Evidence-to-policy gap on hepatitis A vaccine adoption in 6 countries: Literature vs. policymakers' beliefs

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Abstract

Background: National vaccine adoption decisions may be better understood by linking multiple data sources. When examining countries’ decisions to adopt the hepatitis A vaccine, applying multiple research methods can facilitate assessments of gaps between evidence and policy. We conducted a literature review on hepatitis A and stakeholder interviews about decisions to adopt the vaccine in six countries (Chile, India, South Korea, Mexico, Russia, and Taiwan).

Methods: A systematic literature review was conducted across five literature databases. The review identified and abstracted 340 articles, supplemented by internet search. In addition, we interviewed 62 experts and opinion leaders on hepatitis A and/or vaccines. Data from the two sources were analyzed to identify gaps around epidemiologic data, economic data, and barriers/facilitators of hepatitis A vaccine adoption.

Results: Epidemiologic data gaps were found in Chile and Russia, where stakeholders believed data to be more solid than the literature documented. Economic data on hepatitis A was found to be weak across all countries despite stakeholders’ agreement on its importance. Barriers and facilitators of vaccine adoption such as political will, prioritization among vaccines, and global or local recommendations were discussed more by stakeholders than the literature. Stakeholders in India and Mexico were not concerned with the lack of data, despite growing recognition in the literature of the epidemiological transition and threat of outbreaks.

Conclusions: Triangulation of results from two methods captured a richer story behind vaccine adoption decisions for hepatitis A. The discrepancy between policymakers’ beliefs and existing data suggest a decline in priority of hepatitis A or weak investment in data collection. Filling the confirmed data gaps in seroprevalence or economic data is important to help guide policy decisions. Greater communication of the risk of hepatitis A and the benefits of the vaccine may help countries undergoing the epidemiologic transition.

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1. Introduction

Using one research methodology is often not enough to tell a full story especially for national vaccine adoption decisions, which often require diverse viewpoints to understand the complete picture. Applying multiple research methods and triangulating results may capture elements of the story that might be overlooked by one method or the other. In this paper, we apply two research methods in examining decisions to adopt a new vaccine where notable gaps may exist between evidence and policy. These gaps may be particularly important for considerations to add the hepatitis A vaccine into national immunization schedules given the unique characteristics of the epidemiological transition that moves countries from high to low endemicity of hepatitis A.

Hepatitis A is an acute liver disease caused by the hepatitis A virus, which is preventable by available safe and highly efficacious
vaccines [1]. Since hepatitis A virus is transmitted through the fecal-oral route, the incidence of hepatitis A varies according to level of socio-economic development. As countries develop and improve sanitation and water supply, childhood exposure to the virus decreases and countries begin an epidemiologic transition, characterized by later age at first infection and increasing incidence of symptomatic hepatitis A. The disease may represent a substantial economic burden in countries transitioning from developing to developed economies with intermediate and high incidence rates, where slow recovery and rare serious complications result in productivity loss, caregiver burden and medical resource utilization. Despite its high efficacy, the hepatitis A vaccine has not been widely adopted into national immunization programs to date [2,3].

This study simultaneously carried out a literature review on hepatitis A, supplemented by an internet search and policy interviews about the adoption process for hepatitis A vaccine in six middle- and high-income countries (Chile, India, South Korea, Mexico, Russia, and Taiwan). The literature review focused on capturing epidemiologic, economic or policy articles on hepatitis A in these countries, while key informant interviews set out to understand local stakeholder perceptions about the evidence on hepatitis A infections and its vaccines. The study focused on countries in various stages of epidemiologic transition and economic development (see Table 1 for key health and economic indicators) to assess if any gaps exist between existing evidence and policies.

