Bibliographic analysis of research publications on access to and use of medicines in low-income and middle-income countries in the Eastern Mediterranean Region: identifying the research gaps

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Title

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Short title:

Research publications on access to and use of medicines in the Eastern Mediterranean Region

Authors:

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Keywords:

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Article Summary

Article focus

- To assess the situation of academic publications on access to and use of medicines (ATM) in low- and middle-income countries (LMICs) in the Eastern Mediterranean Region
- To inform priority setting for research in the area of ATM in the region and globally
- To identify the geographical and issue related research gaps that may have not been covered in previous research.

Key messages

- The publications were mainly focused on rational use of medicines and most studies only assessed challenges at the service provider level.
- There is dire need for further research on financing and affordability aspects of ATM in the region.
- The picture of research on the ATM in the region is better than what had been reported in previous recent publications or in comparison with LMICs in other regions.
- There is a growing trend, over the years, of more and better quality studies from the region appearing in international journals.
- Access to medicines needs to be fully integrated with health financing, human resource planning, service delivery, information and governance systems.
- Most publications (77%) in the region originated from the LMICs in the region.
- Over half of all the publications originated from Iran, Pakistan, Jordan and Lebanon.

Strengths and limitations of this study

- This is the first study conducted in this region that has collated ATM related published literature to identify research priorities.
- We conducted systematic searches of the main international databases for identifying ATM papers.
- Although we followed rigorous methods, the search should not be considered exhaustive. Further studies might have been published in locally indexed or non-indexed journals which might not have been captured by our methods.

Abstract

Objectives: We assessed the situation of academic publications on access to and use of medicines (ATM) in low- and middle-income countries (LMICs) of the Eastern Mediterranean Region (EMR). We aimed to inform priority setting for research on ATM in the region

Design: Bibliographic study of published studies

Setting: Low- and middle-income countries in the Eastern Mediterranean Region

Inclusion criteria: Publications on ATM issues originating from or focusing on EMR LMIC countries covering the period 2000-2011. Publications involving multi-national studies were included if at least one eligible country had been included in the study.

Information sources and data extraction: We conducted comprehensive searches of the PubMed, Social Science Citation Index and Science Citation Index. We used the WHO ATM framework for data extraction and synthesis. We analyzed the data according the ATM issues, health system levels, year of publication, and the countries of origin or focus of the studies.

Results: 151 articles met the inclusion criteria. Most articles (77%) originated from LMIC countries in the EMR, suggesting that the majority of evidence on ATM in the region is homegrown. Over 60% of articles were from Iran, Pakistan, Jordan and Lebanon (in order of volume), while we found no studies assessing ATM in Somalia, Djibouti and South Sudan, all low-income countries. Most studies focused on the rational use of medicines, while affordability and financing received limited attention. There was a steady growth over time in the number of ATM publications in the region (r=0.87).

Conclusions: There is a growing trend, over the years, of more studies from the region appearing in international journals. There is a need for further research on financing and affordability aspects of ATM in the region. Cross-border issues and the roles of non-health sectors in access to medicines in the region have not been explored widely.

Introduction

The provision of reliable access to affordable, appropriate and high-quality medicines is a key component of a functioning health system.[1] According to the WHO Framework for Access To and appropriate use of Medicines (ATM), access has been defined as having four parameters: that the available medicines are effective, of consistently good quality, and are used rationally (rational use), that there is no financial obstacle to a patient receiving it (affordability), that the financing mechanisms are sustainable to ensure the access to quality medicines and affordability are ensured over time (sustainable financing), and that the health system provides required infrastructure, knowledge and guidance for proper use of medicines (health system and availability). The Framework stipulates that any isolated efforts on one ATM aspect would not result to adequate and lasting improvement in ATM situation.[2]

Unfortunately, ATM is often poor in low- and middle-income countries (LMICs). WHO estimated that about one third of the world's population had limited access to the medicines they needed. Many factors determine access including, for example, tax and tariff policies, pricing and affordability of medicines, price mark-up policies, cost-sharing and copayment for medicines, and regulations and lack of access to effective financial protection systems (which may result in high copayments). WHO estimates that the average availability of essential drugs in LMICs is 35% in public sector facilities and 66% in the private sector.[3] Quality of pharmaceutical products and rational use of medicines also affects the effectiveness of the medicines and health outcomes.[4] In many LMICs there is limited access to the information that might help clinical decision making on use of medicines [5, 6].

Medicines account for a high proportion of health spending in LMICs, between 20% – 60% (compared to an average of around 18% in high-income countries).[7] Moreover, more than half of the expenditure on medicines in most LMICs is out-of-pocket.[8] This inequitable financing situation, whether due to a lack of effective general revenue financing or social insurance financing or other mechanisms, creates significant access barriers for the poor and may lead to catastrophic household expenditures. The poor and other population groups often rely on the private informal sector for medicines, particularly in rural areas. Over and inappropriate prescription and dispensing of medicines are prevalent.[9]

Despite some progress in some areas - such as price and availability[7] - data on access to and use of medicines is often weak. Even where data are available, there is often limited systematic research that enables the interpretation of the data and using it in identifying priorities and developing policy options to improve access to medicines in LMICs. The application of health systems research tools and methods in the field of access to medicines will help understanding the weaknesses and barriers of access to medicines and generating useful evidence to formulate policies.[10]

This study was part of the ATM Policy Research project, Funded by the WHO Alliance for Health Policy and Systems Research with the ultimate goal of "increasing access to and improve the use of medicines in low and middle income countries, particularly for the poor (MDG 8)".

We aimed to assess the situation of academic publications on ATM in LIMCs in the Eastern Mediterranean Region (EMR), and the distribution of such publications both in terms of geographical coverage and issues of interest. The ultimate objective of the study was to inform priority setting for research in the area of access to medicines in the region and globally.

Methods

Study design

We conducted a bibliographic study of research in the Eastern Mediterranean Region (EMR), involving comprehensive searches of the literature.

The study involved an extensive search of national, regional and international literature in the EMR's LMICs in 2000-2011 and mapping of research to identify the geographical, and research gaps that may have not been covered in previous research.

Literature searches

EMR included sixteen LMICs according to the World Bank categories which comprised the geographical focus of the study. The country-specific searches were conducted both in relation to author affiliations as well as the titles and abstracts of the papers.

A set of specific ATM terms were developed in two brainstorming meetings and used to devise the search strategy. The initial search strategy was tested in a number of limited searches, and was compared against a list of previously known publications. The results of the assessment were used to finalize the search strategy (Table 1). The main terms selected for this study included drugs, medicines, medications and pharmaceuticals and their variations. These were suitably linked with ATM related terms. We conducted comprehensive searches of three major electronic databases (PubMed, Social Science Citation Index and Science Citation Index). Initial searches were conducted in January 2011 and all the searches were updated in June 2011 (Figure 1). Additionally we searched the WHO websites, and contacted a few topic experts for additional publications.

Table 1. Search strategy for regional literature

Pubmed example:

#1- ((((((((((((((((Iran[Affiliation]) OR Pakistan[Affiliation]) OR Lebanon[Affiliation]) OR Egypt[Affiliation]) OR Afghanistan[Affiliation]) OR Sudan[Affiliation]) OR Yemen[Affiliation]) OR Jordan[Affiliation]) OR Tunisia[Affiliation]) OR Morocco[Affiliation]) OR Syria[Affiliation]) OR Palestine[Affiliation]) OR Iraq [Affiliation]) OR Djibouti[Affiliation]) OR Libya$[Affiliation]) OR Somalia[Affiliation])

#2- ((((((((((((((((((middle east[Title/Abstract]) OR Iran[Title/Abstract]) OR low income countries[Title/Abstract]) OR middle income countries[Title/Abstract]) OR Pakistan[Title/Abstract]) OR Lebanon[Title/Abstract]) OR Egypt[Title/Abstract]) OR Afghanistan[Title/Abstract]) OR Sudan[Title/Abstract]) OR Yemen[Title/Abstract]) OR Jordan[Title/Abstract]) OR Tunisia[Title/Abstract]) OR Morocco[Title/Abstract]) OR EMRO[Title/Abstract]) OR Syria[Title/Abstract]) OR Palestine[Title/Abstract]) OR eastern Mediterranean[Title/Abstract]) OR Iraq [Title/Abstract]) OR Djibouti[Title/Abstract]) OR Libya$[Title/Abstract]) OR Somalia[Title/Abstract])

#3- (#1) OR (#2)

#4- ((((drug$[Title/Abstract]) OR medicines[Title/Abstract]) OR medication$[Title/Abstract]) OR pharmac$[Title/Abstract])

#5- ((((((((((((((((((use[Title/Abstract]) OR access[Title/Abstract]) OR available[Title/Abstract]) OR availability[Title/Abstract]) OR affordable[Title/Abstract]) OR affordability[Title/Abstract]) OR utilisation[Title/Abstract]) OR utilization[Title/Abstract]) OR essential [Title/Abstract]) OR counterfeit$[Title/Abstract]) OR price[Title/Abstract]) OR pricing[Title/Abstract]) OR licensing[Title/Abstract]) OR licencing[Title/Abstract]) OR labeling[Title/Abstract]) OR labelling[Title/Abstract]) OR formularies[Title/Abstract]) OR generic[Title/Abstract])

#6- (((((((prescription$ [Title/Abstract]) OR prescrib$ [Title/Abstract]) OR "drug policy"[Title/Abstract]) OR "pharmaceutical policy"[Title/Abstract]) OR formulary[Title/Abstract]) OR pharmacy[Title/Abstract]) OR pharmacies[Title/Abstract]) OR pharmacist$[Title/Abstract])

#7- (#3) AND (#6)

#8- (#3) AND (#4) AND (#5)

#9- (#7) OR (#8)

Inclusion process and criteria

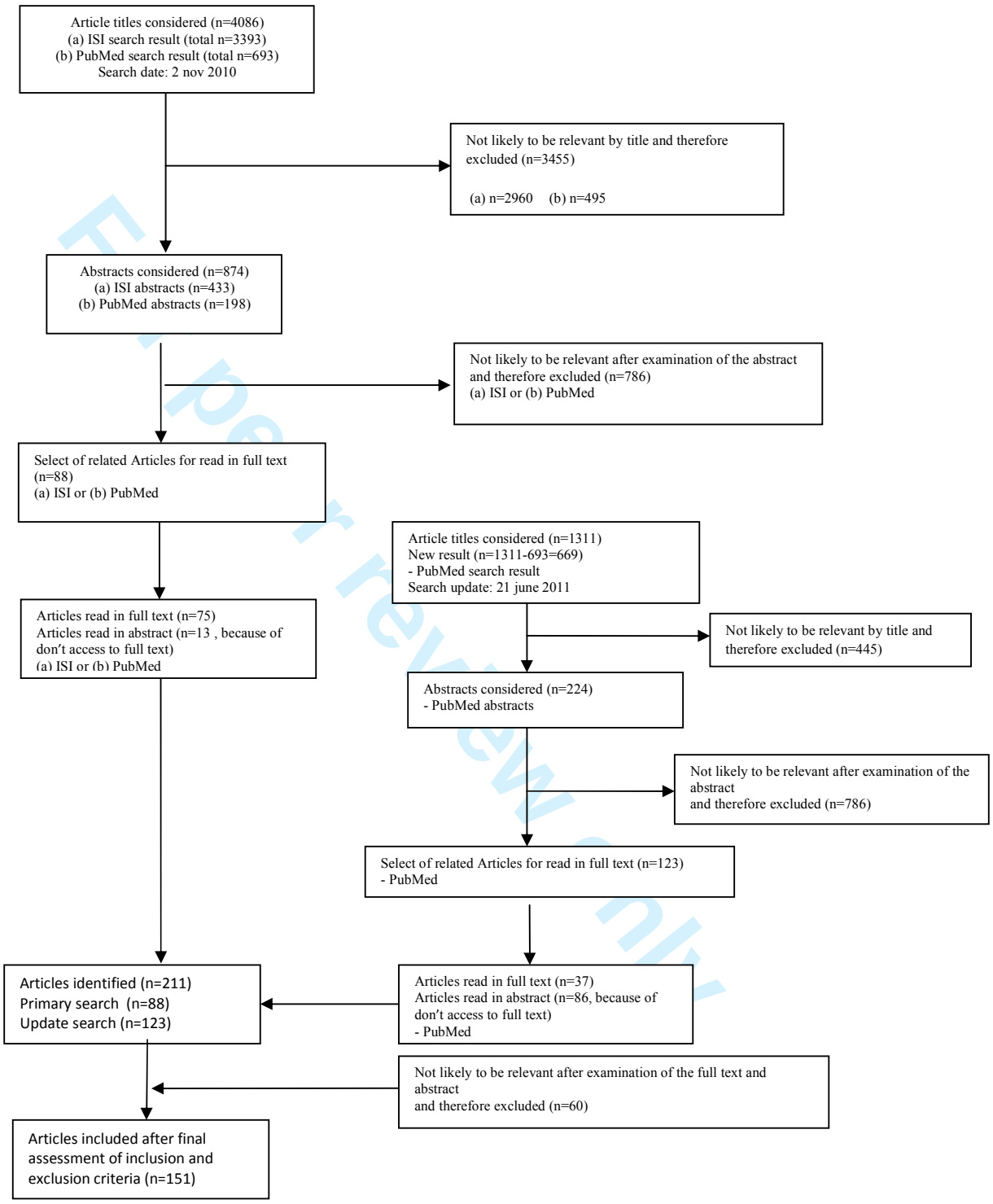
Papers published from 2000 onward were considered. To ensure accuracy, two separate samples of 100 titles were reviewed by two researchers and disagreements were discussed and clarified. All the remaining titles and the abstracts of the identified papers via the search were initially reviewed by one author. After the initial screenings, the abstracts (and subsequently the full text papers) were read by two authors.

We used the following criteria for the inclusion and exclusion of the papers:

- No research design limit was used. However, letter to the editors and abstract-only publications were excluded.

- Studies that were directly relevant to ATM issues were included. For example, for Rational Use of Medicine (RUM) studies, we considered studies that assessed RUM in a certain setting, or the studies that sought to improve use of medicines specifically. However, broader studies of improving quality of clinical care (which might have involved prescribing issues) were not included. (e.g. a clinical practice guideline development project may not be included). Although prescribing is a part of the majority of the guidelines, if the purpose of the guideline is not prescribing per se; then the paper may not be included in here. This criterion was required to ensure that we remained focused on ATM issues. The same logic was applied to other aspects of the ATM.
- Studies of drug resistance that did not elaborate on health system or ATM implications , studies of herbal medicines alone, studies of drug abuse, studies of use of contraceptive medicines that focused on family planning issues only, and studies focusing only on education methods and curriculum development for pharmacy courses were not included.

Figure 1: Flow chart of search strategies in electronic databases for ATM



Data extraction and analysis

After agreeing on the inclusion of a study, the full texts of the studies were retrieved. We developed a data extraction tool based on the study conceptual framework. We extracted data on title, authors, year of publication, the corresponding author's country of origin, countries of focus, research design and sample, a summary of main findings, ATM issues considered in the study, 'levels' of barrier studied, and the research topics recommended by the authors. If a publication discussed more than one ATM issue, we noted as many issues as applied to that publication.

