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CONCEPTUAL ANALYSIS

Burden of Disease Studies in the Asia-Pacific Region: Are There Enough being Performed to Provide Information for Evidence-Based Health Policy?

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A B S T R A C T

Objective: To review published studies of Burden of Disease (BOD) performed in the Asia-Pacific (AP) region. **Method:** Overlapping strategy of searching four electronic databases was used to identify studies of BOD published during 1993-2009. The quality of identified studies was assessed according to the categories of burden reflected and scope of BOD information included. Chronological and regional distributions of research output were analyzed. **Results:** Among 524 articles identified for review, 27.7% (n=145) were classified as complete summary measures as being most informative BOD studies from health policy maker's perspective and 72.3% (n=379) as using only partial measures. Although an increasing trend of publication of BOD articles was observed, the quantity of publication was not

commensurate with the number of diseases, especially for researches using summary measures. Unbalance of research output of BOD among different diseases areas and selected countries/regions was observed. **Conclusion:** The paucity of specific studies in AP region needs to be addressed. Furthermore, in order to improve the quality of research, a clear definition of BOD study and a uniform template for the research method from health policy-makers' perspective would be necessary.

Keywords: Asia-Pacific, burden of disease, cost-of-illness, research output.

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Introduction

The Asia-Pacific (AP) region is a diverse area that encompasses developed economies, such as Australia, Japan and Singapore, emerging economy countries like India and China, in which most of the population in the world reside, as well as poor and under-developed countries. Likewise, the health-systems in these AP countries are also diverse, but like other countries in Europe or North America, most of them are confronting similar challenges in delivering health care to their respective populations, namely: increasing health-care expenses driven by expanding aging population, increasing prevalence of chronic diseases and the need to incorporate costly new health technologies into the health care system. Given the demand and requirement to keep a balance between efficacy and cost containment to ensure that the available health resources are used in a cost-effective manner, evidence-based decision-making are gradually and increasingly accepted by AP countries in support of decision in formulating and funding of health policies and programs [1,2].

In the process of making the decision about which programs or interventions should be funded from the public purse, theoretically at least three criteria should be considered. These are

the comparative efficacy and safety of the new technologies to existing treatments, the cost-effectiveness index, and the burden of disease (BOD). Fundamentally, the decision rule is that only health programs or health technologies (including new drugs, diagnostics, etc.) considered being cost-effective and producing positive net health benefits for the populations should be funded by public finance. However, to add complexity to the issue, due to the fact that resources are limited, not all potentially cost-effective services can be funded. Priorities must be made in allocating scarce resources and the new technologies or programs that can tackle diseases or disorders that inflict the greater burden to society would naturally be given higher priorities. Consequently, Burden of Disease (BOD) study with its objectives of quantifying the burden imposed by the disease or disorder can contribute to good decision making by helping priority setting for health planning, public health programs, research and development, as well as professional manpower training [3]. Furthermore, the results of studies of BOD can be incorporated into cost-effectiveness analyses when evaluating affordability of health interventions [4]. In addition, as a common currency, BOD results can also be used as an indicator of overall health status at the population level and compare efficiency of health care system

across countries [5–7]. Hence, the information provided in the study of BOD in one country can serve as a benchmark or reference point for other countries.

Normally when talking about burden incurred by a disease, it refers to three aspects: epidemiological burden, economic burden and humanistic burden. The scope of BOD can be either broad or narrow depending on the perspectives adopted, such as the burden to the patients, to the health service provider, to the payer and to society. In addition, a number of approaches and indicators are used to assess the BOD. From the policy makers' perspective, however, indicators integrating as much information as possible that potentially highlight areas of greatest possible health gain and resource consumption are more contributive to decision making. Indeed, the evidence from Gross et al. in the United States showed this preference of policy makers when considering the relationship between disease-specific funding at National Institute of Health with several measures [8].

In fact, public health specialists have monitored the burden of some diseases for many decades with epidemiology parameters such as prevalence, incidence and mortality etc. [9–11]. Epidemiologic data can answer the question, "How big is the health problem?" in terms of number of people affected and the associated mortality (if applicable) in people afflicted with the disease or disorder in a specific country or district. It cannot reflect explicitly the magnitude of resource consumption and quality of life loss, caused not only by fatal effect but also by non-fatal effect of disease.

