CORRESPONDENCE

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Geography of biomedical publications

Sir—The analysis of publications in the Arab world by Ghazi Omar Tadmouri and Nisrine Bissar-Tadmouri (Nov 22, p 1766)[1] is a welcome undertaking, but there are conceptual and methodological limitations that affect its validity and conclusions.

Conceptually, the aim of the research is not clear: is it geographical mapping of publication activities, validation of methods for assessment of publication output, assessment of the appropriateness of such methods for developing countries, or linking of conflict with publication output?

Methodologically, Tadmouri and Bissar-Tadmouri omit important factors that can affect both numerator and denominator and, consequently, the validity of the findings. Regarding numerator factors, and contrary to others,[2,3] Tadmouri and Bissar-Tadmouri do not provide adequate information about the search strategy used. For example, was the publication's source country determined by the setting in which the research was undertaken or by the country of the first or corresponding author's affiliation? If the former strategy was used, publications that address the whole Arab region rather than a single country might be missed. If the latter was used, publications by first authors from non-Arab countries who are nevertheless working collaboratively with local colleagues could be missed.[3] Other numerator variables that should have been taken into account include: language of publication, search index used, publication format (eg, non-MEDLINE-indexed formats such as correspondence, opinion, research in progress, case studies, books), hand searching, and publication bias.

Tadmouri and Bissar-Tadmouri focus on the quantity of publications rather than quality. Consideration of quality would have modified the search strategy from one of "search and count" to a more critical review of publications according to preset criteria. Preliminary work suggests that application of quality perspectives could affect country rank (unpublished data).

The authors have also missed several potentially important denominator-related factors. They use a budgetary indicator (gross domestic product [GDP]) and a demographic indicator (100 000 population/year) as denominators. They acknowledge that GDP can be "misleading" but do not discuss other budgetary, demographic, socioeconomic, human, and material resources or health-status indicators. These might include total or national expenditures on health; population growth rate; adult literacy; proportion of physicians, nurses, and midwives per population; total life expectancy at birth; proportion of population with access to local health services; and number of biomedical universities or higher education institutions. Choice of indicators can affect the countries' publication ranks.

Although Tadmouri and Bissar-Tadmouri's conclusions linking publication output with conflict in the Arab region are speculative, they are intuitively logical and probably true. Conflicts have far-reaching effects on health, health services, and health research. However, conflicts cannot be blamed for all woes and there is need to explore all causes, both local and global. Other important factors include research capacity, access to information, degree of institutional and academic development, pressure on academics to provide public services rather than publish research, regional institutional differences in the ways professional merit is recognised and career advancement achieved, strength of research and publication culture, and brain drain. In the Arab region, many measures can be readily taken to support research using existing regional resources. For example, a prestigious award would be better spent to support local researchers than to honour international researchers with ready access to honour platforms.[4]

Globally, the gap in publication output between industrialised and non-industrialised countries reflects maldistribution of research resources. The so-called 10/90 gap, in which 90% of global research resources go to only 10% of world population, is now recognised as a major impediment to progress.[5] Correcting this gap should be the focus of our collective global efforts.

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1 Tadmouri G, Bissar-Tadmouri N. Biomedical publications in an unstable region: the Arab world, 1988–2002. *Lancet* 2003; **362:** 1766.
2 Tompkins RK, Ko CY, Donovan AJ. Internationalization of general surgical journals: origin and content of articles published in North America and Great Britain from 1983 to 1998. *Arch Surg* 2001; **136:** 1345–512.
3 Hefler L, Tempfer C, Kainz C. Geography of biomedical publications in the European Union, 1990–98. *Lancet* 1999; **353:** 1856.
4 King Faisal International Prize. http://www.kff.com/english/kfip/w_archive.html (accessed Dec 7, 2003).
5 Global Forum for Health Research. The 10/90 Report on Health Research 2001-2002.Geneva: Global Forum for Health Research, 2002. http://www.globalforumhealth.org/pages/index.asp (accessed Jan 14, 2004).

Authors' reply

Sir—In our letter, we aimed to investigate the geographical distribution of biomedical publication rates in the Arab world and to compare our data with those of other regions.[1] We used the same method as Hefler and colleagues[1] to collect "made in Arabia" citations according to the first author's affiliation. Furthermore, we implemented sensitive search queries to include non-English citations and to eliminate those with false-positive affiliations.[2] Owing to PubMed limitations, correspondence letters and collaborative research papers with no leading Arabic contribution were not retrieved. Nevertheless, inclusion of data from the latter type of paper would impede the comparison of our results with those of other groups, and would introduce dispute about the extent of Arab contributions in every publication.

We compared the ability of the Science Citation Index (SCI) and PubMed to retrieve "made in Arabia" biomedical citations for the years 1993–2003. Interestingly, only 72% of the Lebanese biomedical citations retrieved from PubMed are indexed in

SCI.[2,3] PubMed has a broader coverage since it indexes locally published biomedical journals not catalogued in SCI. Furthermore, by contrast with the costly subscription to SCI, the free availability of PubMed allows equal opportunity for scientists in developed[1] and developing[4] countries to extract rough estimates on research productivity in their regions. The accumulation of these data would allow comparative analyses among regions of the world.

Because of the size limitation of our paper, we could not include qualitative analyses of Arab biomedical publications. However, the numerators suggested by El Ansari and colleagues cannot be standardised or automated, might be subject to bias, and require the efforts of devoted institutions.