We categorized the 'levels' of the health system barriers to ATM as: 'household and community', 'health service providers', 'health sector as a whole', 'other related sectors', and 'cross border issues'.[11, 12] We defined ATM issues based on the WHO Framework for ATM which included four aspects: affordability, sustainability of financing, rational use, and health systems and availability of medicines.[13]

One author extracted data from all the included studies, and another author assessed all the data extractions for accuracy and completeness. Then we used descriptive methods and presentational graphs and diagrams pertaining to the study questions, and used Pearson r estimates to assess the publication trends over time.

Results

In total 4755 titles were retrieved as a result of the searches and were reviewed (Figure 1). In total, 151 articles were identified (Figure 1) that focused entirely or partially on ATM issues in one or more of EMR's LMICs.

As the search strategy was sensitive to identify studies that were conducted in LMICs, we also identified additional twelve international studies that had important implications about ATM in LMICs of the region.[1, 14-24] Among these twelve studies, eight had been published in 2011 alone. We used these studies to discuss and highlight some of the identified issues but did not include them in the analyses.

Six papers were published in languages other than English: French (two each from Tunisia and Morocco and one from Lebanon) and Czech (on Yemen).

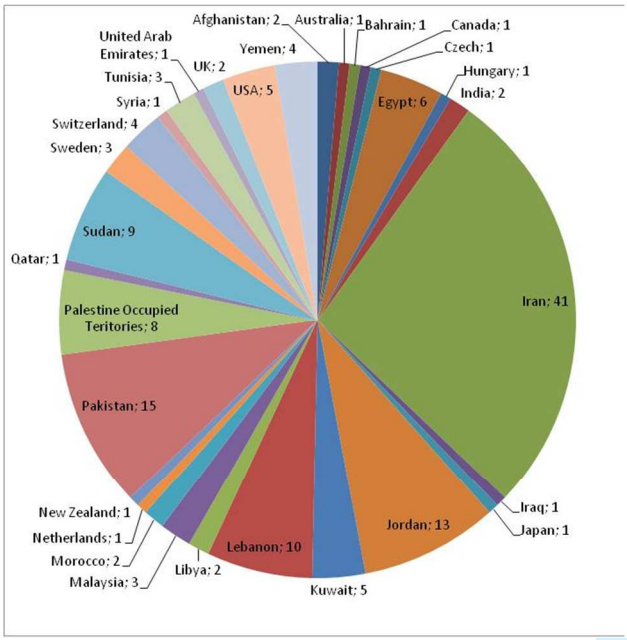
Countries of origins of the studies

Most of these articles (117 articles, 77%) originated (based on the corresponding author's address) from the LMICs in EMR, while 8 (5%) originate from high-income countries of the region and 26 (17%) from other countries (Figure 2a). There was a wide variation in the number of publications per country (Figure 2a). The countries that produced at least ten articles in the journals indexed in international databases were Iran (41, 27%), Pakistan (15, 10%), Jordan (13, 9%) and Lebanon (10, 7%). These were followed by Sudan (9), Palestine Occupied Territories (8), Egypt (6), USA (5) and Kuwait (5).

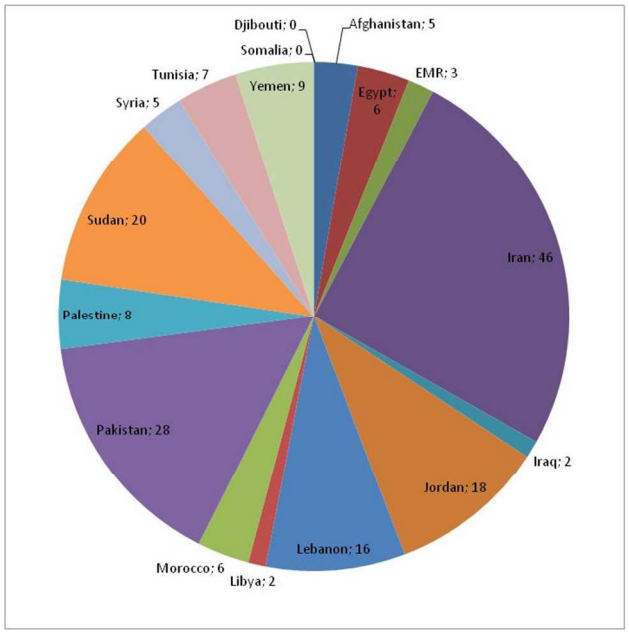
We found several comparative international studies that used data from EMR or discussed issues relevant to EMR countries. In total 17% of the identified literature originated from countries outside the EMR. 11 (out of 26) of these studies were multi-country studies that included one or more EMR countries alongside others.

Figure 2. Distribution of the country of origin (a), and the country of focus* (b) for publications on ATM issues in the EMR's low-income and middle-income countries.

a



b



* The total number of publications adds up to more than 151, because some publications discuss more than one country each.

Countries of focus of the studies

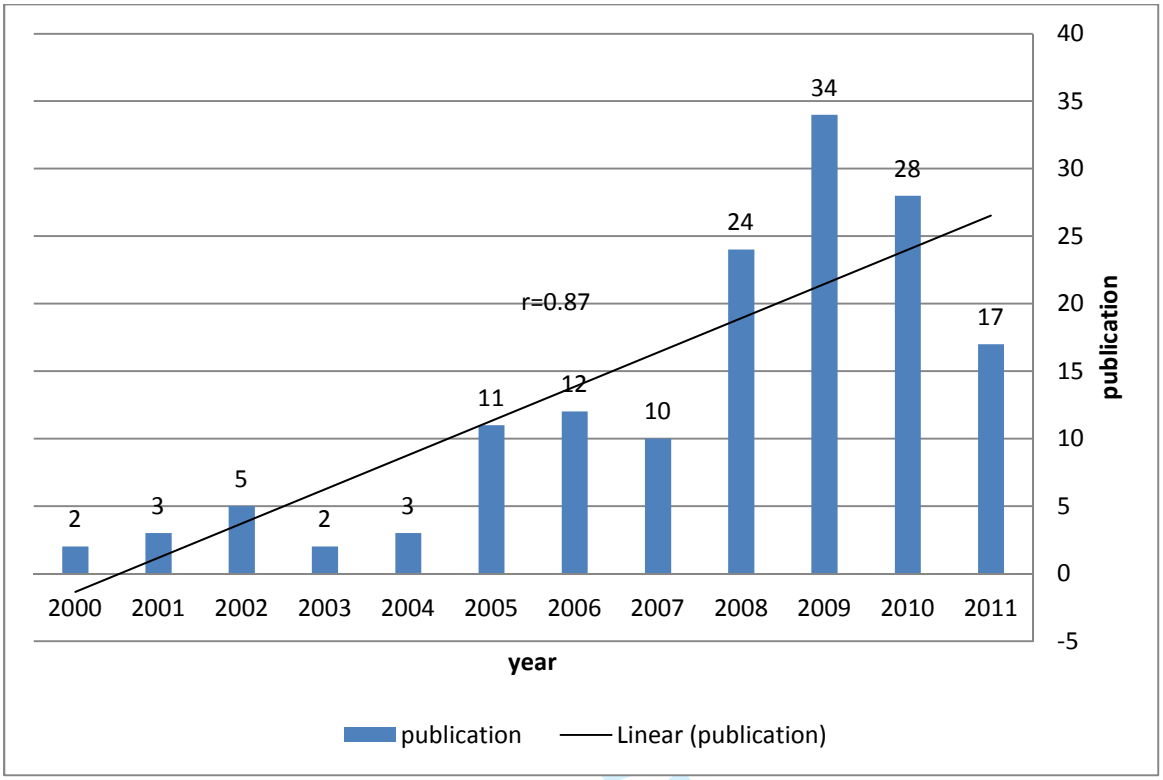
In total, fourteen EMR LMICs have been the focus of at least one ATM research article in the past decade. The countries that were the focus of at least 10 articles were Iran (46, 30%), Pakistan (28, 19%), Sudan (20, 13%), Jordan (18, 12%) and Lebanon (16, 11%).

Two countries (Iraq, Libya) were discussed in only two papers each (Figure 2b). We found no studies on Somalia and Djibouti. There were also no studies of South Sudan, i.e. none of the publications discussing Sudan had specific attention or data from South Sudan, which is now an independent country.

Growth in ATM publications

We observed a relatively steady growth in the number of publications per year on ATM in the EMR within the last decade (Pearson r=0.87; see Figure 3). While in the first three years of this period there were only about ten publications from the region, 80 studies had been published in the last three years of the study period. We also observed a modest increase in the proportion of studies originated from outside EMR during 2006-2010 period (20%) compared with the 2000-2004 period (13%).

Figure 3. The increasing number of ATM publications per year n EMR. (note: 2011 publications cover only the first half of this year.)



ATM issues of focus

To understand the ATM issues on which the published article focused we assigned each article to one or more of the four large components in the WHO ATM framework. We noted the ATM issues of focus for the articles: affordability (25, 17%), financing (18, 12%), rational use (106, 70%), and health system and availability (63, 42%) (Table 2). RUM studies were the main bulk of the studies conducted in the region, while very limited attention had been devoted to financing aspects of access to medicines.

Table 2. ATM issues and health system levels discussed each year in EMR publications*

Year	Affordability	Sustainable financing	RUM	Health system and availability	Household & community	Health service public or private	National Health sector	National beyond health sector	Cross border issues
2000			2	1		2			
2001	1		1	2	1	2	1		
2002	1	1	5		3	3	2		
2003			1	2		2	2		
2004	2	1	2	2	1	2	2	1	1
2005			10	1	4	8	8		
2006	2		8	5	3	10	5	2	1
2007	1	1	8	6	3	6	8		1
2008	4	5	16	9	9	18	13		1
2009	7	7	20	15	9	22	16	1	1
2010	4		20	10	6	20	14	1	1
2011	3	3	13	10	5	13	8	2	3
Total	**25**	**18**	**106**	**63**	**44**	**108**	**79**	**7**	**9**

* The totals add up to more than 151 as an article might be assigned to more than one ATM issue or health system level

Similarly the papers were assigned to one or more 'health system levels' that were the focus of attention for the study (the total adds up to more than 151): household and community (44, 29%), health service (108, 72%), national health sector (79, 52%), national beyond health sector (7, 5%), and cross border issues (9, 6%) (Table 2). Despite the importance of cross-border issues and the role of sectors beyond the health sector in facilitating or impeding ATM, scarce attention was devoted to those issues in the region.

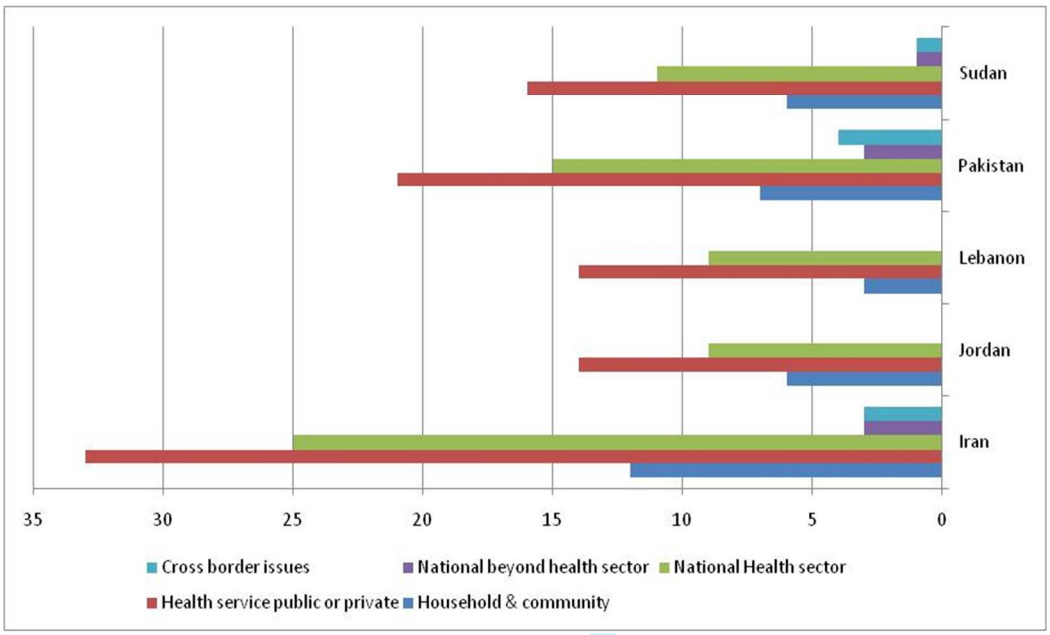
On the whole the majority of the studies were limited to health services level, mainly assessing RUM issues at the level of providers. We found many studies of availability and RUM issues (Table 2), including studies that focused on adverse drug reaction (ADR) reporting in several countries.[25] Many studies focused on reporting simple RUM indicators for prescribing behaviors (e.g. average number of medicines per prescription, or the proportion of prescriptions containing injectables), and most reported an unfavorable picture.[26-32] Others focused on self-medication issues from different countries and areas, and different sub-groups of population.

As a further analysis, we focused attention on the countries for which there were ten or more ATM publications (Iran, Jordan, Lebanon, Pakistan, Sudan) to see the proportion of these publications that discussed different health systems level (Figure 4a). Very few studies considered cross-border issues and other relevant sectors beyond the health sector. In terms of the ATM issues considered in the studies, ATM research in Iran was heavily biased towards

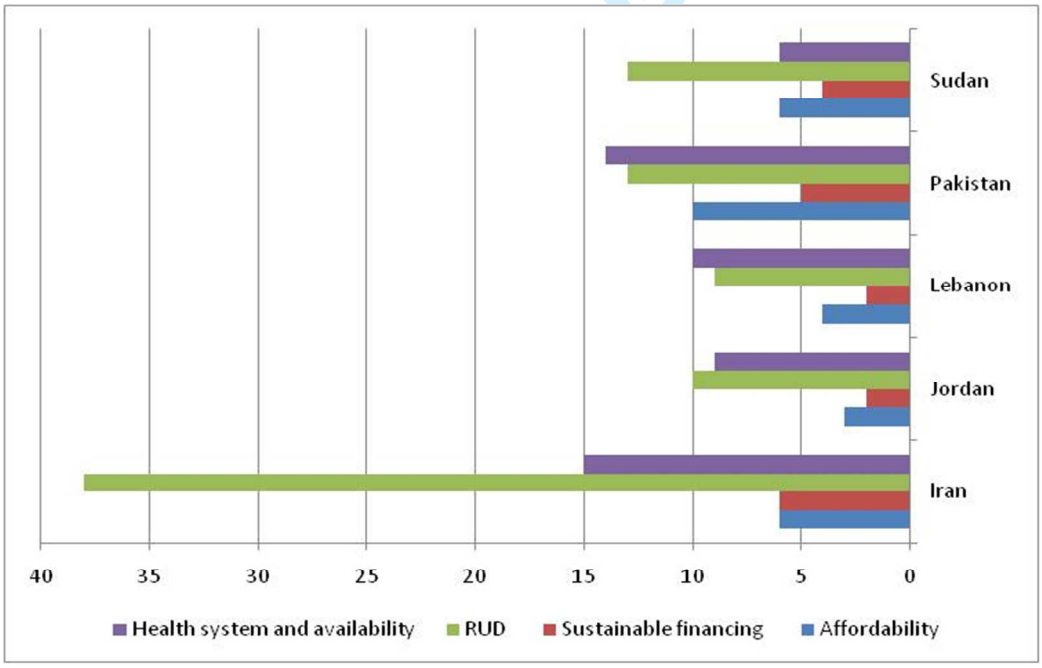
RUM studies with 38 papers, followed by health system issues (15 papers) (Figure 4b). Other countries gave a more balanced picture, albeit with smaller number of papers: 9 to 13 papers on RUM; 6 to 14 papers on health system and availability issues, and 3 to 10 papers on affordability issues. Similarly in all five countries, the health service and national health sector levels of the health system had attracted the majority of the published ATM papers.