2. Materials and methods

2.1. Literature review

We conducted a systematic literature search in October 2011 across five electronic databases: PubMed®, ISI Web of Knowledge, EMBASE, Scopus, and EconLit. The search used variations of two search terms: “hepatitis A” and [one of six countries]. We included articles primarily focused on hepatitis A epidemiology, economics and/or policy. Epidemiologic articles included those reporting seroprevalence, incidence, prevalence, endemicity, clinical manifestations or risk factors of hepatitis A. Policy articles included government reports, editorials or reports without primary data, which were focused on issues related to vaccine adoption, prevention or control efforts for hepatitis A. We excluded articles less relevant to this analysis, such as papers focusing on biological mechanisms of hepatitis A, non-human studies, vaccine trial results, and case studies. Given that hepatitis A was not high on the global agenda prior to 1990, our search was limited to articles published since then. For most countries, pre-1990 seroprevalence data was reported in articles published after 1990 providing historical data with trends in seroprevalence over several decades. In some instances, however, it was necessary to search pre-1990 literature to fill in data gaps on seroprevalence prior to 1990. Articles in each of the local languages (Chinese, Korean, Russian, Spanish) were included in the search. Reference lists of primary studies and systematic reviews were also scanned to identify additional studies missed by the initial search. Articles were first reviewed for inclusion based on title. Abstracts and full articles were reviewed next to determine study inclusion.

A supplementary internet search was conducted to fill in gaps in country-specific epidemiological data or vaccine policy information. Direct scan of ministry of health, pediatric society, infectious disease society, immunization technical advisory councils, medical journal databases or other relevant websites was also conducted for each country to identify relevant articles or reports, find current recommendations or fill specific data gaps.

For articles meeting the inclusion criteria, we abstracted data on background information (authors, title, year of publication and data collection, journal, country/region, type of article), as well as study design, study subject characteristics, results, policy recommendations and perceived barriers and facilitators to hepatitis A vaccine adoption. We summarized results separately for epidemiologic and policy-focused articles. Articles in Russian, Spanish, and Chinese were abstracted by native language speakers and writers of those languages, with a background in healthcare analysis.

2.2. Policy interviews

In-depth interviews were conducted with experts and opinion leaders on hepatitis A in each country, including current and former government officials, authors of articles on hepatitis A, academics, clinicians, hepatologists, individuals working for international organizations, vaccine manufacturers, and those in civil society. Individuals were identified through the literature search and personal contacts using snowball sampling. The contact list was reviewed by country experts to identify the most relevant contacts and facilitate interviews in some cases. All interviews were carried out face-to-face by two interviewers, where one individual took detailed notes. Interviews were held in the capital cities, lasted one hour, and not digitally recorded. Questions were asked mostly in English with professional translators used in Taiwan and Russia. In
Chile and Mexico, some respondents explained some answers in Spanish in response to questions in English.

An interview guide was developed and pretested where questions focused on perceptions of disease burden and the evidence supporting hepatitis A vaccination, as well as the decision-making processes for adoption of a hepatitis A vaccine into national immunization programs. Interviews also assessed respondent beliefs about general policymaker agreement with a series of statements about hepatitis A severity and its vaccine.

Detailed interview notes were analyzed by line-by-line coding using ATLAS.ti software. A codebook including a priori research questions was developed and applied. We present numbers of responses among those who answered specific questions. Results are presented in aggregate across respondents to protect the confidentiality of individuals. Analyses were conducted at the country level and by themes across countries.

### 2.3. Combining the literature review and policy interviews

Data from the literature review, internet search and key informant interviews were analyzed together to identify gaps between the two sources around epidemiological data, economic data and policies around hepatitis A vaccine adoption. For each topic, we compared what was said or reported in the literature with what stakeholders reported.

### 3. Results

The literature and internet search yielded 797 articles. The initial screening removed 343 articles based on titles and abstracts. Another 114 articles were excluded upon reading of full-length articles. This resulted in 340 articles, or 352 by country, as some articles covered multiple countries (see Fig. 1 for a flow diagram). The majority of included articles were identified through PubMed. India, South Korea and Taiwan (88, 77 and 72 articles) had twice as many publications as Russia, Chile and Mexico (43, 40 and 32 articles). 312 articles discussed the epidemiology of hepatitis A. 36 articles were on policy and 4 articles on economic analyses. While all the articles on India were in English, many of the articles in the other countries were in local languages (Russia 83%, Chile 75%, Mexico 63%, South Korea 47% and Taiwan 13%).

