages	Year	Doc Type	Title
1	42	15	2.8	MGN	4.319	Coura, JR	MEM I OSWALDO CRUZ	97	3-24	2002	R	A critical review on Chagas disease chemotherapy
2	20	2.18	9.17	MGN	15.54	Araujo, CAC	MEM I OSWALDO CRUZ	96	723-728	2001		Biological activities of Curcuma longa L.
3	18	15	1.2	MGN	11.38	Dias, JCP	MEM I OSWALDO CRUZ	97	603-612	2002	R	The impact of Chagas disease control in Latin America - A review
4	17	1.54	11.04		N/A	Sakaue, M	J OCCUP HEALTH	43	185-190	2001		Bisphenol-A affects spermatogenesis in the adult rat even at a low dose
5	16	4.43	3.61	DER	10.32	Girdhar, BK	LEPROSY REV	71	144-153	2000		Relapses in multibacillary leprosy patients: effect of length of therapy
6	16	4.43	3.61	DER	10.32	Saunderson, P	LEPROSY REV	71	285-308	2000		The pattern of leprosy-related neuropathy in the AMFES patients in Ethiopia: definitions, incidence, risk factors and outcome
7	16	2.33	6.87	MGN	24.62	Vidigal, THDA	MEM I OSWALDO CRUZ	95	57-66	2000		Further studies on the molecular systematics of Biomphalaria snails from Brazil
8	15	6	2.5	MGN	26	Evans, DE	MEM I OSWALDO CRUZ	95	453-470	2000	R	A review of the ticks (Acari, ixodida) of Brazil, their hosts and geographic distribution - 1. The state of Rio Grande do Sul, Southern Brazil
9	15	3.12	4.81	ENV	3.059	Radon, K	ANN AGR ENV MED	9	41-48	2002		Air contaminants in different European farming environments
10	14	4.43	3.16	DER	13.04	Croft, RP	LEPROSY REV	71	18-33	2000		Incidence rates of acute nerve function impairment in leprosy: a prospective cohort analysis after 24 months (The Bangladesh Acute Nerve Damage Study)

Citation Analysis of OA Journals, 2000-2004

- Cited Reference Summary by Country, sorted by Total Cites
- Our sample set used journals published in these countries

CITED SUMMARY by COUNTRY

File Sort Options View Options Collection

What You See:
Countries, publishing 1 or more papers, that have been cited 1 or more times by papers in this database, sorted by the number of times cited by

Double-Click:
'Cites' for list of citing papers.
'Papers' for list of source papers.

Cites	Country	Papers	Avg.
15434	USA	12994	1.19
4460	ENGLAND	3406	1.31
4436	BRAZIL	2820	1.57
2308	FRANCE	1713	1.35
1493	JAPAN	1280	1.17
1456	CANADA	1225	1.19
1421	NETHERLANDS	1043	1.36
1299	GERMANY	1103	1.18
1144	SWEDEN	969	1.18
1106	MEXICO	779	1.42
974	AUSTRALIA	841	1.16
906	ITALY	799	1.13
902	SWITZERLAND	732	1.23
780	SPAIN	623	1.25
768	INDIA	590	1.30
651	SCOTLAND	509	1.28
638	ARGENTINA	470	1.36
602	DENMARK	483	1.25
592	FINLAND	503	1.18
560	BELGIUM	478	1.17
438	POLAND	204	2.15
352	COLOMBIA	233	1.51
338	VENEZUELA	227	1.49
324	ISRAEL	265	1.22
307	NORWAY	260	1.18
249	PEOPLES R CHINA	217	1.15
234	SOUTH AFRICA	211	1.11

Total Rows: 196

New Analysis...

Citation Analysis of OA Journals, 2000-2004

- **Citing Reference Summary by Country, sorted by Total Cites**
 - Our sample set was cited by authors in these countries
- South America, as a region, is citing OA journals
 - Brazil 641
 - Mexico 155
 - Argentina 76
 - Columbia 40
 - Venezuela 34
 - Chile 22
 - Total 968

CITING SUMMARY by COUNTRY

File Sort Options View Options Collection

What You See:
Countries that have cited articles in this database, in 1 or more papers, sorted by total number of citing papers.

Citing	Citing Country
641	Brazil
433	USA
170	England
155	Mexico
127	France
112	Japan
79	India
76	Argentina
73	Germany
67	Netherlands
67	Poland
61	Spain
45	Switzerland
42	Sweden
41	Canada
40	Colombia
34	Venezuela
32	Australia
32	Peoples R China
28	Scotland
28	Turkey
26	Italy
23	Belgium
22	Chile
20	Denmark
17	Thailand
15	Taiwan

Total Rows: 110

New Analysis...