Figure 4. Distribution of the level of barriers considered (a), and issues discussed (b) in the ATM publications in countries with over ten publications.

a)



b)



Discussion

The results of the study showed that in 16 LMICs (now 17 countries including South Sudan) in the EMR, with a total population of over 537 million people, 151 articles were published that focused entirely, or in some parts on ATM issues. These studies focused on fourteen countries with no publications assessing ATM issues in Djibouti, Somalia or South Sudan. The countries that produced most publications were Iran, Pakistan, Jordan and Lebanon.

The number of publications for some countries was proportionately very low. For example, if we had excluded the studies from Egypt that were published because of the presence of the WHO regional office in Cairo, then very few studies from Egypt would have remained in our sample. This was surprising given that Egypt is one of the most populous countries in the region, and it enjoys an expanded academic sector.

The last decade demonstrates a growth in the number of publications per year on ATM in the EMR. This is a good sign that with further development of health systems, the number of publications is growing. This may provide a good opportunity for evidence-based decision making based on evidence from the region.[33] however the publications were focused mainly on RUM issues and most studies only assessed challenges at the service provider level. There was limited attention to affordability and financing issues in EMR region, and the impact of cross border factor and sectors other than health sector on ATM were rarely studied.

Lack of attention to the financing and affordability aspects of ATM in EMR studies is despite the fact that several studies have demonstrated the importance of these aspects.[7] In an international study using household survey data from World Health Surveys, it was clear that affordability was a major barrier to access at the level of households. The study concluded that between 41% and 56% of households in LMICs spent almost all of health care expenditures on medicines.[34] The study called for expanded benefit packages and further coverage of medicines in insurance plans in low-income and lower-middle-income countries. Whether or not this was taken up in the EMR region is another matter. Among LMICs in the region, Jordan, Iran, Egypt, Morocco and Tunisia have health care insurance systems developed and established by the government.[35, 36] These schemes have various successes and limitations which may impede access to medicines.[37] Despite this system development in these countries, still limited attention to insurance related issues was observed in the ATM publications. For other LMICs in the region, without such nationally funded programs, it will be more difficult to adopt and implement Wagner et al (2010) advice.

Another issue for both affordability as well as financing of medicines in LMICs is the pricing of medicines. Wagner et al noted that there was an array of reasons and manifestations of price differences for medicines in different countries. Despite the importance of the issue they noted that literature from developing countries has showed very little attention to pricing issues.[14] Our findings supports their conclusion.

The overrepresentation of RUM studies might be linked to the availability of widely used instruments to measure RUM, developed by the WHO and other organizations. For example the "investigating medicine use" tools have existed since early 80s. Although in its current edition, it covers all areas of ATM,[38] in its original versions it had a special attention towards measurement of RUM aspects of medicine. Pricing and availability tools (WHO-HAI project) have been more recently developed.[39] Also, recent growing attention on financing mechanisms and universal health coverage seems to slowly attract attention on these aspects applied to medicines area. Note also that standard instruments household survey and health care utilization tools (e.g. the World Health Survey tool) tools that usually allow to look at health financing aspects or out of pocket expenditures often do not discriminate between medicines and other expenditure items. To assess households' pharmaceutical expenditure, usually primary data collection is needed, which may be expensive and time-consuming and therefore limited only to countries that have the resources to conduct such studies. Also it seems that the indicators and instruments on RUM are more widely accepted than pricing indicators, e.g. there may be disagreement on measuring retail price, procurement price, with or without markup.[7, 40] Still one might hope that with the emergence of further attention and better tools to assess financing aspects of the ATM, more papers will be published on such issues in near future.

RUM research in the region has been mainly in the shape of prescription audits, the majority of it showing there are important problems in prescriptions.[32, 41-44] There are two important patterns to note in here. First, the RUM research, although forming the majority of ATM research is yet to show a substantial effect in improving drug utilization patterns. The prescribing problems of focus in ten years ago remain unresolved today, if not joined by new challenges (e.g. non-generic prescribing). For example, one study that assessed ADR repots for artemisinin based anti-malaria treatments did not find a single report of ADR for artemisinin-based medicines from EMR countries with hyper- and meso- endemic malaria problems.[45] Also studies of pharmacy service quality demonstrated a low quality of service and a room for improvement in provision of care at the pharmacies.[46] In a way, maybe it is safe to conclude that even RUM studies have not been that effective in improving access, or tackling the main issues.

Second, it seems a change in research strategies is required and future studies should further focus on interventional issues. Fortunately in recent years there is a shift towards interventional studies assessing the impact of interventions on improving prescribing outcomes.[47-51] Also further demand side (e.g. why public still seems fascinated with antibiotics), supply side (e.g. how physicians might be encouraged to follow evidence-based prescribing) and health systems angle (e.g. what are the financial and organizational barriers to improving prescribing patterns) research is required.

Other sectors (other than health care sector) effects on access to medicines are barely considered in the publications from the region. Studies have demonstrated that general socioeconomic status of a country is linked to ATM, while few studies have elaborated on this in the region.[52] Despite many studies that assessed the impact of health system and provision issues on ATM, there are very few studies that discuss important policy directions for improving ATM. For example we did not find any study that had assessed the impact of essential drug lists initiatives on access to medicines in an EMR country. This is despite the fact that according to Mirza (2008), all of the LMICs in the EMR region, except Libya and Lebanon, had a policy of essential drug lists in place at the time.[35]

Ritz et al (2010) reported the findings a of a bibliometric analysis of ATM literature in LMICs.[53] Compared to our study, they underestimated the number of papers produced from the EMR region by a wide margin. They suggested that medicine selection, intellectual property rights and monitoring and quality assurance were among the top ATM topics studied in developing countries, which is different from what we observed in EMR. Interestingly, Ritz et al observed that the corresponding authors residing in high-income countries represented around 50% of all publications relative to LMICs. Our study demonstrated that most articles (77%) in the region originated (as per the corresponding author's address) from the LMICs in the region.

There are several limitations to the current bibliography study. Using the affiliation of the corresponding author to identify the study's country of origin has several limitations. For example, it may be a team work, in which authors from different countries contribute. Also several identified studies were from research students in high-income countries institutions running research on their own countries. Many such students are also funded by their own countries, but may use the affiliations of the institutions in which they study. On the other hand, there are studies conducted by foreign missions based in a country, and although the address of the foreign mission is from that country, the study cannot be strictly considered as homegrown. Despite such limitations, the bibliographic analyses are informative of country productivity in ATM research.

We conducted systematic searches of the main international databases for identifying ATM papers. Although we followed rigorous methods, the search should not be considered

exhaustive. We might have missed published papers not indexed in these databases. However, as most of the important health research from the region makes it to international databases, we believe that we have captured a substantial number, if not the majority, of papers on ATM.

Conclusions

The provision of reliable access to affordable, appropriate and high-quality medicines is a key component of a functioning health system. Access to medicines needs to be fully integrated with health financing, human resource planning, service delivery, information and governance systems. This is the first study conducted in this region that has collated published literature and summarized the main policy concerns to identify ATM research priorities. In this study we used an extensive search of local and regional literature. We developed detailed maps of research on the issue, conceptual frameworks of policy concerns and issues, and identified lists of ATM research priorities for the countries of focus and the region as a whole.

This study clearly indicates that there is dire need for further research on financing and affordability aspects of ATM in the region. This should be given paramount attention in future research funding and calls for proposals. Also cross-border issues and other sectors roles on access to medicines in the region has not explored widely. It seems that many household (demand side) studies in the region remain of poor quality and limited methods. Together, these main areas should provide the main aspects of access to medicines research in the region.

This is in no way indicating that further RUM or studies of health systems and availability access are not needed, or that the barriers at the levels of providers and health systems are exhaustively identified. Rather it seems that individual researchers and available funding route are giving attention to these issues at the moment, which should continue while further resources should be mobilized for studies related to the relatively ignored aspects of ATM research in the region.

The picture of research on the ATM in the region is better than what had been reported in recent publications[53] or compared to other regions.[6] There is a growing trend, over the years, of more and better quality studies from the region appearing in international journals. Still, a concurrent trend will be required to ensure the local audience of such research (i.e. practitioners, policy makers and media) remains informed of the new development as a result of ATM research in countries in the region. An active knowledge translation approach will be essential.

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Competing interests:

The views expressed in the document are those of the individual authors and do not necessarily reflect the views of their respective organizations or the funding body.

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Bibliographic review of research publications on access to and use of medicines in low-income and middle-income countries in the Eastern Mediterranean Region: identifying the research gaps

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Title

Bibliographic review of research publications on access to and use of medicines in low-income and middle-income countries in the Eastern Mediterranean Region: identifying the research gaps

Short title:

Research publications on access to and use of medicines in the Eastern Mediterranean Region

Authors:

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Article Summary

Article focus

- To assess the situation of academic publications on access to and use of medicines (ATM) in low- and middle-income countries (LMICs) in the Eastern Mediterranean Region
- To inform priority setting for research in the area of ATM in the region and globally
- To identify the geographical and issue related research gaps that may have not been covered in previous research.

Key messages

- The publications were mainly focused on rational use of medicines and most studies only assessed challenges at the service provider level.
- There is dire need for further research on financing and affordability aspects of ATM in the region.
- The picture of research on the ATM in the region is better than what had been reported in previous recent publications or in comparison with LMICs in other regions.
- There is a growing trend, over the years, of more and better quality studies from the region appearing in international journals.
- Access to medicines needs to be fully integrated with health financing, human resource planning, service delivery, information and governance systems.
- Most publications (77%) in the region originated from the LMICs in the region.
- Over half of all the publications originated from Iran, Pakistan, Jordan and Lebanon.

Strengths and limitations of this study

- This is the first study conducted in this region that has collated ATM related published literature to identify research priorities.
- We conducted systematic searches of the main international databases for identifying ATM papers.
- Although we followed rigorous methods, the search should not be considered exhaustive. Further studies might have been published in locally indexed or non-indexed journals which might not have been captured by our methods.

Abstract

Objectives: We assessed the situation of academic publications on access to and use of medicines (ATM) in low- and middle-income countries (LMICs) of the Eastern Mediterranean Region (EMR). We aimed to inform priority setting for research on ATM in the region

Design: Bibliographic review of published studies

Setting: Low- and middle-income countries in the Eastern Mediterranean Region

Inclusion criteria: Publications on ATM issues originating from or focusing on EMR LMIC countries covering the period 2000-2011. Publications involving multi-national studies were included if at least one eligible country had been included in the study.

Information sources and data extraction: We conducted comprehensive searches of the PubMed, Social Science Citation Index and Science Citation Index. We used the WHO ATM framework for data extraction and synthesis. We analyzed the data according the ATM issues, health system levels, year of publication, and the countries of origin or focus of the studies.

Results: 151 articles met the inclusion criteria. Most articles (77%) originated from LMIC countries in the EMR, suggesting that the majority of evidence on ATM in the region is homegrown. Over 60% of articles were from Iran, Pakistan, Jordan and Lebanon (in order of volume), while we found no studies assessing ATM in Somalia, Djibouti and South Sudan, all low-income countries. Most studies focused on the rational use of medicines, while affordability and financing received limited attention. There was a steady growth over time in the number of ATM publications in the region (r=0.87).

Conclusions: There is a growing trend, over the years, of more studies from the region appearing in international journals. There is a need for further research on financing and affordability aspects of ATM in the region. Cross-border issues and the roles of non-health sectors in access to medicines in the region have not been explored widely.

Introduction

The provision of reliable access to affordable, appropriate and high-quality medicines is a key component of a functioning health system.[1] According to the WHO Framework for Access To and appropriate use of Medicines (ATM), access has been defined as having four parameters: that the available medicines are effective, of consistently good quality, and are used rationally (rational use), that there is no financial obstacle to a patient receiving it (affordability), that the financing mechanisms are sustainable to ensure the access to quality medicines and affordability are ensured over time (sustainable financing), and that the health system provides required infrastructure, knowledge and guidance for proper use of medicines (health system and availability). The Framework stipulates that any isolated efforts on one ATM aspect would not result to adequate and lasting improvement in ATM situation.[2]

Unfortunately, ATM is often poor in low- and middle-income countries (LMICs). WHO estimated that about one third of the world's population had limited access to the medicines they needed. Many factors determine access. They include, for example, tax and tariff policies, pricing and affordability of medicines, price mark-up policies, cost-sharing and copayment for medicines, and health care regulation policies, and financial protection systems for health care users. WHO estimates that on average the availability of essential drugs in LMICs is 35% in the public sector facilities and 66% in the private sector.[3] Quality of pharmaceutical products and rational use of medicines also affects the effectiveness of the medicines and health outcomes.[4] In many LMICs there is limited access to the information that might help clinical decision making on use of medicines [5, 6].

Medicines account for a high proportion of health spending in LMICs, between 20% – 60% (compared to an average of around 18% in high-income countries).[7] Moreover, more than half of the expenditure on medicines in most LMICs is out-of-pocket.[8] This inequitable financing situation, whether due to a lack of effective general revenue financing or social insurance financing or other mechanisms, creates significant access barriers for the poor and may lead to catastrophic household expenditures. The poor and other population groups often rely on the private informal sector for medicines, particularly in rural areas. Over-prescribing and inappropriate prescribing and dispensing of medicines are prevalent.[9]

Despite some progress in some areas - such as price and availability[7] - data on access to and use of medicines is often weak. Even where data are available, there is often limited systematic research that enables the interpretation of the data and using it in identifying priorities and developing policy options to improve access to medicines in LMICs. The application of health systems research tools and methods in the field of access to medicines will help understanding the weaknesses and barriers of access to medicines and generating useful evidence to formulate policies.[10]

This study was part of the ATM Policy Research project, Funded by the WHO Alliance for Health Policy and Systems Research with the ultimate goal of "increasing access to and improve the use of medicines in low and middle income countries, particularly for the poor (Millennium Development Goal no. 8)".

We aimed to assess the situation of academic publications on ATM in LIMCs in the Eastern Mediterranean Region (EMR), and the distribution of such publications both in terms of geographical coverage and issues of interest. The ultimate objective of the study was to inform priority setting for research in the area of access to medicines in the region and globally.

Methods

Study design

We conducted a bibliographic review of research in the Eastern Mediterranean Region (EMR), involving comprehensive searches of the literature.

The study involved an extensive search of national, regional and international literature in the EMR's LMICs in 2000-2011 and mapping of research to identify the geographical, and research gaps that may have not been covered in previous research.

Literature searches

EMR included sixteen LMICs according to the World Bank categories which comprised the geographical focus of the study. The country-specific searches were conducted both in relation to author affiliations as well as the titles and abstracts of the papers.

A set of specific ATM terms were developed in two brainstorming meetings and used to devise the search strategy. The initial search strategy was tested in a number of limited searches, and was compared against a list of previously known publications. The results of the assessment were used to finalize the search strategy (Table 1). The main terms selected for this study included drugs, medicines, medications and pharmaceuticals and their variations. These were suitably linked with ATM related terms. We conducted comprehensive searches of three major electronic databases (PubMed, Social Science Citation Index and Science Citation Index). Initial searches were conducted in January 2011 and all the searches were updated in June 2011 (Figure 1). Additionally we searched the WHO websites, and contacted a few topic experts for additional publications.