For policy interviews, a total of 143 individuals were contacted and 62 interviews were completed in 2012. In Mexico, Russia and Chile, current and former government employees represented 67%, 50% and 42% of respondents, respectively, compared to 20–30% of respondents in other countries. Other respondents included clinicians (29%), academics (23%), members of civil society (6%), vaccine manufacturers (2%), and international organization representatives (2%). Among those not interviewed, 72% did not respond to interview invitations, 15% were unable to participate due to travel, 11% stated they were not experts on hepatitis A, and 2% could not be conducted without permission in Russia.
Table 2
Epidemiologic data on hepatitis A disease.

<table>
<thead>
<tr>
<th>Literature</th>
<th>Endemcity of Hepatitis A, WHO Classification</th>
<th>Most Recent Year of Seroprevalence Data</th>
<th>Support for the Epidemiological Transition</th>
<th>No. of Epidemiology publications</th>
<th>Most Recent Year of Incidence Data</th>
<th>Most Recent Year of Outbreak Data</th>
<th>Perceptions of hepatitis A disease</th>
<th>Most decision-makers would:</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>High</td>
<td>Seoul: 2010; Central: 2009; Northern: 2009; Southern: 2009</td>
<td>Western: Yes; North: No; South: No; Central: No; East: No</td>
<td>80</td>
<td>Not identified</td>
<td>2005</td>
<td>India</td>
<td>64%</td>
</tr>
<tr>
<td>South Korea</td>
<td>Low</td>
<td>Mexico City: 1995; Other: 2006</td>
<td>Seoul: Late 1980-90s; Central: variable data; Northern: N/A; Southern: variable data</td>
<td>67</td>
<td>2010</td>
<td>2008</td>
<td>South Korea</td>
<td>60%</td>
</tr>
<tr>
<td>Mexico</td>
<td>Intermediate</td>
<td>Mexico City: unclear; Other: Late 1990s</td>
<td>Data are variable; trends unclear</td>
<td>100</td>
<td>2000</td>
<td>None</td>
<td>Mexico</td>
<td>67%</td>
</tr>
<tr>
<td>Russia</td>
<td>Low</td>
<td>Data are not available for this year</td>
<td>Data are not available for this year</td>
<td>50</td>
<td>2010</td>
<td>2002</td>
<td>Russia</td>
<td>100%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Low</td>
<td>Data are not available for this year</td>
<td>Data are not available for this year</td>
<td>30</td>
<td>2010</td>
<td>2007</td>
<td>Taiwan</td>
<td>10%</td>
</tr>
</tbody>
</table>

3.1. Epidemiologic data on hepatitis A disease

Epidemiologic data from the literature were compared with interviewees’ general perceptions of data availability and risk of hepatitis A disease (Table 2).

There was strong agreement between the literature and interviewees’ perceptions of the ample epidemiologic evidence on hepatitis A in South Korea (75 articles) and Taiwan (65 articles). Many Korean interviewees mentioned epidemiologic data including disease burden and infection source of hepatitis A. In Taiwan,
a number of interviewees expressed confidence in the country’s surveillance system: “We have disease burden and reported cases, very excellent surveillance.” Published data in South Korea and Taiwan show a downward shift in population seroprevalence over time and trends toward infection at older ages [4–7]. A number of Korean studies showed most people aged 10–29 have no antibodies against hepatitis A virus [6,8–11], a trend also mentioned in Taiwan. Recent outbreaks were reported in both countries (2007 in Taiwan, 2008–9 in South Korea) [12–15].