In early 1990s the Global Burden of Disease (GBD) Study was commissioned by the World Bank and co-sponsored by World Health Organization, in which Disability Adjusted Life Years (DALY) was adopted as a summary indicator [3]. This composite indicator combines the mortality and quality of life or morbidity data and gives a more comprehensive estimation of BOD. The result of 1990 GBD study revealed many previously under-appreciated and unmeasured burden when measured by mortality alone, for example mental disorders and hearing loss, which may cause considerable health impairment but no or few direct deaths [3]. In addition, to express the burden of disease in terms of both premature mortality and morbidity, various indicators besides DALY have been compiled and adopted to measure BOD, such as, Disability-Adjusted Life Expectancy (DALE), Disability-Free Life Expectancy (DFLE), Health Adjusted Life Expectancy (HALE) and Years of Healthy Life (YHL) [12–15]. Nevertheless, in these summary humanistic burden measures, epidemiological parameters are inputted to compute the outcome on a population level.

Another commonly used approach to ascertain the burden of disease is conducting a cost-of-illness study. The cost-of-illness (COI) analysis, first clearly spelled out by the health economist, Dr. Dorothy Rice, has been widely accepted as an effective measure of BOD, especially the economic burden [16]. In essence, COI study can translate simple descriptive epidemiology parameters into a measure of resource use and productivity loss in monetary terms. Normally, economic costs of disease are divided into direct, indirect and intangible costs. Direct costs are defined as the cost of all resources associated with the provision of an intervention or treatment for an illness. Indirect costs involve the costs that result from the loss of productivity because of illness or death. Intangible costs include the costs of pain, suffering, anxiety, or fatigue that occur because of an illness or the treatment of an illness. By capturing all these costs, COI not only grasps the direct economic burden incurred by disease, but also takes the economic effect of morbidity and mortality into account from social perspective.

Since the first publication of GBD appeared in World Development Report 1993: Investing in Health [17], many organizations and several countries became interested in applying the results of BOD and combining it with cost-effectiveness evaluation to better inform health policy [18–20]. Considering that health service research activity should reflect the relative interest in application of relevant information into decision-making process, the aim of the current study is to review the more recent output of BOD studies published in scientific journals from the AP region, where health economics and outcomes research are increasingly gaining interest [1]. This analysis will showcase the current status of BOD research in this region and whether there are sufficient studies of acceptable quality being performed and published in the public domain to support the need of policy makers in the AP region.

Methods

Data source

Electronic literature databases searched were Medline, EMBASE, EconLit and Cochrane Library. Overlapping strategy of searching several electronic databases was used to identify potentially relevant articles [21].

Time frame

A time frame was set and all entries between the years 1993-2009 were retrieved and analyzed. The final search of the databases concluded at August 29th, 2009.

Searching strategy

Papers were retrieved using a double-filtration process. Firstly, a subject filter selectively retrieved papers from the databases that are relevant to the subfield. We used the following terms, burden of illness, burden of disease, cost of illness, economic burden, health burden, to seek matches in the titles, abstracts and MeSH headings (Medline)/index term (EMBASE)/subjects (EconLit)/keywords(Cochrane Library) of published articles. This was followed by a geographical filter with names of the following 12 selected AP countries and economic entities: Australia, China, Hong Kong, India, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, and Thailand, to select more subsets in the title, abstract and MeSH headings/index term/subjects/keywords. Non-English publications were also included in the searching strategy. For the different searches, phrases were joined together with Boolean operators "AND" and "OR".

The electronic search was supplemented by an second overlapping strategy where the reference lists of retrieved full articles were searched manually to identify further relevant studies [21].