Table 1. Search strategy for regional literature

Pubmed example:

#1- ((((((((((((((((Iran[Affiliation]) OR Pakistan[Affiliation]) OR Lebanon[Affiliation]) OR Egypt[Affiliation]) OR Afghanistan[Affiliation]) OR Sudan[Affiliation]) OR Yemen[Affiliation]) OR Jordan[Affiliation]) OR Tunisia[Affiliation]) OR Morocco[Affiliation]) OR Syria[Affiliation]) OR Palestine[Affiliation]) OR Iraq [Affiliation]) OR Djibouti[Affiliation]) OR Libya$[Affiliation]) OR Somalia[Affiliation])

#2- ((((((((((((((((((middle east[Title/Abstract]) OR Iran[Title/Abstract]) OR low income countries[Title/Abstract]) OR middle income countries[Title/Abstract]) OR Pakistan[Title/Abstract]) OR Lebanon[Title/Abstract]) OR Egypt[Title/Abstract]) OR Afghanistan[Title/Abstract]) OR Sudan[Title/Abstract]) OR Yemen[Title/Abstract]) OR Jordan[Title/Abstract]) OR Tunisia[Title/Abstract]) OR Morocco[Title/Abstract]) OR EMRO[Title/Abstract]) OR Syria[Title/Abstract]) OR Palestine[Title/Abstract]) OR eastern Mediterranean[Title/Abstract]) OR Iraq [Title/Abstract]) OR Djibouti[Title/Abstract]) OR Libya$[Title/Abstract]) OR Somalia[Title/Abstract])

#3- (#1) OR (#2)

#4- ((((drug$[Title/Abstract]) OR medicines[Title/Abstract]) OR medication$[Title/Abstract]) OR pharmac$[Title/Abstract])

#5- ((((((((((((((((((use[Title/Abstract]) OR access[Title/Abstract]) OR available[Title/Abstract]) OR availability[Title/Abstract]) OR affordable[Title/Abstract]) OR affordability[Title/Abstract]) OR utilisation[Title/Abstract]) OR utilization[Title/Abstract]) OR essential [Title/Abstract]) OR counterfeit$[Title/Abstract]) OR price[Title/Abstract]) OR pricing[Title/Abstract]) OR licensing[Title/Abstract]) OR licencing[Title/Abstract]) OR labeling[Title/Abstract]) OR labelling[Title/Abstract]) OR formularies[Title/Abstract]) OR generic[Title/Abstract])

#6- (((((((prescription$ [Title/Abstract]) OR prescrib$ [Title/Abstract]) OR "drug policy"[Title/Abstract]) OR "pharmaceutical policy"[Title/Abstract]) OR formulary[Title/Abstract]) OR pharmacy[Title/Abstract]) OR pharmacies[Title/Abstract]) OR pharmacist$[Title/Abstract])

#7- (#3) AND (#6)

#8- (#3) AND (#4) AND (#5)

#9- (#7) OR (#8)

Inclusion process and criteria

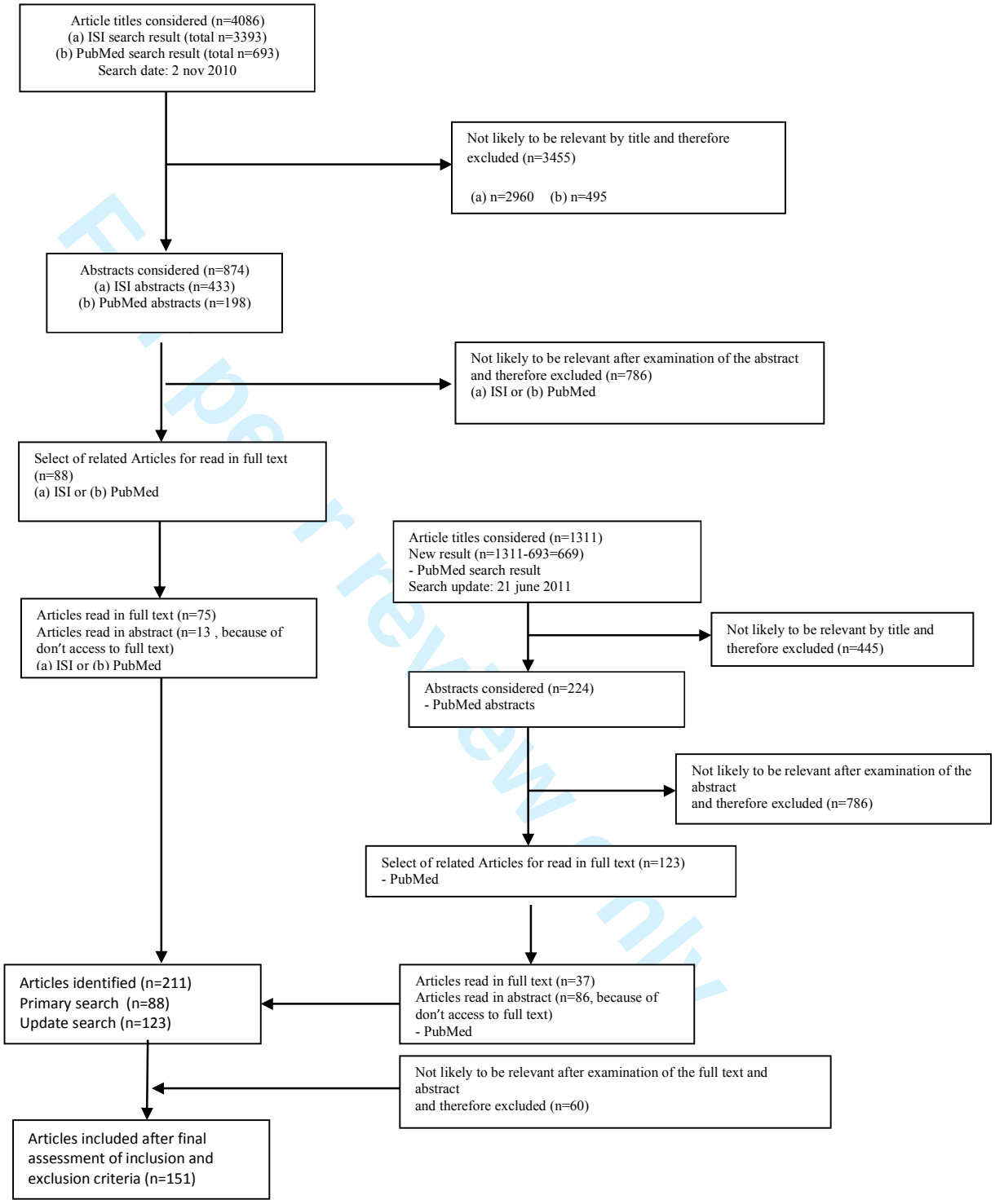
Papers published from 2000 onward were considered. To ensure accuracy, two separate samples of 100 titles were reviewed by two researchers and disagreements were discussed and clarified. All the remaining titles and the abstracts of the identified papers via the search were initially reviewed by one author. After the initial screenings, the abstracts (and subsequently the full text papers) were read by two authors.

We used the following criteria for the inclusion and exclusion of the papers:

- No research design limit was used. However, letter to the editors and abstract-only publications were excluded.

- Studies that were directly relevant to ATM issues were included. For example, for Rational Use of Medicine (RUM) studies, we considered studies that assessed RUM in a certain setting, or the studies that sought to improve use of medicines specifically. However, broader studies of improving quality of clinical care (which might have involved prescribing issues) were not included. (e.g. a clinical practice guideline development project may not be included). Although prescribing is a part of the majority of the guidelines, if the purpose of the guideline is not prescribing per se; then the paper may not be included in here. This criterion was required to ensure that we remained focused on ATM issues. The same logic was applied to other aspects of the ATM.
- Studies of drug resistance that did not elaborate on health system or ATM implications , studies of herbal medicines alone, studies of drug abuse, studies of use of contraceptive medicines that focused on family planning issues only, and studies focusing only on education methods and curriculum development for pharmacy courses were not included.

Figure 1: Flow chart of search strategies in electronic databases for ATM



Data extraction and analysis

After agreeing on the inclusion of a study, the full texts of the studies were retrieved. We developed a data extraction tool based on the study conceptual framework. We extracted data on title, authors, year of publication, the corresponding author's country of origin, countries of focus, research design and sample, a summary of main findings, ATM issues considered in the study, 'levels' of barrier studied, and the research topics recommended by the authors. If a publication discussed more than one ATM issue, we noted as many issues as applied to that publication.

We categorized the 'levels' of the health system barriers to ATM as: 'household and community', 'health service providers', 'health sector as a whole', 'other related sectors', and 'cross border issues'.[11, 12] We defined ATM issues based on the WHO Framework for ATM which included four aspects: affordability, sustainability of financing, rational use, and health systems and availability of medicines.[13]

One author extracted data from all the included studies, and another author assessed all the data extractions for accuracy and completeness. Then we used descriptive methods and presentational graphs and diagrams pertaining to the study questions, and used Pearson r estimates to assess the publication trends over time.

Results

In total 4755 titles were retrieved as a result of the searches and were reviewed (Figure 1). In total, 151 articles were identified (Figure 1) that focused entirely or partially on ATM issues in one or more of EMR's LMICs.

As the search strategy was sensitive to identify studies that were conducted in LMICs, we also identified additional twelve international studies that had important implications about ATM in LMICs of the region.[1, 14-24] Among these twelve studies, eight had been published in 2011 alone. We used these studies to discuss and highlight some of the identified issues but did not include them in the analyses.

Six papers were published in languages other than English: French (two each from Tunisia and Morocco and one from Lebanon) and Czech (on Yemen).

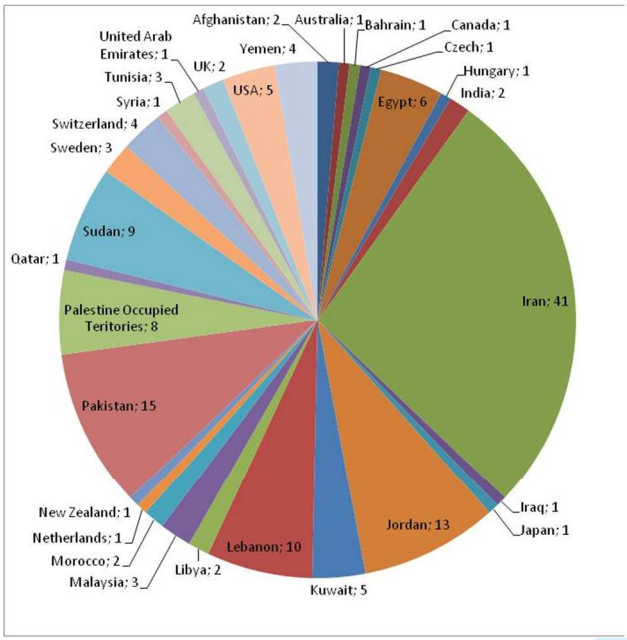
Countries of origins of the studies

Most of these articles (117 articles, 77%) originated (based on the corresponding author's address) from the LMICs in EMR, while 8 (5%) originate from high-income countries of the region and 26 (17%) from other countries (Figure 2a). There was a wide variation in the number of publications per country (Figure 2a). The countries that produced at least ten articles in the journals indexed in international databases were Iran (41, 27%), Pakistan (15, 10%), Jordan (13, 9%) and Lebanon (10, 7%). These were followed by Sudan (9), Palestine Occupied Territories (8), Egypt (6), USA (5) and Kuwait (5).

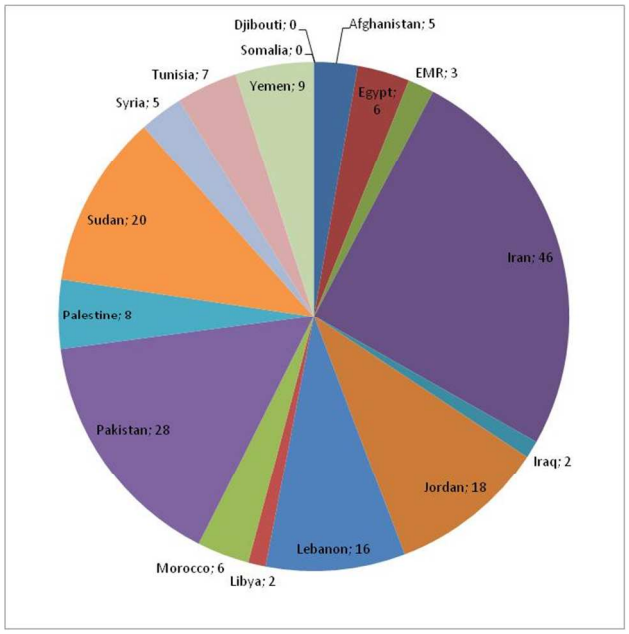
We found several comparative international studies that used data from EMR or discussed issues relevant to EMR countries. In total 17% of the identified literature originated from countries outside the EMR. 11 (out of 26) of these studies were multi-country studies that included one or more EMR countries alongside others.

Figure 2. Distribution of the country of origin (a), and the country of focus* (b) for publications on ATM issues in the EMR's low-income and middle-income countries.

a



b



* The total number of publications adds up to more than 151, because some publications discuss more than one country each.

Countries of focus of the studies

In total, fourteen EMR LMICs have been the focus of at least one ATM research article in the past decade. The countries that were the focus of at least 10 articles were Iran (46, 30%), Pakistan (28, 19%), Sudan (20, 13%), Jordan (18, 12%) and Lebanon (16, 11%).

Two countries (Iraq, Libya) were discussed in only two papers each (Figure 2b). We found no studies on Somalia and Djibouti. There were also no studies of South Sudan, i.e. none of the publications discussing Sudan had specific attention or data from South Sudan, which is now an independent country.

Research designs

The majority of the included studies involved cross-sectional studies of various designs. Questionnaire surveys - of facilities, providers and students (38 articles), patients and users (16 articles) and households (seven articles) - were the most common research designs and were used in 41% of the articles. This was followed by prescription audits and medicines utilization reviews that were observed in 35 articles (23%). Qualitative studies (mainly as case-studies) were observed in 10 articles. Similarly 15 articles (10%) focused on policy related issues in review articles, policy briefs or advocacy papers; although pinpointing the research designs in these studies was not straight forward and some studies did not employ a formal research approach.