In Chile and Russia, the majority of interviewees suggested that routine surveillance provided reasonable epidemiological data on hepatitis A, but recent data were not verified from the literature review. Many Chilean respondents were positive about the surveillance data, and our review found sufficient literature through the 1990s documenting the transition to lower endemicity [16–22]. The most recent hepatitis A specific data, however, were from 2001, with only two studies [23,24] examining the changing epidemiology of hepatitis A and the potential threat it poses. Although the Chile Ministry of Health reports incidence data from 1975 to 2011, all hepatitis A cases are combined, leaving doubts as to the specific role of hepatitis A: “We don’t have routine hepatitis A tested. Typing is for B only, and if not B, then “non-B.” Overall, respondents in Chile reported a high level of confidence that water and sanitation improvements had largely addressed disease, except for a small number of areas.

Table 3
Economic data on hepatitis A vaccine.

<table>
<thead>
<tr>
<th>Key economic data</th>
<th>Chile</th>
<th>India</th>
<th>South Korea</th>
<th>Mexico</th>
<th>Russia</th>
<th>Taiwan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“How important are economic studies in the decision-making process for a Hepatitis A vaccine in [country]?”</td>
<td>Very important</td>
<td>73%</td>
<td>64%</td>
<td>100%</td>
<td>83%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>18%</td>
<td>36%</td>
<td>0%</td>
<td>17%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Not imp./Don’t know</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
<td>34%</td>
</tr>
<tr>
<td>“Were any types of economic studies for Hepatitis A done in [country]?”</td>
<td>Yes</td>
<td>90%</td>
<td>0%</td>
<td>89%</td>
<td>17%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0%</td>
<td>64%</td>
<td>0%</td>
<td>42%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>10%</td>
<td>36%</td>
<td>11%</td>
<td>42%</td>
<td>20%</td>
</tr>
<tr>
<td>“[If Yes above] Are the economic studies sufficient to support an adoption of a Hepatitis A vaccine?”</td>
<td>Yes</td>
<td>67%</td>
<td>N/A</td>
<td>71%</td>
<td>N/A</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33%</td>
<td>N/A</td>
<td>29%</td>
<td>N/A</td>
<td>75%</td>
</tr>
<tr>
<td>Literature</td>
<td>Type of economic study</td>
<td>Cost-effectiveness</td>
<td>None</td>
<td>Economic analysis</td>
<td>Financial burden</td>
<td>None</td>
</tr>
<tr>
<td>Main conclusions</td>
<td>Chile</td>
<td>Valenzuela, 2005</td>
<td>From the health system perspective, vaccination would cost $460 US per life-year saved, or $281 US per QALY gained. Savings from healthcare costs would exceed the cost of vaccination in 7–13 years ($3.9 million US saved within 5 years).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quezada, 2008</td>
<td>$4,984 per life year gained (base case scenario: 95% vaccine coverage, 100-year time horizon, 1% annual decrease in force of infection); Cost savings were reached after 6 years; Break-even price for one dose of the vaccine: $48.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>South Korea CDC, 2010</td>
<td>Most cost beneficial vaccination strategy: vaccinate 90% of 1-year olds and 50% of those 13–18 years; Most effective strategy: vaccinate 50% of those 19–39 years along with 90% of 1-year olds.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mexico Rivas-Oropeza, 2009</td>
<td>Annual cost of hepatitis A and its complications: $75.9 million pesos (US$5.9 million); Cost per minor case: $1,186 pesos (US$92), severe case: $5,942 pesos (US$461), cholestatic case: $5,967 pesos (US$4,349).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussed by: ■ Both ■ Interviews only ■ Literature only ■ Neither
In Russia, several respondents reported that disease burden data is available and cited numbers of cases by region and year; however, we could not identify such data through the literature review. The review identified 38 epidemiological studies in Russia, with only two studies reporting seroprevalence data after 2000 [25,26]. One Russian government respondent noted: “seroprevalence data for some regions show high antibodies; however, we do not have exact data for most regions in different age groups.” Overall, the published epidemiological data in Russia were quite variable, suggesting variations in measurement, reporting, or interpretation [27–29].