Culling criteria

Articles with English abstracts were included, as the aim was to review all abstracts and classify the papers in various categories, including type of paper, type of BOD indicator, main results, disease covered and the country of origin of the study. When a decision could not be reached based on information from the abstract, full articles were retrieved and read to make the decision. In the culling process, as our objective was to retrieve original studies, therefore, reviews, manuscripts which only cite BOD data as the supportive evidence, opinions, theory and historical description articles were excluded. In addition, articles were excluded if they focused mainly on intervention or programs controlling the BOD, validating instruments to measure BOD or other topics that did not evaluate BOD itself. If the abstract cannot provide enough information to make the judgment for inclusion and exclusion, the full text article was retrieved for further review.
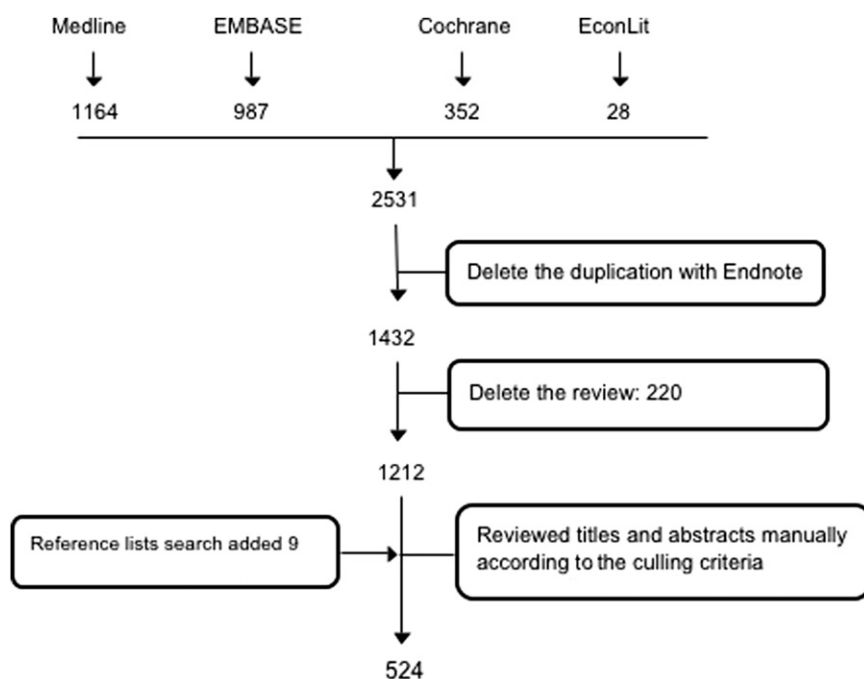
Fig. 1 – Flow chart of articles selection process.

Quality analysis

For the identified articles, they were categorized according to the scope of information provided by the study based on the outcome measures used in each of the retrieved study. As a first cut, we categorized all included studies in our current study into two main types: BOD studies that provided full information and BOD studies that provided partial information. Our definition of "full" information refers to whether outcome measures used in the individual study incorporate epidemiology, economic and humanistic burden of the disease or condition being studied. Hence, BOD studies that provide full information would be those using summary measures to estimate the economic burden or humanistic burden of diseases imposed on the patients or society in population level. The measure indicators for BOD falling in this category include the COI study, DALY, YHL and other summary Health-related Quality of Life (HRQoL) indicators mentioned previously. Those COI studies which combine information on prevalence or incidence with data on resource use and costs are classified as providing "full" information. Other studies were categorized as providing partial information if the article was about burden on the caregiver only, not containing epidemiological data to estimate in population level, or only measuring one scope of BOD. Then the retrieved BOD studies were further analyzed for publication time, country of origin, and disease types. According to the International Monetary Fund's (IMF) World Economic Outlook Report 2010 [22], the countries were classified as developed and emerging economies for subgroup analyses.

Results

A total of 1432 articles were retrieved using overlapping search strategy from four electronic databases. The manual search of reference lists of retrieved full articles further identified 9 additional relevant articles. After the culling process, 524 articles fulfilled the inclusion criteria and were further reviewed and classified (Fig. 1).

Among the 524 BOD studies, 27.7% (n=145) adopted summary measures as indicator of BOD which would qualified them as providing "full" information according to our study definition (Table 1), with 100 estimated the COI and 45 evaluated humanistic burden with summary indicators.

The geographic distribution of summary measures of BOD was summarized in Fig. 2. Australia was the leading country in regards to the number of both COI studies (n=26) and partial estimations (n=85). In addition, Mainland China, Australia, and Korea had 13, 10 and 7 publications with summary humanistic burden estimation respectively. These numbers are more than other countries and regions. The number of full COI studies was less than 10 and the studies using summary humanistic burden measures did not exceed 3 in all other countries and regions. Even though some countries, such as Japan and India, have relatively more publications for partial measures, they had less than 10 publications adopting summary BOD measures.