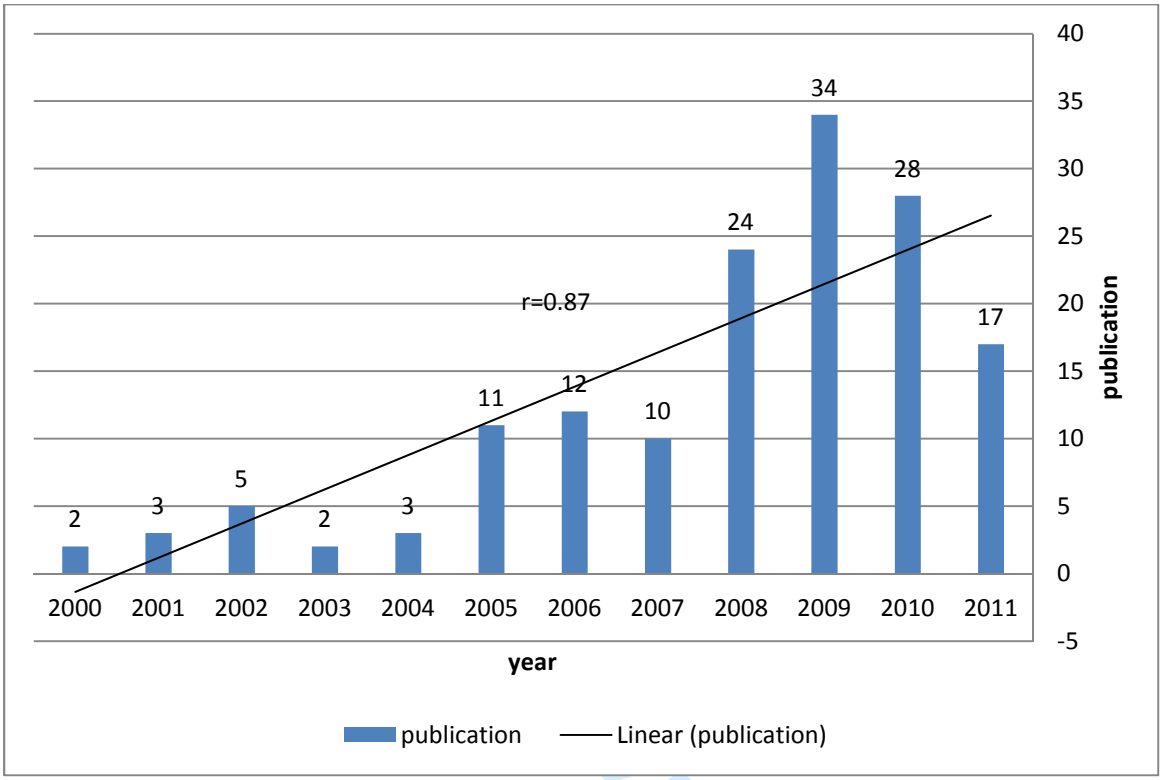
We also identified 13 interventional studies (including two randomized controlled trials), and two economic studies and two consensus development studies. These articles, except for one, were all published since 2008. We included nine secondary data analyses (mostly involving multi-national data analyses), one systematic review, one bibliometric study, one cohort and one case-control study.

The studies had substantial variations in their designs, from well-designed trials or large-sample national and multi-national studies to small-scale studies of convenient samples or with unclear research designs.

Growth in ATM publications

We observed a relatively steady growth in the number of publications per year on ATM in the EMR within the last decade (Pearson r=0.87; see Figure 3). While in the first three years of this period there were only about ten publications from the region, 80 studies had been published in the last three years of the study period. We also observed a modest increase in the proportion of studies originated from outside EMR during 2006-2010 period (20%) compared with the 2000-2004 period (13%).

Figure 3. The increasing number of ATM publications per year n EMR. (note: 2011 publications cover only the first half of this year.)



ATM issues of focus

To understand the ATM issues on which the published article focused we assigned each article to one or more of the four large components in the WHO ATM framework. We noted the ATM issues of focus for the articles: affordability (25, 17%), financing (18, 12%), rational use (106, 70%), and health system and availability (63, 42%) (Table 2). RUM studies were the main bulk of the studies conducted in the region, while very limited attention had been devoted to financing aspects of access to medicines.

Table 2. ATM issues and health system levels discussed each year in EMR publications*

Year	Affordability	Sustainable financing	RUM	Health system and availability		Household & community	Health service public or private	National Health sector	National beyond health sector	Cross border issues
2000			2	1			2			
2001	1		1	2		1	2	1		
2002	1	1	5			3	3	2		
2003			1	2			2	2		
2004	2	1	2	2		1	2	2	1	1
2005			10	1		4	8	8		
2006	2		8	5		3	10	5	2	1
2007	1	1	8	6		3	6	8		1
2008	4	5	16	9		9	18	13		1
2009	7	7	20	15		9	22	16	1	1
2010	4		20	10		6	20	14	1	1
2011	3	3	13	10		5	13	8	2	3
Total	**25**	**18**	**106**	**63**		**44**	**108**	**79**	**7**	**9**

* The totals add up to more than 151 as an article might be assigned to more than one ATM issue or health system level

Similarly the papers were assigned to one or more 'health system levels' that were the focus of attention for the study (the total adds up to more than 151): household and community (44, 29%), health service (108, 72%), national health sector (79, 52%), national beyond health sector (7, 5%), and cross border issues (9, 6%) (Table 2). Despite the importance of cross-border issues and the role of sectors beyond the health sector in facilitating or impeding ATM, scarce attention was devoted to those issues in the region.

On the whole the majority of the studies were limited to health services level, mainly assessing RUM issues at the level of providers. We found many studies of availability and RUM issues (Table 2), including studies that focused on adverse drug reaction (ADR) reporting in several countries.[25] Many studies focused on reporting simple RUM indicators for prescribing behaviors (e.g. average number of medicines per prescription, or the proportion of prescriptions containing injectables), and most reported an unfavorable picture.[26-32] Others focused on self-medication issues from different countries and areas, and different sub-groups of population.

The articles occasionally offered research recommendations for future studies. Examples of such research recommendations are offered in Table 3.

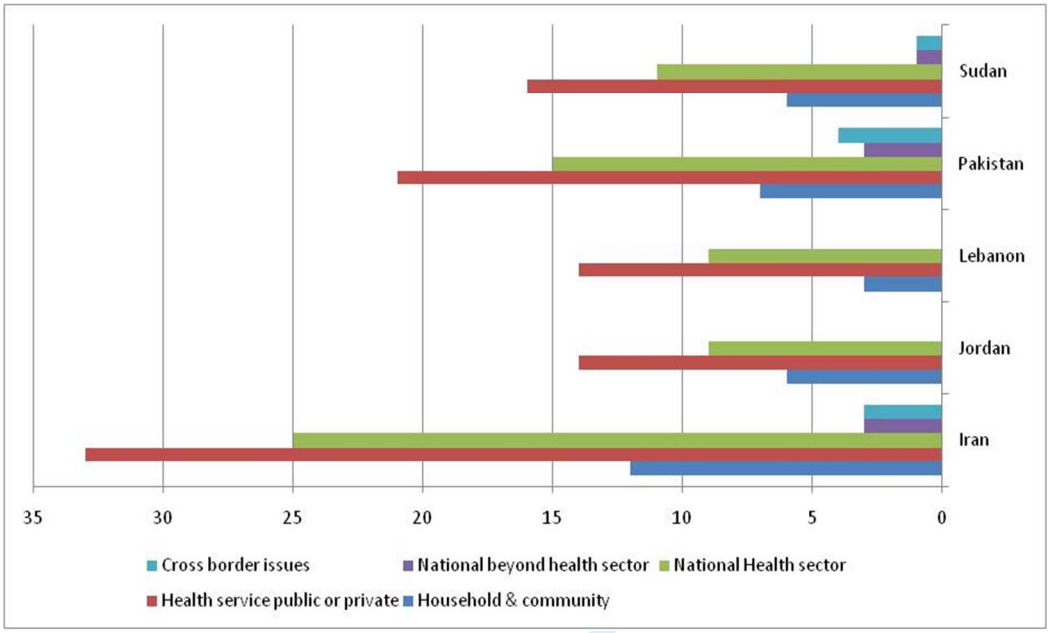
Table 3. A few examples of research recommendations for future studies reported in the included articles

- The cost–effectiveness of different respiratory care services on TB case detection and health system strengthening [33]
- The cost-effectiveness of using community health workers or outreach clinics for dispersed rural populations [34]
- The effect of various policy interventions to make medicine more affordable [7]
- The impact of the national pharmaceutical policies on financial capacity of health system, out-of-pocket health expenditure, and the domestic pharmaceutical industry [35]
- Identifying valid indicators for the assessment of physicians' prescribing performance [36]
- The outcomes of unnecessary 'stat' (urgent) prescribing orders on adverse drug events in hospitals [37]
- Using longer term routine data to assess the effects of essential medicines lists and universal health coverage policies on rational use of medicines, out-of-pocket health expenditures and health outcomes [38]
- The impact of legislative and market changes to improve the quality of retail pharmacy in low- and middle-income countries [39]
- Formulating clinical guidelines for use of benzodiazepines in different indications [40]
- The effectiveness of policies to improving access to medicines in resource poor countries based on research evidence from such countries [41]

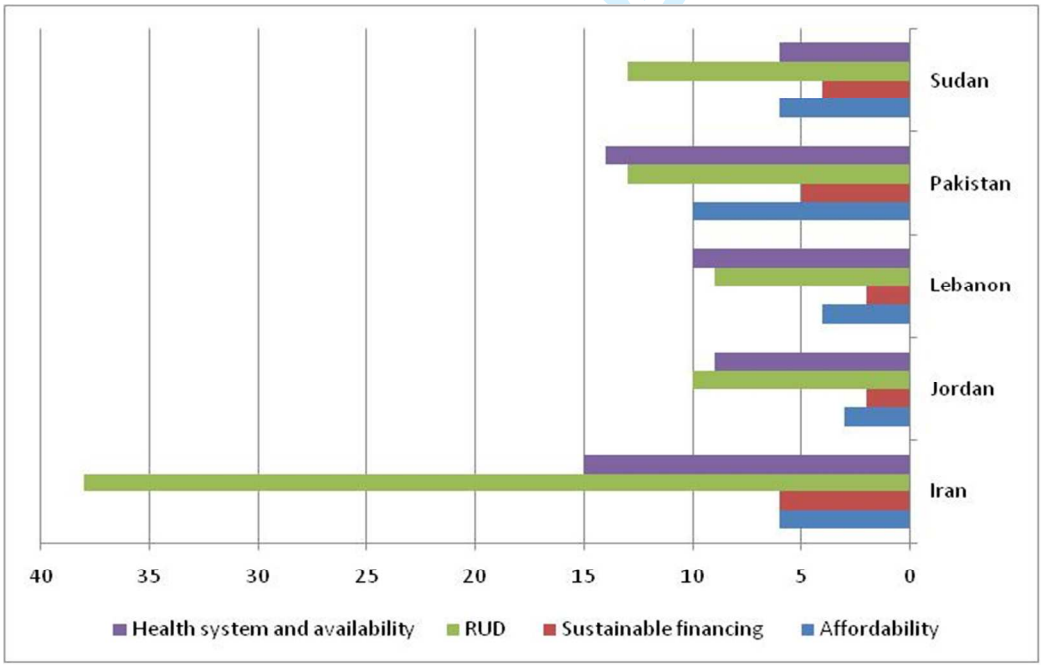
As a further analysis, we focused attention on the countries for which there were ten or more ATM publications (Iran, Jordan, Lebanon, Pakistan, Sudan) to see the proportion of these publications that discussed different health systems level (Figure 4a). Very few studies considered cross-border issues and other relevant sectors beyond the health sector. In terms of the ATM issues considered in the studies, ATM research in Iran was heavily biased towards RUM studies with 38 papers, followed by health system issues (15 papers) (Figure 4b). Other countries gave a more balanced picture, albeit with smaller number of papers: 9 to 13 papers on RUM; 6 to 14 papers on health system and availability issues, and 3 to 10 papers on affordability issues. Similarly in all five countries, the health service and national health sector levels of the health system had attracted the majority of the published ATM papers.

Figure 4. Distribution of the level of barriers considered (a), and issues discussed (b) in the ATM publications in countries with over ten publications.

a)



b)



Discussion

The results of the study showed that in 16 LMICs (now 17 countries including South Sudan) in the EMR, with a total population of over 537 million people, 151 articles were published that focused entirely, or in some parts on ATM issues. These studies focused on fourteen countries with no publications assessing ATM issues in Djibouti, Somalia or South Sudan. The countries that produced most publications were Iran, Pakistan, Jordan and Lebanon.

The number of publications for some countries was proportionately very low. For example, if we had excluded the studies from Egypt that were published because of the presence of the WHO regional office in Cairo, then very few studies from Egypt would have remained in our sample. This was surprising given that Egypt is one of the most populous countries in the region, and it enjoys an expanded academic sector.

The last decade demonstrates a growth in the number of publications per year on ATM in the EMR. This is a good sign that with further development of health systems, the number of publications is growing. This may provide a good opportunity for evidence-based decision making based on evidence from the region.[42] however the publications were focused mainly on RUM issues and most studies only assessed challenges at the service provider level.[43] There was limited attention to affordability and financing issues in EMR region, and the impact of cross border factor and sectors other than health sector on ATM were rarely studied.

Lack of attention to the financing and affordability aspects of ATM in EMR studies is despite the fact that several studies have demonstrated the importance of these aspects.[7] In an international study using household survey data from World Health Surveys, it was clear that affordability was a major barrier to access at the level of households. The study concluded that between 41% and 56% of households in LMICs spent almost all of health care expenditures on medicines.[44] The study called for expanded benefit packages and further coverage of medicines in insurance plans in low-income and lower-middle-income countries. Whether or not this was taken up in the EMR region is another matter. Among LMICs in the region, Jordan, Iran, Egypt, Morocco and Tunisia have health care insurance systems developed and established by the government.[45, 46] These schemes have various successes and limitations which may impede access to medicines.[47] Despite this system development in these countries, still limited attention to insurance related issues was observed in the ATM publications. For other LMICs in the region, without such nationally funded programs, it will be more difficult to adopt and implement Wagner et al (2010) advice.

Another issue for both affordability as well as financing of medicines in LMICs is the pricing of medicines.[43] Wagner et al noted that there was an array of reasons and manifestations of price differences for medicines in different countries. Despite the importance of the issue they noted that literature from developing countries has showed very little attention to pricing issues.[14] Our findings supports their conclusion.

The overrepresentation of RUM studies might be linked to the availability of widely used instruments to measure RUM, developed by the WHO and other organizations. For example the "investigating medicine use" tools have existed since early 80s. Although in its current edition, it covers all areas of ATM,[48] in its original versions it had a special attention towards measurement of RUM aspects of medicine. Pricing and availability tools (WHO-HAI project) have been more recently developed.[49] Also, recent growing attention on financing mechanisms and universal health coverage seems to slowly attract attention on these aspects applied to medicines area. Note also that standard instruments household survey and health care utilization tools (e.g. the World Health Survey tool) tools that usually allow to look at health financing aspects or out of pocket expenditures often do not discriminate between medicines and other expenditure items. To assess households' pharmaceutical expenditure, usually primary data collection is needed, which may be expensive and time-consuming and therefore limited only to countries that have the resources to conduct such studies. Also it seems that the indicators and instruments on RUM are more widely accepted than pricing indicators, e.g. there may be disagreement on measuring retail price, procurement price, with or without markup.[7, 50] Still one might hope that with the emergence of further attention and better tools to assess financing aspects of the ATM, more papers will be published on such issues in near future.

RUM research in the region has been mainly in the shape of prescription audits, the majority of it showing there are important problems in prescriptions.[32, 43, 51-53] There are two important patterns to note in here. First, the RUM research, although forming the majority of ATM research is yet to show a substantial effect in improving drug utilization patterns. The prescribing problems of focus in ten years ago remain unresolved today, if not joined by new challenges (e.g. non-generic prescribing). For example, one study that assessed ADR repots for artemisinin based anti-malaria treatments did not find a single report of ADR for artemisinin-based medicines from EMR countries with hyper- and meso- endemic malaria problems.[54] Also studies of pharmacy service quality demonstrated a low quality of service and a room for improvement in provision of care at the pharmacies.[55] In a way, maybe it is safe to conclude that even RUM studies have not been that effective in improving access, or tackling the main issues.