In Russia, the literature reported several outbreaks in cities [30] and following natural disasters [31–33], some of which were mentioned by respondents.

In India and Mexico, respondents and the literature agreed that the hepatitis A epidemiological evidence is weak, but some respondents did not find this alarming. In India, two respondents said there were no epidemiologic data available: “[We have] no mortality, no morbidity, no estimates of economic loss for the poor. But the technical advisory groups need to have these data to review to make decisions.” A few respondents noted recent studies not yet completed and published. The literature review confirmed the lack of recent seroprevalence data in most areas of India [34–39]. Meanwhile, several respondents believed hepatitis A disease is not in India and that seroprevalence in India has not changed: “We don’t have [data] and we really don’t need it.” Policy articles from 1995 through 2011, however, indicate a growing recognition of the epidemiological transition in India and the growing threat of outbreaks [40–47]: “The epidemiological transition needs to be documented as well as the potential for outbreaks; Kerala was one state with a recent outbreak.” A 2005 outbreak in Hyderabad suggested a change in adult seroprevalence, warranting further assessment for vaccination [48]. Currently, there is no national surveillance system to track outbreaks and the burden of hepatitis A in India.

In Mexico, respondents noted there is no data by age group, geography, or socioeconomic status, or data capturing private immunizations, disease severity and the extent of fulminant disease. The overall body of Mexican literature on hepatitis A epidemiology was relatively small, with old (1996) seroprevalence data for Mexico City [49] and more recent data through 2006 for other areas [50–52]. Older data suggest the initiation of the epidemiological transition in Mexico [53].

3.2. Economic data on hepatitis A vaccine

The majority of stakeholders in 5 out of 6 countries reported that economic and financial data were very important in the decision making process (Table 3). A government implementer in Mexico noted the Ministry of Health is “quite willing to have a discussion on hepatitis A; that is why we need cost-effectiveness [data].” However, the literature and Internet search identified only 4 economic analyses on hepatitis A in the six countries. These included two cost-effectiveness studies in Chile [54,55] which were referred to by the interviewees in Chile, one economic analysis model in South Korea [56] also known to Korean respondents, and one study of the costs of hepatitis A in Mexico [57] which is only published as an abstract and was not known to the respondents. No economic analyses were found in India, Russia or Taiwan.

Even among the published economic studies, data gaps remain. Of the two cost-effectiveness studies in Chile [54,55] respondents noted the studies are missing the cost of illness for a patient with hepatitis A, and that they were suspicious of economic studies sponsored by pharmaceutical companies. We also found that neither models used Chilean cost data, and instead relied on US and European costs of hepatitis A. The 2010 economic model published by the South Korean Centers for Disease Control did not include detailed data on incidence by severity of hepatitis A cases and only reported per unit costs for different services, leaving gaps in costs of hepatitis A in South Korea [56].

While economic data are important, respondents cautioned that it is not the sole decision maker. A vaccine manufacturer in India noted that economic data are “not the only issue as India looks at several other impact factors such as infant and maternal mortality.” In Mexico, a government official noted: “The introduction of the vaccine could be more costly than the disease itself. For example, pneumococcal vaccine was controversial at one time because of the cost. One study showed that it wasn’t cost-effective, but it was still introduced because of the number of deaths and cases reported.”

3.3. Barriers and facilitators to hepatitis A vaccine adoption

We identified 14 barriers and facilitators to adopting the hepatitis A vaccine by comparing those discussed in the literature with those described in interviews by country. Fig. 2 presents these barriers/facilitators and whether each was discussed in the literature and/or interviews.