In our paper, GDP-normalised data show that several Arab countries efficiently translate their GDPs into publications, as do the most advanced European countries.[1] However, we found that data from countries with limited GDP and PubMed citations (eg, Djibouti, Mauritania, and Comoros) compete with those from Arab countries with well established biomedical research.[4] Such obvious statistical considerations prompted us to be careful in interpreting the results of GDP-normalised data. Data normalised to population size correlate well with the known facts about the developed scientific research in the Arabian Gulf,[4] the Maghreb, Lebanon, and Jordan.[2] The annual publication rates that we presented in our paper confirm the dominance of the successive regional conflicts over the facts cited by El Ansari and colleagues.

Accurate historical data for most of the theoretical denominators that El Ansari and colleagues suggest are not available for all Arab countries.[5] In addition, we believe that proportions of "scientists and engineers in research and design" or of "tertiary biomedical science students" are more significant predictors of socioeconomic status than El Ansari and colleagues's suggestion of adult literacy. Additionally, examination of the proportion of "physicians, nurses, and midwives" would focus on medicine at the expense of other high-impact, rapidly growing biomedical research fields such as biochemistry, biology, and molecular genetics. Data on "number of biomedical universities" could be misleading since these universities might not have equivalent histories and equal numbers of active scientists.

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1 Hefler L, Tempfer C, Kainz C. Geography of biomedical publications in the European Union, 1990–98. *Lancet* 1999; **353:** 1856.
2 Tadmouri GO, Bissar-Tadmouri N. A major pitfall in the search strategy on PubMed. *Saudi Med J* 2004; **25:** 7–10.
3 Thomson ISI. InCites countries: Lebanon. http://www.in-cites.com/countries/lebanon.html (accessed Jan 14, 2004).
4 Tadmouri GO, Tadmouri NB. Biomedical research in the Kingdom of Saudi Arabia (1982-2000). *Saudi Med J* 2002; **23:** 20–24.
5 UNESCO Institute for Statistics. http://www.uis.unesco.org/ev.php?URL_ID=5218&URL_DO=DO_TOPIC&URL_SECTION=201 (accessed Jan 20, 2004).

Sir—Life is certainly not easy for Arab scientists, especially if they want to pursue a scientific career in their home countries. Ghazi Omar Tadmouri and Nisrine Bissar-Tadmouri's Correspondence letter[1] about the dearth of biomedical research in the Arab world compared with its wealth is quite stimulating and points at regional conflicts as an important factor. A previous publication[2] related to this issue identifies other aspects of the problems facing scientists in Arab countries, such as lack of funding, poor institutional support, and poor integration within the international scientific community.

Without wishing to underestimate the importance of all these factors, a major barrier to science in the Arab world lies in the weakness of democratic institutions. Broad-based science can never flourish without an atmosphere of freedom and security, and scientists certainly thrive on the free flow of information and ideas. This problem is not confined to the effect of undemocratic governance on free scientific inquiry and access to information, but also involves social pressure against research dealing with sensitive issues, such as polygamy.[3] The three major taboos in the Arab world: religion, politics, and sex do apply to science and hinder scientific enquiry.

Higher scientific institutions in many Arab countries are mostly governmental, which means that in undemocratic systems, they are more political than scientific in nature. This fact taints many aspects of academic life, rendering qualifications and performance of little consequence in the employment and assessment of staff. Moreover, many Arab higher institutions lack some basic requirements of research, such as institutional review boards, financial units that can deal with external funds, or even the capability to communicate effectively with their counterparts.

No major change will be possible in biomedical research in the Arab world unless free scientific enquiry is protected, and until science, scientific thinking, and the natural history of science are constantly advocated to the public. In the midst of the flurry of solutions to development—earthly and heavenly—that is rampant in the Arab world, science as the only tested means of development must be advocated by governments and non-governmental institutions. Public interest in and demand for science is the best curator of active scientific activity in the Arab world.

Notwithstanding all these circumstances, I am confident that Arab scientists are much like camels: they are a rare breed that can go a long way on very little.

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1 Tadmouri GO, Bissar-Tadmouri N. Biomedical publications in an unstable region: the Arab world, 1988–2002. *Lancet* 2003; **362:** 1766.
2 Masood E. Arab science: blooms in the desert. *Nature* 2002; **416:** 120–22.
3 Maziak W. Fatal child abuse in two children of a family: the alleged role of polygamy. *Ann Saudi Med* 2001; **21:** 356–57.

Peer-assisted learning in clinical examination

Sir—In an attempt to improve students' clinical examination skills, we at Glasgow University Medical School have implemented a peer-assisted learning (PAL) programme. This programme was designed to enable 4th-year and 5th-year medical students (trainers) to practise the principles of small-group tutoring and micro-teaching,[1] and to encourage 1st-year and 2nd-year students (trainees) to improve their clinical examination techniques. PAL programmes have been implemented in theoretical parts of medical courses[2] and students have benefited from better examination results,[3] but PAL has not, to our knowledge, been formally undertaken in the context of clinical examination.

In our programme, the trainers are initially introduced to the key ideas of teaching and learning, and watch videos on how to examine the relevant systems. Subsequently they undertake bedside teaching sessions with a consultant in each specialty. They then set up 3-h clinical skill training sessions for the trainees using PAL techniques. The trainers set the principles behind clinical examination for each system, break the process into sections, and show trainees how to do each part. The trainees are then videoed practising the complete clinical examination. These videos are