Second, it seems a change in research strategies is required and future studies should further focus on assessing the impacts of relevant interventions. Fortunately in recent years there is a shift toward interventional studies assessing the impact of interventions on improving prescribing outcomes.[33, 56-59] Also further demand side (e.g. why public still seems fascinated with antibiotics), supply side (e.g. how physicians might be encouraged to follow evidence-based prescribing) and health systems angle (e.g. what are the financial and organizational barriers to improving prescribing patterns) research is required.

Other sectors (other than health care sector) effects on access to medicines are barely considered in the publications from the region. Studies have demonstrated that general socioeconomic status of a country is linked to ATM, while few studies have elaborated on this in the region.[60] Despite many studies that assessed the impact of health system and provision issues on ATM, there are very few studies that discuss important policy directions for improving ATM. For example we did not find any study that had assessed the impact of essential drug lists initiatives on access to medicines in an EMR country. This is despite the fact that according to Mirza (2008), all of the LMICs in the EMR region, except Libya and Lebanon, had a policy of essential drug lists in place at the time.[45]

Ritz et al (2010) reported the findings a of a bibliometric study of ATM literature in LMICs.[41] Compared to our study, they underestimated the number of papers produced from the EMR region by a wide margin. They suggested that medicine selection, intellectual property rights and monitoring and quality assurance were among the top ATM topics studied in developing countries, which is different from what we observed in EMR. Interestingly, Ritz et al observed that the corresponding authors residing in high-income countries represented around 50% of all publications relative to LMICs. Our study demonstrated that most articles (77%) in the region originated (as per the corresponding author's address) from the LMICs in the region.

There are several limitations to the current bibliography study. Using the affiliation of the corresponding author to identify the study's country of origin has several limitations. For example, it may be a team work, in which authors from different countries contribute. Also several identified studies were from research students in high-income countries institutions running research on their own countries. Many such students are also funded by their own countries, but may use the affiliations of the institutions in which they study. On the other hand, there are studies conducted by foreign missions based in a country, and although the address of the foreign mission is from that country, the study cannot be strictly considered as homegrown. Despite such limitations, the bibliographic reviews are informative of country productivity in ATM research.

We conducted systematic searches of the main international databases for identifying ATM papers. Although we followed rigorous methods, the search should not be considered

exhaustive. We might have missed published papers not indexed in these databases. However, as most of the important health research from the region makes it to international databases, we believe that we have captured a substantial number, if not the majority, of papers on ATM.

Conclusions

The provision of reliable access to affordable, appropriate and high-quality medicines is a key component of a functioning health system. Access to medicines needs to be fully integrated with health financing, human resource planning, service delivery, information and governance systems. This is the first study conducted in this region that has collated published literature and summarized the main policy concerns to identify ATM research priorities. In this study we used an extensive search of local and regional literature. We developed detailed maps of research on the issue, conceptual frameworks of policy concerns and issues, and identified lists of ATM research priorities for the countries of focus and the region as a whole.

This study clearly indicates that there is dire need for further research on financing and affordability aspects of ATM in the region. This should be given paramount attention in future research funding and calls for proposals. Also cross-border issues and other sectors roles on access to medicines in the region has not explored widely. It seems that many household (demand side) studies in the region remain of poor quality and limited methods. Together, these main areas should provide the main aspects of access to medicines research in the region.

This is in no way indicating that further RUM or studies of health systems and availability access are not needed, or that the barriers at the levels of providers and health systems are exhaustively identified. Rather it seems that individual researchers and available funding route are giving attention to these issues at the moment, which should continue while further resources should be mobilized for studies related to the relatively ignored aspects of ATM research in the region.

The picture of research on the ATM in the region is better than what had been reported in recent publications[41] or compared to other regions.[6] There is a growing trend, over the years, of more and better quality studies from the region appearing in international journals. Still, a concurrent trend will be required to ensure the local audience of such research (i.e. practitioners, policy makers and media) remains informed of the new development as a result of ATM research in countries in the region. An active knowledge translation approach will be essential.

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Competing interests

The views expressed in the document are those of the individual authors and do not necessarily reflect the views of their respective organizations or the funding body.

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Contributorship

AR and MB conceived the study; AR, SJ and SZ developed the methods; NJ, AR, SJ, SZ and FS collected the data; NJ, AR and FS analyzed the data; AR and NJ wrote the paper; All the authors revised and commented on different versions of the manuscript, and read and approved the final manuscript.

Data sharing

The list of the included studies will be available to interested researchers upon request.

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Title

Bibliographic review ~~analysis~~ of research publications on access to and use of medicines in low-income and middle-income countries in the Eastern Mediterranean Region: identifying the research gaps

Short title:

Research publications on access to and use of medicines in the Eastern Mediterranean Region

Authors:

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Keywords:

Access to medicines, Eastern Mediterranean Region, rational use of medicines, low- and middle-income countries, affordability, research priorities

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Article Summary

Article focus

- To assess the situation of academic publications on access to and use of medicines (ATM) in low- and middle-income countries (LMICs) in the Eastern Mediterranean Region
- To inform priority setting for research in the area of ATM in the region and globally
- To identify the geographical and issue related research gaps that may have not been covered in previous research.

Key messages

- The publications were mainly focused on rational use of medicines and most studies only assessed challenges at the service provider level.
- There is dire need for further research on financing and affordability aspects of ATM in the region.
- The picture of research on the ATM in the region is better than what had been reported in previous recent publications or in comparison with LMICs in other regions.
- There is a growing trend, over the years, of more and better quality studies from the region appearing in international journals.
- Access to medicines needs to be fully integrated with health financing, human resource planning, service delivery, information and governance systems.
- Most publications (77%) in the region originated from the LMICs in the region.
- Over half of all the publications originated from Iran, Pakistan, Jordan and Lebanon.

Strengths and limitations of this study

- This is the first study conducted in this region that has collated ATM related published literature to identify research priorities.
- We conducted systematic searches of the main international databases for identifying ATM papers.
- Although we followed rigorous methods, the search should not be considered exhaustive. Further studies might have been published in locally indexed or non-indexed journals which might not have been captured by our methods.

Abstract

Objectives: We assessed the situation of academic publications on access to and use of medicines (ATM) in low- and middle-income countries (LMICs) of the Eastern Mediterranean Region (EMR). We aimed to inform priority setting for research on ATM in the region

Design: Bibliographic review ~~study~~ of published studies

Setting: Low- and middle-income countries in the Eastern Mediterranean Region

Inclusion criteria: Publications on ATM issues originating from or focusing on EMR LMIC countries covering the period 2000-2011. Publications involving multi-national studies were included if at least one eligible country had been included in the study.

Information sources and data extraction: We conducted comprehensive searches of the PubMed, Social Science Citation Index and Science Citation Index. We used the WHO ATM framework for data extraction and synthesis. We analyzed the data according the ATM issues, health system levels, year of publication, and the countries of origin or focus of the studies.

Results: 151 articles met the inclusion criteria. Most articles (77%) originated from LMIC countries in the EMR, suggesting that the majority of evidence on ATM in the region is homegrown. Over 60% of articles were from Iran, Pakistan, Jordan and Lebanon (in order of volume), while we found no studies assessing ATM in Somalia, Djibouti and South Sudan, all low-income countries. Most studies focused on the rational use of medicines, while affordability and financing received limited attention. There was a steady growth over time in the number of ATM publications in the region (r=0.87).

Conclusions: There is a growing trend, over the years, of more studies from the region appearing in international journals. There is a need for further research on financing and affordability aspects of ATM in the region. Cross-border issues and the roles of non-health sectors in access to medicines in the region have not been explored widely.

Introduction

The provision of reliable access to affordable, appropriate and high-quality medicines is a key component of a functioning health system.[1] According to the WHO Framework for Access To and appropriate use of Medicines (ATM), access has been defined as having four parameters: that the available medicines are effective, of consistently good quality, and are used rationally (rational use), that there is no financial obstacle to a patient receiving it (affordability), that the financing mechanisms are sustainable to ensure the access to quality medicines and affordability are ensured over time (sustainable financing), and that the health system provides required infrastructure, knowledge and guidance for proper use of medicines (health system and availability). The Framework stipulates that any isolated efforts on one ATM aspect would not result to adequate and lasting improvement in ATM situation.[2]

Unfortunately, ATM is often poor in low- and middle-income countries (LMICs). WHO estimated that about one third of the world's population had limited access to the medicines they needed. Many factors determine access. They include, ~~ing,~~ for example, tax and tariff policies, pricing and affordability of medicines, price mark-up policies, cost-sharing and copayment for medicines, and health care regulation policies, and ~~lack of access to effective~~ financial protection systems for health care users~~(which may result in high copayments)~~. WHO estimates that on~~the~~ average the availability of essential drugs in LMICs is 35% in the public sector facilities and 66% in the private sector.[3] Quality of pharmaceutical products and rational use of medicines also affects the effectiveness of the medicines and health outcomes.[4] In many LMICs there is limited access to the information that might help clinical decision making on use of medicines [5, 6].

Medicines account for a high proportion of health spending in LMICs, between 20% – 60% (compared to an average of around 18% in high-income countries).[7] Moreover, more than half of the expenditure on medicines in most LMICs is out-of-pocket.[8] This inequitable financing situation, whether due to a lack of effective general revenue financing or social insurance financing or other mechanisms, creates significant access barriers for the poor and may lead to catastrophic household expenditures. The poor and other population groups often rely on the private informal sector for medicines, particularly in rural areas. Over-prescribing and inappropriate prescribing~~ption~~ and dispensing of medicines are prevalent.[9]

Despite some progress in some areas - such as price and availability[7] - data on access to and use of medicines is often weak. Even where data are available, there is often limited systematic research that enables the interpretation of the data and using it in identifying priorities and developing policy options to improve access to medicines in LMICs. The application of health systems research tools and methods in the field of access to medicines will help understanding the weaknesses and barriers of access to medicines and generating useful evidence to formulate policies.[10]

This study was part of the ATM Policy Research project, Funded by the WHO Alliance for Health Policy and Systems Research with the ultimate goal of "increasing access to and improve the use of medicines in low and middle income countries, particularly for the poor (Millennium Development Goal no. 8)".

We aimed to assess the situation of academic publications on ATM in LIMCs in the Eastern Mediterranean Region (EMR), and the distribution of such publications both in terms of geographical coverage and issues of interest. The ultimate objective of the study was to inform priority setting for research in the area of access to medicines in the region and globally.

Methods

Study design

We conducted a bibliographic review ~~study~~ of research in the Eastern Mediterranean Region (EMR), involving comprehensive searches of the literature.

The study involved an extensive search of national, regional and international literature in the EMR's LMICs in 2000-2011 and mapping of research to identify the geographical, and research gaps that may have not been covered in previous research.

Literature searches

EMR included sixteen LMICs according to the World Bank categories which comprised the geographical focus of the study. The country-specific searches were conducted both in relation to author affiliations as well as the titles and abstracts of the papers.

A set of specific ATM terms were developed in two brainstorming meetings and used to devise the search strategy. The initial search strategy was tested in a number of limited searches, and was compared against a list of previously known publications. The results of the assessment were used to finalize the search strategy (Table 1). The main terms selected for this study included drugs, medicines, medications and pharmaceuticals and their variations. These were suitably linked with ATM related terms. We conducted comprehensive searches of three major electronic databases (PubMed, Social Science Citation Index and Science Citation Index). Initial searches were conducted in January 2011 and all the searches were updated in June 2011 (Figure 1). Additionally we searched the WHO websites, and contacted a few topic experts for additional publications.

Table 1. Search strategy for regional literature

Pubmed example:

#1- ((((((((((((((((Iran[Affiliation]) OR Pakistan[Affiliation]) OR Lebanon[Affiliation]) OR Egypt[Affiliation]) OR Afghanistan[Affiliation]) OR Sudan[Affiliation]) OR Yemen[Affiliation]) OR Jordan[Affiliation]) OR Tunisia[Affiliation]) OR Morocco[Affiliation]) OR Syria[Affiliation]) OR Palestine[Affiliation]) OR Iraq [Affiliation]) OR Djibouti[Affiliation]) OR Libya$[Affiliation]) OR Somalia[Affiliation])

#2- ((((((((((((((((((middle east[Title/Abstract]) OR Iran[Title/Abstract]) OR low income countries[Title/Abstract]) OR middle income countries[Title/Abstract]) OR Pakistan[Title/Abstract]) OR Lebanon[Title/Abstract]) OR Egypt[Title/Abstract]) OR Afghanistan[Title/Abstract]) OR Sudan[Title/Abstract]) OR Yemen[Title/Abstract]) OR Jordan[Title/Abstract]) OR Tunisia[Title/Abstract]) OR Morocco[Title/Abstract]) OR EMRO[Title/Abstract]) OR Syria[Title/Abstract]) OR Palestine[Title/Abstract]) OR eastern Mediterranean[Title/Abstract]) OR Iraq [Title/Abstract]) OR Djibouti[Title/Abstract]) OR Libya$[Title/Abstract]) OR Somalia[Title/Abstract])

#3- (#1) OR (#2)

#4- ((((drug$[Title/Abstract]) OR medicines[Title/Abstract]) OR medication$[Title/Abstract]) OR pharmac$[Title/Abstract])

#5- ((((((((((((((((((use[Title/Abstract]) OR access[Title/Abstract]) OR available[Title/Abstract]) OR availability[Title/Abstract]) OR affordable[Title/Abstract]) OR affordability[Title/Abstract]) OR utilisation[Title/Abstract]) OR utilization[Title/Abstract]) OR essential [Title/Abstract]) OR counterfeit$[Title/Abstract]) OR price[Title/Abstract]) OR pricing[Title/Abstract]) OR licensing[Title/Abstract]) OR licencing[Title/Abstract]) OR labeling[Title/Abstract]) OR labelling[Title/Abstract]) OR formularies[Title/Abstract]) OR generic[Title/Abstract])

#6- (((((((prescription$ [Title/Abstract]) OR prescrib$ [Title/Abstract]) OR "drug policy"[Title/Abstract]) OR "pharmaceutical policy"[Title/Abstract]) OR formulary[Title/Abstract]) OR pharmacy[Title/Abstract]) OR pharmacies[Title/Abstract]) OR pharmacist$[Title/Abstract])

#7- (#3) AND (#6)

#8- (#3) AND (#4) AND (#5)

#9- (#7) OR (#8)