Citation Analysis of OA Journals, 2000-2004

- **Cited Reference Summary by Journal Country, sorted by Total Cites**
 - Our sample set used these journals in their papers
- This is a combination of OA and traditional journals. Notice that the OA sample set authors use a wide variety of reference sources.

CITED SUMMARY by JOURNAL

File Sort Options View Options Collection

What You See:
Journals, publishing 1 or more papers, that have been cited 1 or more times by papers in this database, sorted by the number of times cited by

Double-Click:
'Cites' for list of citing papers.
'Journal' for full name.
'Papers' for list of source papers.

Cites	Journal	Papers	Avg.
1349	MEM I OSWALDO CRUZ	773	1.75
839	AM J TROP MED HYG	578	1.45
822	LEPROSY REV	371	2.22
804	J CLIN MICROBIOL	664	1.21
665	LANCET	530	1.25
583	REV SAUDE PUBL	344	1.69
572	INT J LEPROSY	311	1.84
536	J INFECT DIS	436	1.23
498	NEW ENGL J MED	395	1.26
496	T ROY SOC TROP MED H	372	1.33
436	J MED ENTOMOL	291	1.50
401	INFECT IMMUN	354	1.13
386	JAMA-J AM MED ASSOC	318	1.21
380	J IMMUNOL	326	1.17
374	J PARASITOL	284	1.32
364	P NATL ACAD SCI USA	288	1.26
361	SCIENCE	292	1.24
332	BRIT MED J	277	1.20
325	MOL BIOCHEM PARASIT	228	1.43
320	AM J IND MED	219	1.46
316	AM J EPIDEMIOLOG	273	1.16
305	NATURE	227	1.34
297	SALUD PUBLICA MEXICO	212	1.40
275	PARASITOLOGY	204	1.35
254	EXP PARASITOL	184	1.38
251	PARASITOL TODAY	183	1.37
242	B WORLD HEALTH ORGAN	182	1.33

Total Rows: 2772

New Analysis...

Citation Analysis of OA Journals, 2000-2004

- **Citing Reference Summary by Journal Country, sorted by Total Cites**
 - Our sample set was referenced by articles in these journals.
- This is a combination of OA and traditional journals.
- Next question: what are the cited and citing patterns within the OA groups?

CITING SUMMARY by JOURNAL

File Sort Options View Options Collection

What You See:

Journals that have cited articles in this database, in 1 or more papers, sorted by total number of citing papers.

Citing	Citing Journal
233	MEM I OSWALDO CRUZ
92	REV SAUDE PUBL
89	LEPROSY REV
66	ANN AGR ENV MED
66	SALUD PUBLICA MEXICO
59	J OCCUP HEALTH
42	J MED ENTOMOL
33	AM J TROP MED HYG
29	J CLIN MICROBIOL
29	PARASITOL RES
25	INT J LEPROSY
24	ACTA TROP
24	PARASITOLOGY
16	J PARASITOL
16	TRENDS PARASITOL
15	ENVIRON HEALTH PERSP
15	J BIOL CHEM
14	ANN TROP MED PARASIT
14	ANTIMICROB AGENTS CH
13	TROP MED INT HEALTH
12	BRAZ J MED BIOL RES
12	INT J PARASITOL
12	T ROY SOC TROP MED H
11	EXP PARASITOL
11	IND HEALTH
11	VET PARASITOL
10	AM J IND MED

Total Rows: 652

New Analysis...

Citation Analysis of OA Journals, 2000-2004

- **Do OA journals use other OA journals as cited references?**
- Our sample of 6 OA journals used 91 OA journals as cited references or about 1/3 of the OA group of journals
- Ex: OA journal Environmental Health Perspectives was cited 182 times by 1 or some of the 6 in the OA sample.
- Just over 2900 papers from OA journals, in the period, 2000-2004, cited OA journals
- These are the top 20 OA journals that the 6 sample OA journals cited. (The 6 sample journals were excluded from the list.)

Cited references to OA journals from a select OA journal	OA journal name
182	ENVIRONMENTAL HEALTH PERSPECTIVES
182	BULLETIN OF THE WORLD HEALTH ORGANIZATION
83	EMERGING INFECTIOUS DISEASES
80	JOURNAL OF CLINICAL INVESTIGATION
61	BRAZILIAN JOURNAL OF MEDICAL AND BIOLOGICAL RESEARCH
48	NUCLEIC ACIDS RESEARCH
40	CANADIAN MEDICAL ASSOCIATION JOURNAL
32	REVISTA DE INVESTIGACION CLINICA
31	MEDICAL JOURNAL OF AUSTRALIA
19	REVISTA MEDICA DE CHILE
19	INDIAN JOURNAL OF MEDICAL RESEARCH
15	ARCHIVOS LATINOAMERICANOS DE NUTRICION
13	MICROBIOLOGY AND IMMUNOLOGY
12	REVISTA DE BIOLOGIA TROPICAL
11	CHEMICAL & PHARMACEUTICAL BULLETIN
11	INTERNATIONAL FAMILY PLANNING PERSPECTIVES
10	VETERINARNI MEDICINA
9	JOURNAL OF INVESTIGATIONAL ALLERGOLOGY AND CLINICAL IMMUNOLOGY
7	ACTA PROTOZOOLOGICA
7	ARQUIVOS DE NEURO-PSIQUIATRIA