In general, we found a large gap between barriers and facilitators for adoption perceived by stakeholders compared to those discussed in policy papers. The importance of political support from government leaders and the role of elections were brought up as a barrier or facilitator in interviews in every country (e.g. “this is an election year and it is not good to introduce anything that costs money.”), but were not mentioned in the literature. The interviews also discussed the priority for this vaccine vis-à-vis other vaccines and mentioned global or local recommendations on vaccine adoption, which were rarely discussed in the literature. A Mexican government official noted, “There are many other needs for the country and the [Ministry of Health] spends large sums of money on immunization. It is the money that is the problem, it is not available.” Other areas less frequently discussed in the literature but described by stakeholders as barriers were: a strong emphasis on sanitation, weak public awareness and low media coverage, challenges in vaccine procurement, delivery and regulations, anti-vaccine movements and distrust of manufacturers.

On the other hand, barriers more commonly discussed in the literature were: the lack of data on hepatitis A disease, cost-effectiveness and other economic data, combination vaccines for hepatitis A, and the potential for safety and effectiveness data of the vaccine to facilitate decision making. Immunization budget or price of the vaccine, and outbreaks of hepatitis A were the only factors consistently discussed by both sources.

4. Discussion

Our analysis identified gaps between the published literature and what key stakeholders believe about epidemiologic data, economic data and barriers and facilitators of vaccine adoption for hepatitis A in six countries. The results of this study highlight several areas in which having data from both the literature review and stakeholder interviews provided additional insights into the factors driving policy decisions for the hepatitis A vaccine. Regarding the evidence in support of an epidemiologic transition for hepatitis A seroprevalence, we found that most often the stakeholders were aware of the existing data or that very little data existed. However, in Chile and Russia, stakeholders believed the data to be more supportive of their positions or more solid than the literature could document. This discrepancy between the belief in existing data and what was found suggest a decline in investment in data collection or priority of hepatitis A, perhaps due to a reliance on improvements in hygiene and sanitation. The lack of solid data on current
seroprevalence rates underscores the potential for outbreaks and a lingering threat of hepatitis A. In India and Mexico, although there was recognition that data were lacking, there were a surprisingly small number of seroprevalence studies despite the size of these countries.

Our findings of limited economic data were consistent between the literature and the interviews. However, investigation into the four economic models identified areas in which current economic modeling falls short in meeting the needs of policy makers and in utilizing the best and most relevant data to support country specific decision making. Our review suggests the need for additional investment in economic analyses using country specific data. Finally, comparison of the barriers and drivers of hepatitis A vaccine adoption noted several differences in factors emphasized by the literature and stakeholders. For example, political will and prioritization of vaccines were barriers rarely mentioned in the literature. These data clearly demonstrate that neither source alone would have provided the complete picture of relevant factors.

Despite the benefits of using two separate methods for assessing hepatitis A vaccine policy decision making, our results are limited by the search strategies for the literature review and the sampling frame for interviews. Our literature search focused primarily on the published literature supplemented by an internet search of the gray literature which varied significantly in quality. For key informant interviews, our study resulted in a relatively small sample size mainly due to the study’s very specific topic (hepatitis A vaccine adoption) and focus on the viewpoints of government officials, scientists, clinicians and other administrators who know something about the topic. People with program and private sector experience were contacted, but many did not respond to interview requests. Despite these limitations, we believe we have identified and synthesized articles in a systematic manner and provide a glimpse into the understandings of key stakeholders of Hepatitis A in each country.

5. Conclusions

This study concurrently carried out a systematic literature review and key stakeholder interviews to assess gaps between documentation and policy makers’ perceptions in six countries. Triangulation of results allowed us to identify countries where better communication of existing evidence or greater sharing of existing non-published evidence would be fruitful. It also highlighted and confirmed data gaps in seroprevalence or cost-effectiveness studies where both the literature and stakeholders agree that evidence is missing and would be important to gather. Applying multiple research methods resulted in a more focused attention on the data gaps and evidence-to-policy gaps than if only one method had been used. This study also highlights the dearth of seroprevalence data that exist in India and Mexico. Further research is needed in these countries to highlight the potential health and economic impacts of hepatitis A disease to help guide vaccination decisions.

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References