Inclusion process and criteria

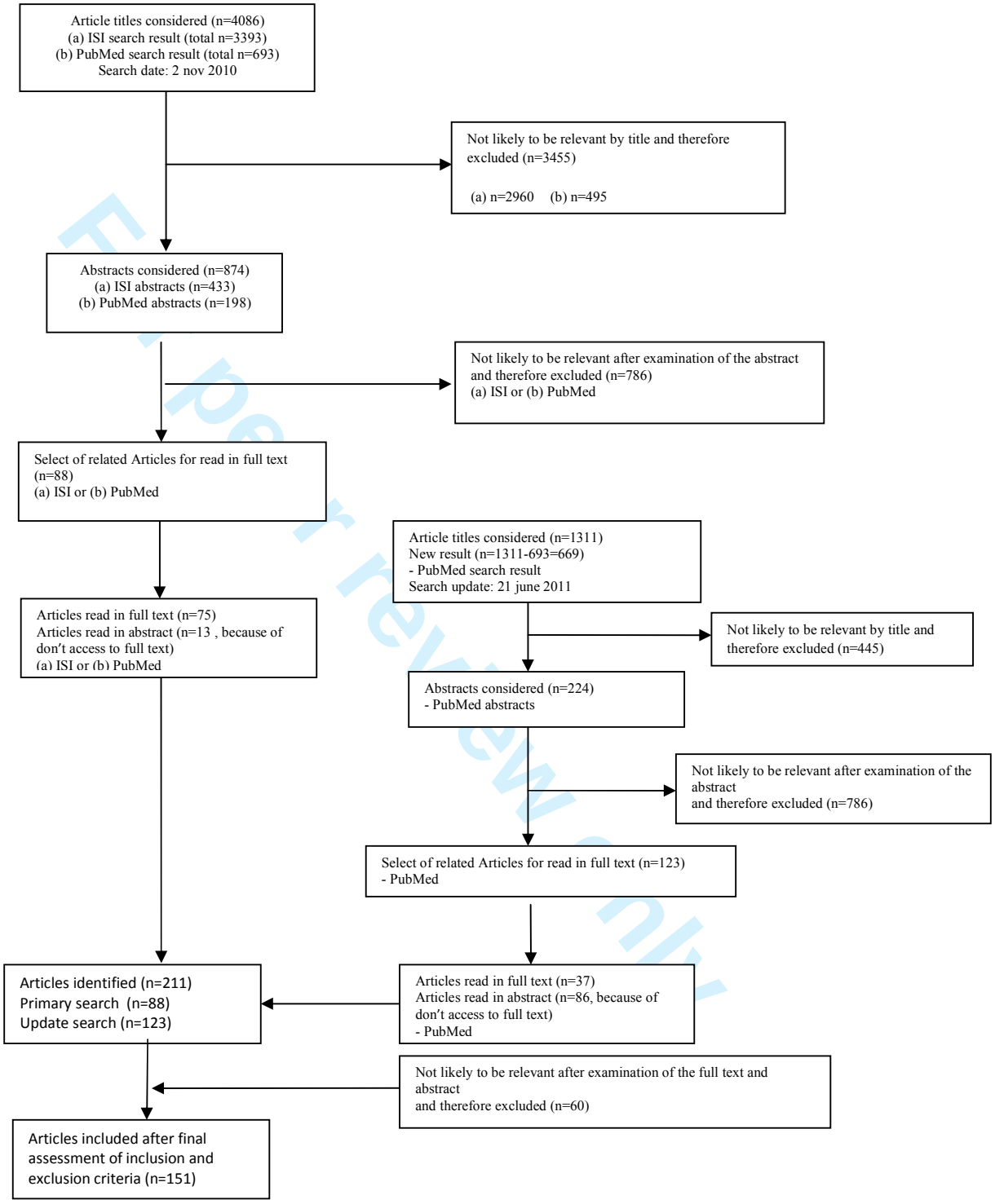
Papers published from 2000 onward were considered. To ensure accuracy, two separate samples of 100 titles were reviewed by two researchers and disagreements were discussed and clarified. All the remaining titles and the abstracts of the identified papers via the search were initially reviewed by one author. After the initial screenings, the abstracts (and subsequently the full text papers) were read by two authors.

We used the following criteria for the inclusion and exclusion of the papers:

- No research design limit was used. However, letter to the editors and abstract-only publications were excluded.

- Studies that were directly relevant to ATM issues were included. For example, for Rational Use of Medicine (RUM) studies, we considered studies that assessed RUM in a certain setting, or the studies that sought to improve use of medicines specifically. However, broader studies of improving quality of clinical care (which might have involved prescribing issues) were not included. (e.g. a clinical practice guideline development project may not be included). Although prescribing is a part of the majority of the guidelines, if the purpose of the guideline is not prescribing per se; then the paper may not be included in here. This criterion was required to ensure that we remained focused on ATM issues. The same logic was applied to other aspects of the ATM.
- Studies of drug resistance that did not elaborate on health system or ATM implications , studies of herbal medicines alone, studies of drug abuse, studies of use of contraceptive medicines that focused on family planning issues only, and studies focusing only on education methods and curriculum development for pharmacy courses were not included.

Figure 1: Flow chart of search strategies in electronic databases for ATM



Data extraction and analysis

After agreeing on the inclusion of a study, the full texts of the studies were retrieved. We developed a data extraction tool based on the study conceptual framework. We extracted data on title, authors, year of publication, the corresponding author's country of origin, countries of focus, research design and sample, a summary of main findings, ATM issues considered in the study, 'levels' of barrier studied, and the research topics recommended by the authors. If a publication discussed more than one ATM issue, we noted as many issues as applied to that publication.

We categorized the 'levels' of the health system barriers to ATM as: 'household and community', 'health service providers', 'health sector as a whole', 'other related sectors', and 'cross border issues'.[11, 12] We defined ATM issues based on the WHO Framework for ATM which included four aspects: affordability, sustainability of financing, rational use, and health systems and availability of medicines.[13]

One author extracted data from all the included studies, and another author assessed all the data extractions for accuracy and completeness. Then we used descriptive methods and presentational graphs and diagrams pertaining to the study questions, and used Pearson r estimates to assess the publication trends over time.

Results

In total 4755 titles were retrieved as a result of the searches and were reviewed (Figure 1). In total, 151 articles were identified (Figure 1) that focused entirely or partially on ATM issues in one or more of EMR's LMICs.

As the search strategy was sensitive to identify studies that were conducted in LMICs, we also identified additional twelve international studies that had important implications about ATM in LMICs of the region.[1, 14-24] Among these twelve studies, eight had been published in 2011 alone. We used these studies to discuss and highlight some of the identified issues but did not include them in the analyses.

Six papers were published in languages other than English: French (two each from Tunisia and Morocco and one from Lebanon) and Czech (on Yemen).

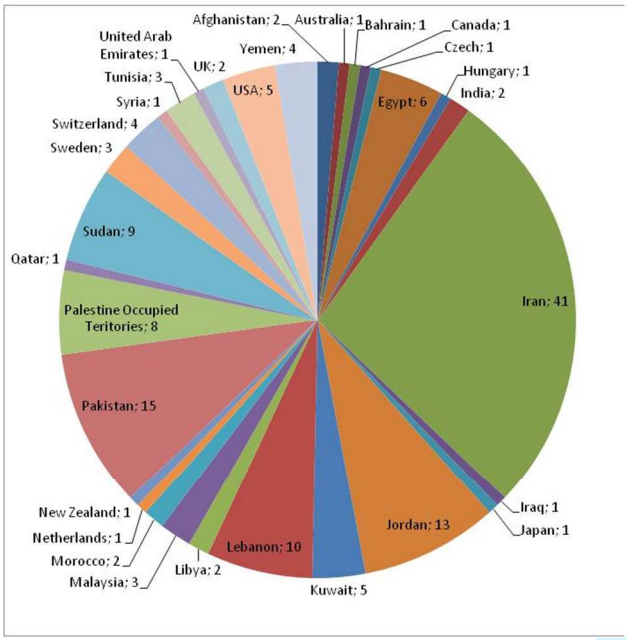
Countries of origins of the studies

Most of these articles (117 articles, 77%) originated (based on the corresponding author's address) from the LMICs in EMR, while 8 (5%) originate from high-income countries of the region and 26 (17%) from other countries (Figure 2a). There was a wide variation in the number of publications per country (Figure 2a). The countries that produced at least ten articles in the journals indexed in international databases were Iran (41, 27%), Pakistan (15, 10%), Jordan (13, 9%) and Lebanon (10, 7%). These were followed by Sudan (9), Palestine Occupied Territories (8), Egypt (6), USA (5) and Kuwait (5).

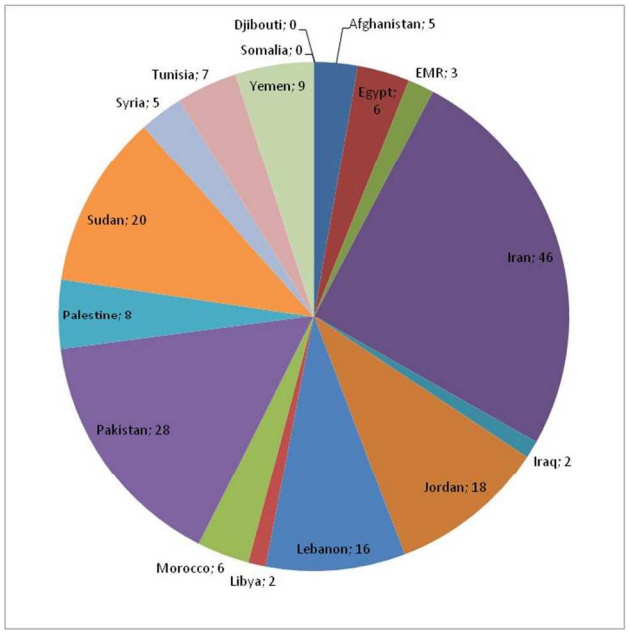
We found several comparative international studies that used data from EMR or discussed issues relevant to EMR countries. In total 17% of the identified literature originated from countries outside the EMR. 11 (out of 26) of these studies were multi-country studies that included one or more EMR countries alongside others.

Figure 2. Distribution of the country of origin (a), and the country of focus* (b) for publications on ATM issues in the EMR's low-income and middle-income countries.

a



b



* The total number of publications adds up to more than 151, because some publications discuss more than one country each.

Countries of focus of the studies

In total, fourteen EMR LMICs have been the focus of at least one ATM research article in the past decade. The countries that were the focus of at least 10 articles were Iran (46, 30%), Pakistan (28, 19%), Sudan (20, 13%), Jordan (18, 12%) and Lebanon (16, 11%).

Two countries (Iraq, Libya) were discussed in only two papers each (Figure 2b). We found no studies on Somalia and Djibouti. There were also no studies of South Sudan, i.e. none of the publications discussing Sudan had specific attention or data from South Sudan, which is now an independent country.

Research designs

The majority of the included studies involved cross-sectional studies of various designs. Questionnaire surveys - of facilities, providers and students (38 articles), patients and users (16 articles) and households (seven articles) - were the most common research designs and were used in 41% of the articles. This was followed by prescription audits and medicines utilization reviews that were observed in 35 articles (23%). Qualitative studies (mainly as case-studies) were observed in 10 articles. Similarly 15 articles (10%) focused on policy related issues in review articles, policy briefs or advocacy papers; although pinpointing the research designs in these studies was not straight forward and some studies did not employ a formal research approach.

We also identified 13 interventional studies (including two randomized controlled trials), and two economic studies and two consensus development studies. These articles, except for one, were all published since 2008. We included nine secondary data analyses (mostly involving multi-national data analyses), one systematic review, one bibliometric study, one cohort and one case-control study.

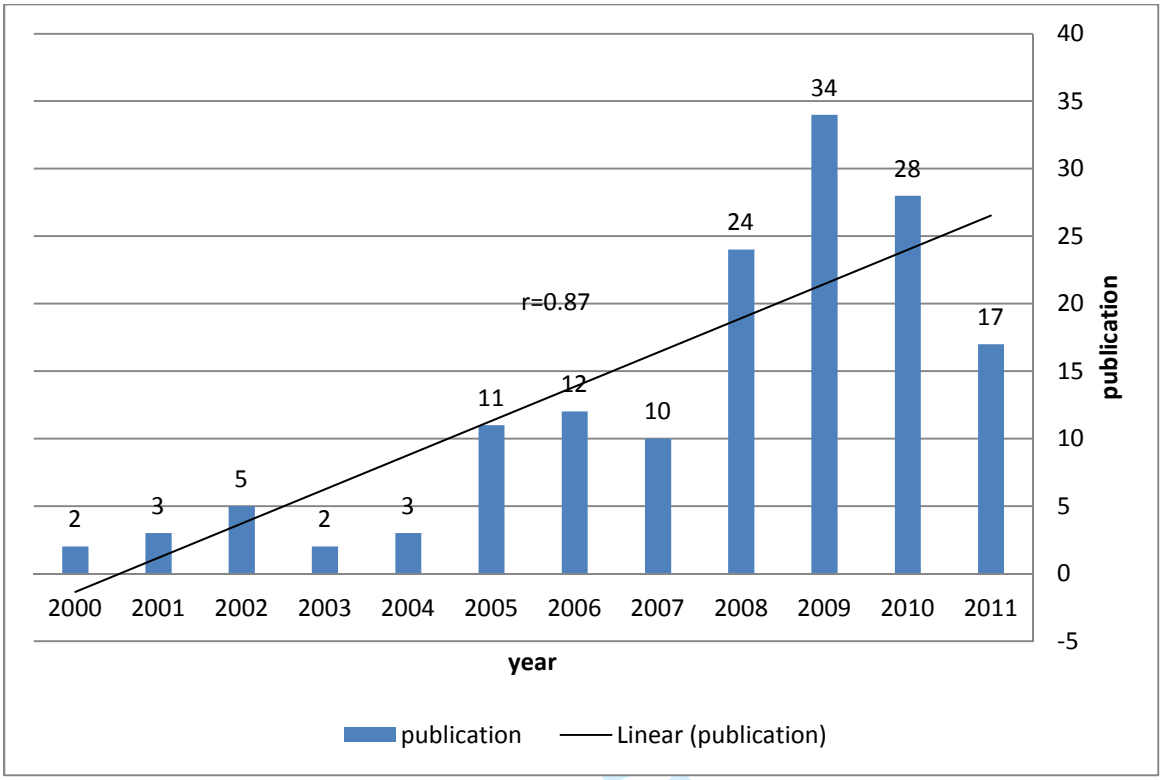
The studies had substantial variations in their designs, from well-designed trials or large-sample national and multi-national studies to small-scale studies of convenient samples or with unclear research designs.

Growth in ATM publications

We observed a relatively steady growth in the number of publications per year on ATM in the EMR within the last decade (Pearson r=0.87; see Figure 3). While in the first three years of this period there were only about ten publications from the region, 80 studies had been published in the last three years of the study period. We also observed a modest increase in the

proportion of studies originated from outside EMR during 2006-2010 period (20%) compared with the 2000-2004 period (13%).

Figure 3. The increasing number of ATM publications per year n EMR. (note: 2011 publications cover only the first half of this year.)



ATM issues of focus

To understand the ATM issues on which the published article focused we assigned each article to one or more of the four large components in the WHO ATM framework. We noted the ATM issues of focus for the articles: affordability (25, 17%), financing (18, 12%), rational use (106, 70%), and health system and availability (63, 42%) (Table 2). RUM studies were the main bulk of the studies conducted in the region, while very limited attention had been devoted to financing aspects of access to medicines.

Table 2. ATM issues and health system levels discussed each year in EMR publications*

Year	Affordability	Sustainable financing	RUM	Health system and availability	Household & community	Health service public or private	National Health sector	National beyond health sector	Cross border issues
2000			2	1		2			
2001	1		1	2	1	2	1		
2002	1	1	5		3	3	2		
2003			1	2		2	2		
2004	2	1	2	2	1	2	2	1	1
2005			10	1	4	8	8		
2006	2		8	5	3	10	5	2	1
2007	1	1	8	6	3	6	8		1
2008	4	5	16	9	9	18	13		1
2009	7	7	20	15	9	22	16	1	1
2010	4		20	10	6	20	14	1	1
2011	3	3	13	10	5	13	8	2	3
Total	**25**	**18**	**106**	**63**	**44**	**108**	**79**	**7**	**9**

* The totals add up to more than 151 as an article might be assigned to more than one ATM issue or health system level

Similarly the papers were assigned to one or more 'health system levels' that were the focus of attention for the study (the total adds up to more than 151): household and community (44, 29%), health service (108, 72%), national health sector (79, 52%), national beyond health sector (7, 5%), and cross border issues (9, 6%) (Table 2). Despite the importance of cross-border issues and the role of sectors beyond the health sector in facilitating or impeding ATM, scarce attention was devoted to those issues in the region.