To evaluate the chronological change of output quantitatively we counted the BOD studies with summary measures and partial measures separately in each year from 1993 to 2009 (Fig. 3). The

Table 1 – Classification of BOD studies.

Category	Indicator Description	Number
Partial measures	Cost analyses not at population level	134
	Epidemiology	114
	Caregivers' burden	58
	Description of resource utilization pattern	29
	Quality of life measurement	29
	Psychology measurement	15
Summary measures	Cost-of-illness study	100
	Summary indicator for humanistic burden at population level (i.e., DALY, PPYLL)	45

BoD, burden of disease; DALY, Disability-adjusted life year; PPYLL, Potential productivity years of life lost.
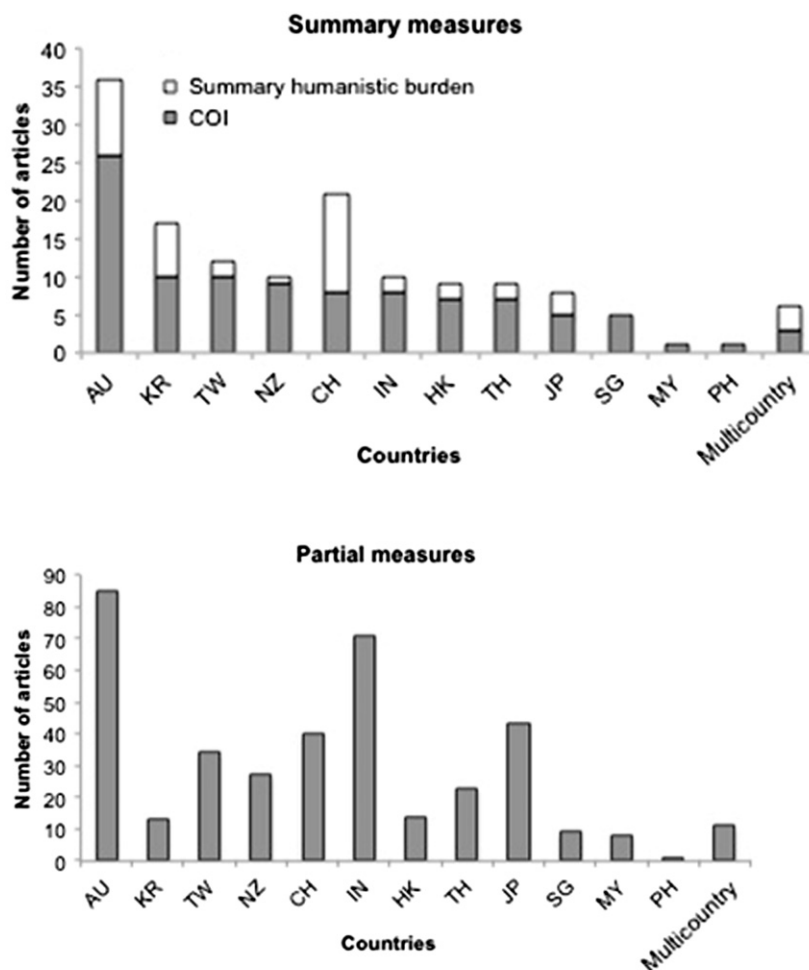
AU: Australia, **CH:** China, **KR:** Korea, **TW:** Taiwan, **NZ:** New Zealand, **IN:** India, **HK:** Hong Kong, **TH:** Thailand, **JP:** Japan, **SG:** Singapore, **MY:** Malaysia, **PH:** Philippine

Fig. 2 – Geographic distribution of published BOD studies. BoD, burden of disease; COI, cost of illness.

overall trend of the amount of BOD articles kept increasing, especially for COI studies. A gradual and quickening increase from 2002 onwards was observed. Until the time of last retrieval, the year 2008 had the largest amount of COI studies (n=18) and partial studies (n=59). The year 2006 had the vast majority of the summary humanistic burden studies (n=7) published. The subgroup analyses by economic status showed a more stable increase of publications for summary measures in emerging than developed economies since 2002 and the disparity of publication numbers between them was gradually decreasing (Fig. 4). The studies using partial measures had a similar increasing trend since 2002 in both emerging and developed economies.