Citation Analysis of OA Journals, 2000-2004

- What OA journals are citing the sample set of 6 OA journals?
- Our sample of 6 OA journals were cited by 51 OA journals in 5 years.
- 713 papers cited our sample of 6 OA journals
- These are the top 25 journals that cited our sample set of 6 journal. (The 6 sample journals were excluded from the list.)
- This could require more time to evaluate, depending on a field's citation life cycle.

Title	Count of Citing Refs
Environmental Health Perspectives	15
Brazilian Journal of Medical and Biological Research	12
Emerging Infectious Diseases	10
Bulletin of the World Health Organization	8
Arquivos de Neuro-Psiquiatria	4
BMC Public Health	3
Current Science	3
Genetics and Molecular Biology	3
Journal of the Brazilian Chemical Society	3
PLoS Biology	3
REVISTA MEDICA DE CHILE	3
Acta veterinaria brno	2
Biological & Pharmaceutical Bulletin	2
Croatian Medical Journal	2
Indian Journal of Medical Research	2
REVISTA DE BIOLOGIA TROPICAL	2
REVISTA DE INVESTIGACION CLINICA	2
Acta Protozoologica	1
ANAIS DA ACADEMIA BRASILEIRA DE CIENCIAS	1
Annals of Saudi Medicine	1
Applied Entomology and Zoology	1
Archivos de Medicina Veterinaria	1
ARCHIVOS LATINOAMERICANOS DE NUTRICION	1
ARKIVOC	1
ARQUIVO BRASILEIRO DE MEDICINA VETERINARIA E ZOOTECNIA	1

Citation Analysis of OA Journals, 2000-2004

- What journals in general are citing the sample set of 6 OA journals?
- Our sample of 6 OA journals were cited by 2114 papers in 652 journals.
- These are the top 25 journals that cited our sample set of 6 journal. (The 6 sample journals were excluded from the list.)
- Areas are citing OA journals
 - Tropical Medicine
 - Infectious Diseases
 - Public, Environmental & Occupational Health

Journal citing OA journals	Papers
JOURNAL OF MEDICAL ENTOMOLOGY	42
AMERICAN JOURNAL OF TROPICAL MEDICINE AND HYGIENE	33
PARASITOLOGY RESEARCH	29
JOURNAL OF CLINICAL MICROBIOLOGY	29
INTERNATIONAL JOURNAL OF LEPROSY AND OTHER MYCOBACTERIAL DISEASES	25
PARASITOLOGY	24
ACTA TROPICA	24
TRENDS IN PARASITOLOGY	16
JOURNAL OF PARASITOLOGY	16
ENVIRONMENTAL HEALTH PERSPECTIVES	15
JOURNAL OF BIOLOGICAL CHEMISTRY	15
ANNALS OF TROPICAL MEDICINE AND PARASITOLOGY	14
ANTIMICROBIAL AGENTS AND CHEMOTHERAPY	14
TROPICAL MEDICINE & INTERNATIONAL HEALTH	13
INTERNATIONAL JOURNAL FOR PARASITOLOGY	12
BRAZILIAN JOURNAL OF MEDICAL AND BIOLOGICAL RESEARCH	12
TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE	12
VETERINARY PARASITOLOGY	11
INDUSTRIAL HEALTH	11
EXPERIMENTAL PARASITOLOGY	11
AMERICAN JOURNAL OF INDUSTRIAL MEDICINE	10
EMERGING INFECTIOUS DISEASES	10
JOURNAL OF INFECTIOUS DISEASES	10
ARCHIVES OF MEDICAL RESEARCH	9
INFECTION AND IMMUNITY	9

Observations

- OA is global in visibility, accessibility and impact and continues to grow.
- OA journals act as cited and citing references within the OA world
- Some fields are taking a lead in using OA – Medicine and Math examples
- There could be changes in citation life cycles with references to more recent rather than older material (Math)
- More time will reveal stronger trends for OA usage

Conclusions

- OA is a burgeoning area which provides a new gateway of communication in the scientific community.
- As with many advancements, it is not always the expected results that create the most interest, but the unexpected results that lead to new paths of inquiry.
- We will continue to watch closely as the impact and influence of OA reveals itself in further citation analysis studies.