On the whole the majority of the studies were limited to health services level, mainly assessing RUM issues at the level of providers. We found many studies of availability and RUM issues (Table 2), including studies that focused on adverse drug reaction (ADR) reporting in several countries.[25] Many studies focused on reporting simple RUM indicators for prescribing behaviors (e.g. average number of medicines per prescription, or the proportion of prescriptions containing injectables), and most reported an unfavorable picture.[26-32] Others focused on self-medication issues from different countries and areas, and different sub-groups of population.

The articles occasionally offered research recommendations for future studies. Examples of such research recommendations are offered in Table 3.

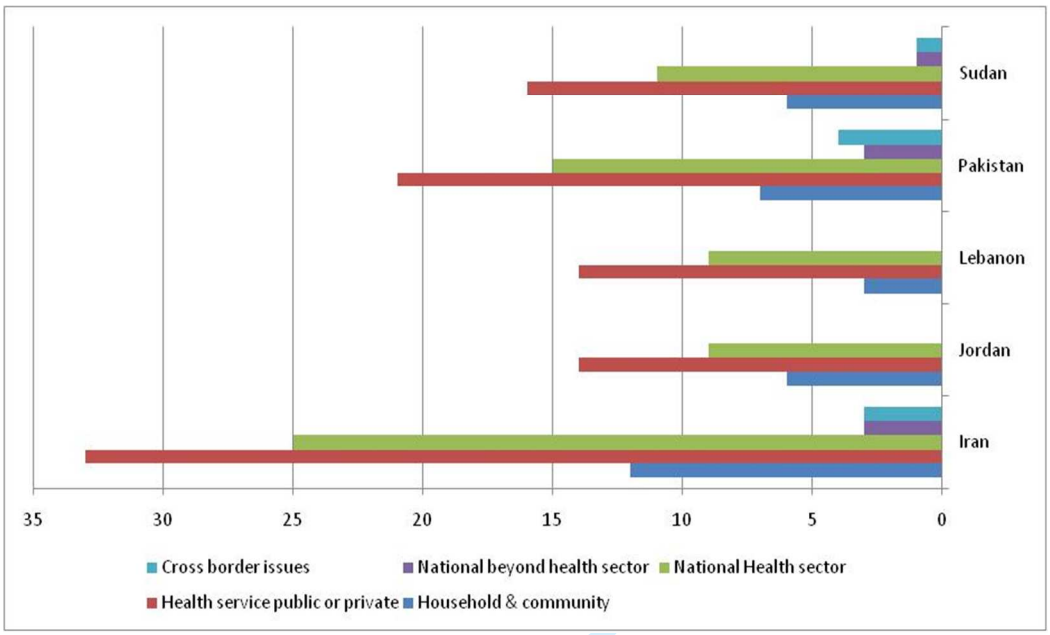
Table 3. A few examples of research recommendations for future studies reported in the included articles

- The cost–effectiveness of different respiratory care services on TB case detection and health system strengthening [33]
- The cost-effectiveness of using community health workers or outreach clinics for dispersed rural populations [34]
- The effect of various policy interventions to make medicine more affordable [7]
- The impact of the national pharmaceutical policies on financial capacity of health system, out-of-pocket health expenditure, and the domestic pharmaceutical industry [35]
- Identifying valid indicators for the assessment of physicians' prescribing performance [36]
- The outcomes of unnecessary 'stat' (urgent) prescribing orders on adverse drug events in hospitals [37]
- Using longer term routine data to assess the effects of essential medicines lists and universal health coverage policies on rational use of medicines, out-of-pocket health expenditures and health outcomes [38]
- The impact of legislative and market changes to improve the quality of retail pharmacy in low- and middle-income countries [39]
- Formulating clinical guidelines for use of benzodiazepines in different indications [40]
- The effectiveness of policies to improving access to medicines in resource poor countries based on research evidence from such countries [41]

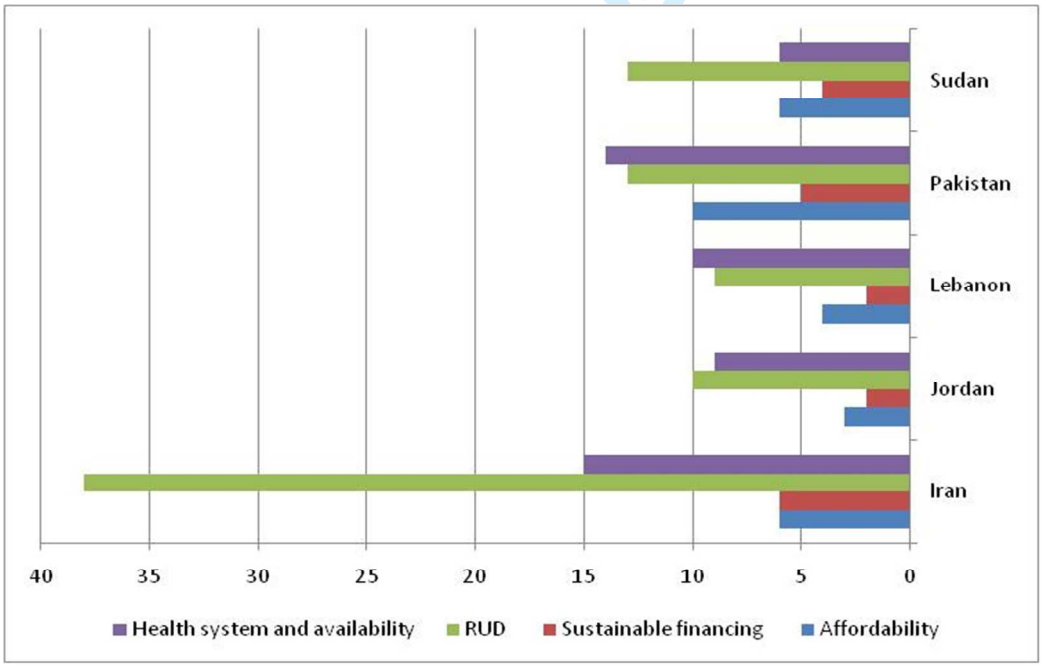
As a further analysis, we focused attention on the countries for which there were ten or more ATM publications (Iran, Jordan, Lebanon, Pakistan, Sudan) to see the proportion of these publications that discussed different health systems level (Figure 4a). Very few studies considered cross-border issues and other relevant sectors beyond the health sector. In terms of the ATM issues considered in the studies, ATM research in Iran was heavily biased towards RUM studies with 38 papers, followed by health system issues (15 papers) (Figure 4b). Other countries gave a more balanced picture, albeit with smaller number of papers: 9 to 13 papers on RUM; 6 to 14 papers on health system and availability issues, and 3 to 10 papers on affordability issues. Similarly in all five countries, the health service and national health sector levels of the health system had attracted the majority of the published ATM papers.

Figure 4. Distribution of the level of barriers considered (a), and issues discussed (b) in the ATM publications in countries with over ten publications.

a)



b)



Discussion

The results of the study showed that in 16 LMICs (now 17 countries including South Sudan) in the EMR, with a total population of over 537 million people, 151 articles were published that focused entirely, or in some parts on ATM issues. These studies focused on fourteen countries with no publications assessing ATM issues in Djibouti, Somalia or South Sudan. The countries that produced most publications were Iran, Pakistan, Jordan and Lebanon.

The number of publications for some countries was proportionately very low. For example, if we had excluded the studies from Egypt that were published because of the presence of the WHO regional office in Cairo, then very few studies from Egypt would have remained in our sample. This was surprising given that Egypt is one of the most populous countries in the region, and it enjoys an expanded academic sector.

The last decade demonstrates a growth in the number of publications per year on ATM in the EMR. This is a good sign that with further development of health systems, the number of publications is growing. This may provide a good opportunity for evidence-based decision making based on evidence from the region.[42] however the publications were focused mainly on RUM issues and most studies only assessed challenges at the service provider level.[43] There was limited attention to affordability and financing issues in EMR region, and the impact of cross border factor and sectors other than health sector on ATM were rarely studied.

Lack of attention to the financing and affordability aspects of ATM in EMR studies is despite the fact that several studies have demonstrated the importance of these aspects.[7] In an international study using household survey data from World Health Surveys, it was clear that affordability was a major barrier to access at the level of households. The study concluded that between 41% and 56% of households in LMICs spent almost all of health care expenditures on medicines.[44] The study called for expanded benefit packages and further coverage of medicines in insurance plans in low-income and lower-middle-income countries. Whether or not this was taken up in the EMR region is another matter. Among LMICs in the region, Jordan, Iran, Egypt, Morocco and Tunisia have health care insurance systems developed and established by the government.[45, 46] These schemes have various successes and limitations which may impede access to medicines.[47] Despite this system development in these countries, still limited attention to insurance related issues was observed in the ATM publications. For other LMICs in the region, without such nationally funded programs, it will be more difficult to adopt and implement Wagner et al (2010) advice.

Another issue for both affordability as well as financing of medicines in LMICs is the pricing of medicines.[43] Wagner et al noted that there was an array of reasons and manifestations of price differences for medicines in different countries. Despite the importance of the issue they noted that literature from developing countries has showed very little attention to pricing issues.[14] Our findings supports their conclusion.

The overrepresentation of RUM studies might be linked to the availability of widely used instruments to measure RUM, developed by the WHO and other organizations. For example the "investigating medicine use" tools have existed since early 80s. Although in its current edition, it covers all areas of ATM,[48] in its original versions it had a special attention towards measurement of RUM aspects of medicine. Pricing and availability tools (WHO-HAI project) have been more recently developed.[49] Also, recent growing attention on financing mechanisms and universal health coverage seems to slowly attract attention on these aspects applied to medicines area. Note also that standard instruments household survey and health care utilization tools (e.g. the World Health Survey tool) tools that usually allow to look at health financing aspects or out of pocket expenditures often do not discriminate between medicines and other expenditure items. To assess households' pharmaceutical expenditure, usually primary data collection is needed, which may be expensive and time-consuming and therefore limited only to countries that have the resources to conduct such studies. Also it seems that the indicators and instruments on RUM are more widely accepted than pricing indicators, e.g. there may be disagreement on measuring retail price, procurement price, with or without markup.[7, 50] Still one might hope that with the emergence of further attention and better tools to assess financing aspects of the ATM, more papers will be published on such issues in near future.

RUM research in the region has been mainly in the shape of prescription audits, the majority of it showing there are important problems in prescriptions.[32, 43, 51-53] There are two important patterns to note in here. First, the RUM research, although forming the majority of ATM research is yet to show a substantial effect in improving drug utilization patterns. The prescribing problems of focus in ten years ago remain unresolved today, if not joined by new challenges (e.g. non-generic prescribing). For example, one study that assessed ADR repots for artemisinin based anti-malaria treatments did not find a single report of ADR for artemisinin-based medicines from EMR countries with hyper- and meso- endemic malaria problems.[54] Also studies of pharmacy service quality demonstrated a low quality of service and a room for improvement in provision of care at the pharmacies.[55] In a way, maybe it is safe to conclude that even RUM studies have not been that effective in improving access, or tackling the main issues.

Second, it seems a change in research strategies is required and future studies should further focus on assessing the impacts of relevant intervention~~sal issues~~. ~~-~~Fortunately in recent years there is a shift toward~~s~~ interventional studies assessing the impact of interventions on improving prescribing outcomes.[33, 56-59] Also further demand side (e.g. why public still seems fascinated with antibiotics), supply side (e.g. how physicians might be encouraged to follow evidence-based prescribing) and health systems angle (e.g. what are the financial and organizational barriers to improving prescribing patterns) research is required.

Other sectors (other than health care sector) effects on access to medicines are barely considered in the publications from the region. Studies have demonstrated that general socioeconomic status of a country is linked to ATM, while few studies have elaborated on this in the region.[60] Despite many studies that assessed the impact of health system and provision issues on ATM, there are very few studies that discuss important policy directions for improving ATM. For example we did not find any study that had assessed the impact of essential drug lists initiatives on access to medicines in an EMR country. This is despite the fact that according to Mirza (2008), all of the LMICs in the EMR region, except Libya and Lebanon, had a policy of essential drug lists in place at the time.[45]

Ritz et al (2010) reported the findings a of a bibliometric study ~~analysis~~ of ATM literature in LMICs.[41] Compared to our study, they underestimated the number of papers produced from the EMR region by a wide margin. They suggested that medicine selection, intellectual property rights and monitoring and quality assurance were among the top ATM topics studied in developing countries, which is different from what we observed in EMR. Interestingly, Ritz et al observed that the corresponding authors residing in high-income countries represented around 50% of all publications relative to LMICs. Our study demonstrated that most articles (77%) in the region originated (as per the corresponding author's address) from the LMICs in the region.

There are several limitations to the current bibliography study. Using the affiliation of the corresponding author to identify the study's country of origin has several limitations. For example, it may be a team work, in which authors from different countries contribute. Also several identified studies were from research students in high-income countries institutions running research on their own countries. Many such students are also funded by their own countries, but may use the affiliations of the institutions in which they study. On the other hand, there are studies conducted by foreign missions based in a country, and although the address of the foreign mission is from that country, the study cannot be strictly considered as homegrown. Despite such limitations, the bibliographic reviews ~~analyses~~ are informative of country productivity in ATM research.

We conducted systematic searches of the main international databases for identifying ATM papers. Although we followed rigorous methods, the search should not be considered

exhaustive. We might have missed published papers not indexed in these databases. However, as most of the important health research from the region makes it to international databases, we believe that we have captured a substantial number, if not the majority, of papers on ATM.

Conclusions

The provision of reliable access to affordable, appropriate and high-quality medicines is a key component of a functioning health system. Access to medicines needs to be fully integrated with health financing, human resource planning, service delivery, information and governance systems. This is the first study conducted in this region that has collated published literature and summarized the main policy concerns to identify ATM research priorities. In this study we used an extensive search of local and regional literature. We developed detailed maps of research on the issue, conceptual frameworks of policy concerns and issues, and identified lists of ATM research priorities for the countries of focus and the region as a whole.

This study clearly indicates that there is dire need for further research on financing and affordability aspects of ATM in the region. This should be given paramount attention in future research funding and calls for proposals. Also cross-border issues and other sectors roles on access to medicines in the region has not explored widely. It seems that many household (demand side) studies in the region remain of poor quality and limited methods. Together, these main areas should provide the main aspects of access to medicines research in the region.

This is in no way indicating that further RUM or studies of health systems and availability access are not needed, or that the barriers at the levels of providers and health systems are exhaustively identified. Rather it seems that individual researchers and available funding route are giving attention to these issues at the moment, which should continue while further resources should be mobilized for studies related to the relatively ignored aspects of ATM research in the region.

The picture of research on the ATM in the region is better than what had been reported in recent publications[41] or compared to other regions.[6] There is a growing trend, over the years, of more and better quality studies from the region appearing in international journals. Still, a concurrent trend will be required to ensure the local audience of such research (i.e. practitioners, policy makers and media) remains informed of the new development as a result of ATM research in countries in the region. An active knowledge translation approach will be essential.

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Competing interests

The views expressed in the document are those of the individual authors and do not necessarily reflect the views of their respective organizations or the funding body.

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