The breakdown of distribution pattern of BOD studies in each of the 15 diseases/conditions is shown in Table 2 for COI, summary humanistic burden measures and partial measures separately. These 15 conditions are all conditions identified in this review. Communicable diseases, neuro-psychiatric diseases, and smoking/alcohol related conditions accounted for the three largest groups of COI studies. Unlike the COI study identified in this review, the number of the studies adopting summary humanistic burden measures was much lower. Furthermore, most of these studies are not disease specific and tend to provide

an overall picture of burden imposed by multiple diseases concurrently. After multiple diseases coverage, injury and elderly management, smoking and alcohol related conditions, and communicable diseases accounted for the three largest numbers of articles with summary humanistic burden estimation. As for the partial burden measurements, over 23% (n=88) of them focussed on communicable diseases. Except the caregiver burden, all other partial measures were dominated by the communicable diseases. Noticeably, some diseases areas, such as gastrointestinal, genito-urinary, sensory organ and congenital anomalies had very poor representation of the BOD for all measures. The subgroup analyses show that research output in different disease areas varied by economics status (Fig. 5). Most of the BOD studies in emerging economies were devoted to communicable disease. In contrast, the distribution of research output in different disease areas was more evenly spread within developed economies.

Discussion

This report summarized the recent research output of BOD studies in AP region. Considering the merit of summary
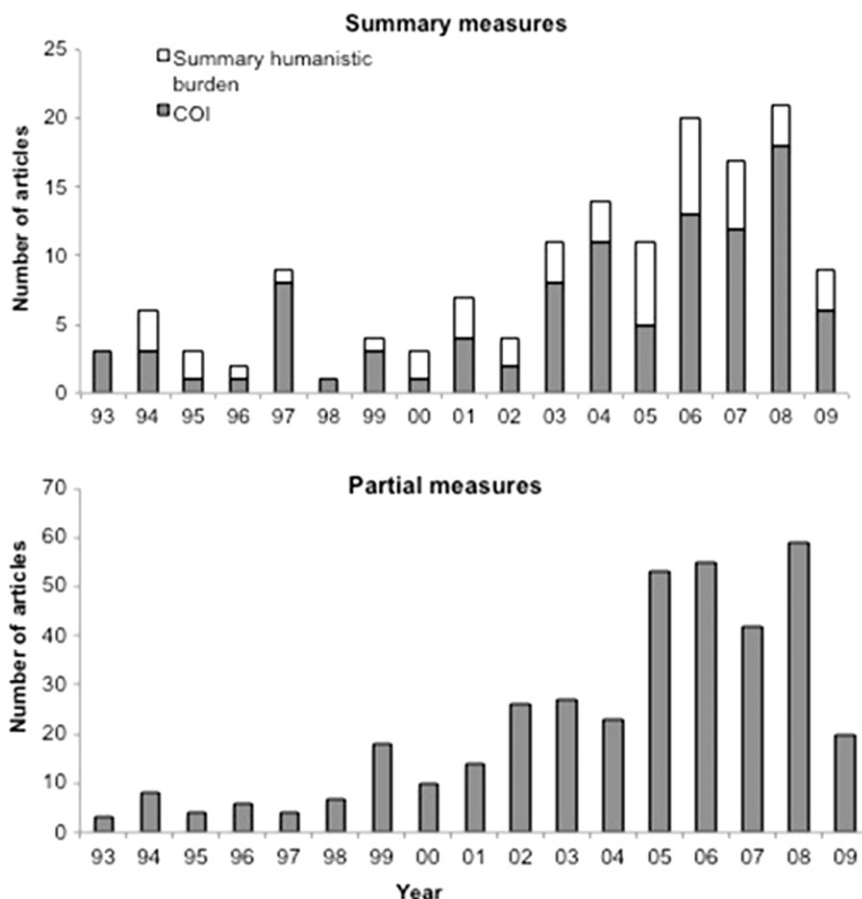
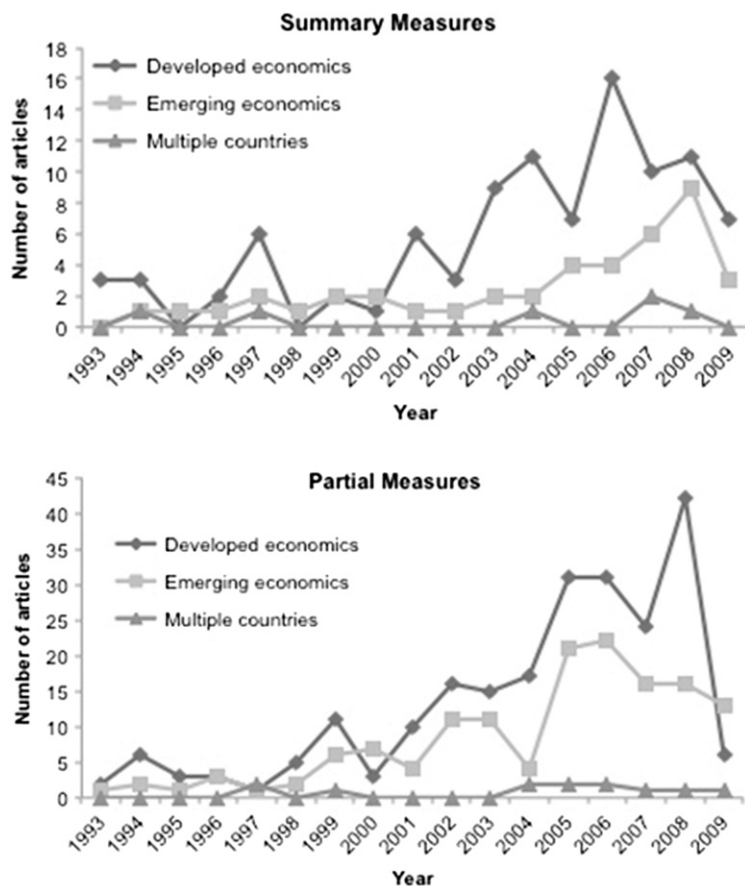**Fig. 3 – Time distribution of published BOD studies. BoD, burden of disease; COI, cost of illness.**

measures of BOD in practical application of health resource allocation decision, we focused our analyses on the COI studies and summary humanistic burden measures. Because of the lack of clear definition for BOD studies, however, we also summarized other measures for the burden of disease appeared in the retrieved articles to provide a more comprehensive picture of BOD studies carried out in this region. Partial measures identified in this study included caregivers' burden, description of resource utilization pattern, psychological measurement, quality of life measurement, cost analyses not at population level and epidemiological studies. From the distribution of BOD studies, we observed that the output of BOD studies is chronologically increasing since 1993, and from 2002 the increase was quickened. The volume of published research output was unbalanced among different diseases/conditions or geographic areas for both summary and partial measures. The emerging economies showed a more stable increase of publications in the recent years, especially those of summary measures, and had a greater apparent research interest in communicable disease relative to developed economies. This is understandable as communicable diseases are more pressing concerns to the emerging economies. However, some disease areas had very poor representation of the BOD for all measures. Compared with partial estimation, comprehensive estimation of BOD with summary measures are underresearched because of the much higher demands in terms of resources and expertise to carry out such studies.

The findings in this review highlight the lack of high quality BOD studies among Asian countries. The lower outputs and poorer quality of the study of BOD in Asian Pacific countries also reflect the status of development in pharmacoeconomic research

and education in this region. To make amend of the situation, guidelines and protocols as how to perform BOD studies based on available data source would urgently be needed. A clear definition about BOD is also necessary as the first step to develop standard protocol. Furthermore, given the importance of BOD information in setting health decision-making priority and for benchmarking purpose across countries [3–7], more resources should be devoted to this important but relatively neglected area.

To our best knowledge, the consensual definition of BOD study is not available up to now. This might be a possible reason for the wide variation of research scopes and perspectives identified in our study. When referring to BOD, the researchers normally measure the humanistic burden and economic burden. According to different perspectives, however, such as the patients, the family/caregiver, the health system, and the society, different indicators are adopted. Nevertheless, from the perspective of policy decision maker, estimating the BOD globally or at the country/region level is necessary. Therefore, we classify the BOD studies into summary measures and partial measures according to whether the estimation is at population level or not. The size of the population affected by the disease needs to be incorporated into the humanistic burden and/or economic burden to produce a summary measure. Normally, epidemiological data are used to reflect the size [3,12–16].

Even though the volumes of publications for summary BOD estimation have increased since 1993, they are not commensurate with the volume of diseases/conditions identified in our study. This is especially noticeable in emerging economies where most BOD studies were committed to communicable diseases. Benchmarked against the list of diseases as presented by WHO [23], BOD research output in AP region suggested that many

Fig. 4 – Time distribution of published BOD studies categorized by economic status of country. BoD, burden of disease; COI, cost of illness.

Table 2 – Diseases distribution of published BOD study.

Disease	Summary Measure		Partial Measure					
	COI	Humanistic	Costs	Epi	Carer	Resource	QoL	Psyco
Communicable	23	6	35	33	2	12	4	2
Neuro-psychiatric	13	2	5	5	13	2	0	3
Smoking and alcohol conditions	10	6	3	1	0	0	0	0
Cardiovascular	9	3	1	9	4	0	0	0
Injury and elderly management	8	8	11	7	14	2	4	1
Endocrine, nutritional & metabolic	7	1	10	12	0	0	2	0
Nervous	5	1	12	9	13	1	1	1
Respiratory	5	1	10	6	1	5	3	0
Sensory organ	5	0	9	1	0	0	1	0
Musculoskeletal system	4	3	8	5	0	1	4	1
Neoplasm	4	1	15	7	7	0	2	2
Gastrointestinal	3	0	4	1	0	5	3	2
Genitourinary	3	0	5	10	1	1	2	1
Congenital anomalies	1	1	1	4	0	0	0	2
Multiple diseases	0	12	5	4	3	0	3	0
Total	100	45	134	114	58	29	29	15

Carer, caregivers' burden; COI, cost-of-illness study; costs, cost analyses not at population level; Epi, epidemiology; humanistic, summary humanistic burden; psyco, psychology measurement; QOL, Quality of life measurement; resource, description of resource utilization pattern.

Developed economics: Australia, Korea, Taiwan, New Zealand, Hong Kong, Japan, and Singapore.
Emerging economics: China, India, Thailand, Malaysia, and Philippine.
Disease code: 1. Neropsychiatric disease 2.Smoking and alcohol-related disease, 3. Communicable disease, 4. Injury and elderly management, 5. Cardiovascular disease, 6. Respiratory disease, 7. Endocrine, nutrition and metabolism disease, 8. Musculoskeletal disease, 9. Neoplasm, 10. Sense organ disease, 11. Nervous system disease, 12. Digestive disease, 13. Genitourinary disease, 14. Congenital disease, 15. Multiple diseases

Fig. 5 – Disease distribution of published BOD studies categorized by economic status of country. BoD, burden of disease.

disease areas, such as respiratory diseases, musculoskeletal system disease, are not well estimated for their burden considering the high prevalence and the potential humanistic and economic loss caused by them. Considering the wide variations in socioeconomic and demographic features, the unbalance of research output among different countries or regions within AP is justifiable. Obviously, socioeconomic status, however, is not the only determinant of volumes of publication. Even in Australia with more public health research articles identified than other developing country [24], the number of summary BOD estimation is limited, especially for the summary humanistic burden estimation. In most of studied countries and regions, the number of COI studies outweighed summary humanistic burden estimation. Furthermore, the main problem of COI studies is that most of the COI estimations were not from societal perspective, thus decreasing the informative power of this potentially comprehensive indicator. In our study, 50% of the COI studies (51 articles) estimated indirect cost and only 2% (2 articles) took intangible cost into account. Theoretically, intangible cost measurement is a practical way to translate patients' pain and discomfort into monetary terms and, in many cases, this component is substantial and might dominate the policy agenda. Because of the complexities and unresolved theoretical controversies in measuring intangible cost, however, it is seldom considered in COI estimation [25]. The two COI studies identified here measured intangible cost using willingness-to-pay method [26] and utility score times estimated value of life [27] respectively. Actually, the lack of an accepted method to provide a uniform template for the cost estimation may limit the reliability and validity of COI study in the decision making process.

In our study, we tracked the output of original BOD research in AP region for guiding further appropriate development of research. However, it must be noted that research publications may not accurately reflect all outputs in the studied regions. For

example, government reports about BOD estimation from Australia Institute of Health and Welfare (http://www.aihw.gov.au) are not included in current searching databases. Nevertheless, for most of other countries and regions in AP, we were unable to locate similar reports on the government websites. In addition, some of the government reports are republished in the peer-reviewed journals. So, with the aforementioned caveats, overall, our review would be a reasonable representation of the status of research in the AP region.

Conclusion

In order to use BOD estimation at the country/region level to guide priority setting in public health decision making, and in assessing the performance of health care system over time, data availability is an important starting point for future strategic planning, however, estimating BOD comprehensively is a complex task and the paucity of specific studies in most AP countries/regions needs to be addressed. In order to improve the quality of research, a clear definition of BOD studies and a uniform template of research method from health policy-makers' perspective would be necessary.

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REFERENCES

[1] Liu GG, Eggleston K, Hu TW. Emerging health economics and outcomes research in the Asia-Pacific region. Value Health 2008;11(Suppl. 1):S1–2.
[2] Doherty J, Kamae I, Lee KK, et al. What is next for pharmacoeconomics and outcomes research in Asia? Value Health 2004;7:118–32.

[3] Murray CJ, Lopez AD. Global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Boston, MA: Harvard School of Public Health, World Health Organization, World Bank, 1996.

[4] Dalziel K, Segal L, Mortimer D. Review of Australian health economic evaluation – 245 interventions: what can we say about cost effectiveness? Cost Eff Resour Alloc 2008;6:9.

[5] National Asthma Campaign: Out in the Open. A true picture of asthma in the United Kingdom today. The Asthma Journal 2001;6:3–14.

[6] Baily MN, Garber AM. Health care productivity; Brookings papers on economic activity: Microeconomics. Washington, DC: Brookings Inst, 1997.

[7] Murray CJ, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. Lancet 1997;349:1436–42.

[8] Gross CP, Anderson GF, Powe NR. The relation between funding by the National Institutes of Health and the burden of disease. New Engl J Med 1999;340:1881–7.

[9] Talley NJ, Locke GR, Saito YA. GI Epidemiology. Malden, MA: Blackwell Publishing, 2007.

[10] Todd EC. Epidemiology of foodborne diseases: a worldwide review. World Health Stat Q 1997;50:30–50.

[11] Department of Health. National service frameworks for coronary heart disease; standard four. London: DoH, 2000.

[12] Field MJ, Gold GM. Summarizing population health: directions for the development and application of population metrics. Washington, DC: Institute of Medicine: National Academy Press, 1998.

[13] Murray CJ, Lopez AD. Regional patterns of disability-free life expectancy and disability-adjusted life expectancy: global Burden of Disease Study. Lancet 1997;349:1347–52.

[14] Ezzati M, Hoorn SV, Rodgers A, et al. Estimates of global and regional potential health gains from reducing multiple major risk factors. Lancet 2003;362:271–80.

[15] Muennig PA, Gold MR. Using the years-of-healthy-life measure to calculate QALYs. Am J Prev Med 2001;20:35–9.

[16] Rice DP. Estimating the cost of illness. Am J Public Health Nations Health 1967;57:424–40.

[17] The World Bank. World Development Report 1993: Investing in Health. Oxford: Oxford University Press, 1993.

[18] World Health Orgaization. Investing in Health Research and Development. Report of the Ad Hoc Committee on Health Research Relating to Future Intervention Options. Geneva:World Health Organization, 1996.

[19] McKenna MT, Michaud CM, Murray CJ, et al. Assessing the burden of disease in the United States using disability-adjusted life years. Am J Prev Med 2005;28:415–23.

[20] Mathers CD, Vos ET, Stevenson CE, et al. The burden of disease and injury in Australia. Bull World Health Organ 2001;79:1076–84.

[21] Counsell C. Formulating questions and locating primary studies for inclusion in systematic reviews. Ann Intern Med 1997;127:380–7.

[22] International Money Fund (IMF). World Economic Outlook 2010. http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/groups.htm#oem [Accessed by December 22, 2010].

[23] World Health Organization. The global burden of disease: 2004 update. Geneva: World Health Organization, 2008.

[24] Dandona L, Sivan YS, Jyothi MN, et al. The lack of public health research output from India. BMC Public Health 2004;4:55.

[25] Tarricone R. Cost-of-illness analysis. What room in health economics? Health Policy 2006;77:51–63.

[26] Scott WG, White HD, Scott HM. Cost of coronary heart disease in New Zealand. N Z Med J 1993;106:347–9.

[27] Hawthorne G, Cheok F, Goldney R, et al. The excess cost of depression in South Australia: a population-based study. Aust N Z J Psychiatry 2003;37:362–73.