Obesity has a substantial economic impact because of its high prevalence and association with multiple chronic diseases, increased levels of disability and absenteeism, and premature mortality. The total cost of obesity and its negative health consequences has been estimated at 0.7% to 7.0% of national health expenditures worldwide. In this review of cost data from nine countries, and costs. This literature review was undertaken to determine the costs associated with obesity both at the aggregate level for each country and the per capita level, where available. Also of interest was the impact of increasing degrees of obesity on costs. This literature review includes data from nine countries: Australia, Canada, France, Germany, Italy, Spain, Sweden, the United Kingdom (UK), and the United States (US).

### Introduction

We searched articles indexed in MEDLINE and published in English, French, German, Italian, Spanish, and Swedish between January 1994 and 2007. The title and abstract were screened to ensure the study corresponded to the criteria for inclusion. The MEDLINE Subject Heading (MeSH) terms "obesity" and "costs" were combined with three topics for costs and cost-analysis: "economic, pharmacological, insurance, medical," "costs, hospitals, health," and "cost effectiveness." The MEDLINE search included 201 results, and 78 articles were selected for full-text review. EMBASE, International Pharmaceutical Abstracts, and Google Scholar searches of the bibliographic databases were searched using similar keywords and limits. 16 additional unique articles were located, and 7 were chosen for full-text review. In addition, supplemental searches of the bibliographic databases were conducted by the World Health Organization (WHO) and governmental agencies were conducted, and seven sources were selected for further consideration. For all search results, costs related to behavioral or lifestyle interventions for obesity were excluded. Of the 92 cost-related full-text documents reviewed, 34 studies or reports presented national or regional data in one or more countries of interest, and information in these sources is presented here.

The data set are standardized and grouped by study methodology. To assist in cross-country comparability, costs are standardized to year 2007 US dollars using purchasing power parity (PPP) exchange rates. PPP rates are currency conversion rates adjusted for differences in price levels among countries for goods and services that meet similar needs. Exchange rates are based on market prices of a basket of goods and services, and allow comparisons of the volume of health care purchased in the different countries (without adjusting for differences in price levels among countries for goods and services that meet similar needs). For each country, the exchange rate for full-time employees aged 21-84 is shown in Table 3. Two additional unique articles were located, and 1 was chosen for full-text review.

### Methods

#### Definition of Obesity

An international panel of experts convened by WHO concluded that body mass index (BMI) (kg/m²) is the most useful population measure of obesity. A BMI ≥ 30 kg/m² is the most widely accepted criteria defining obesity in the prevalence studies reviewed, and that this is obesity for the purposes studied unless otherwise noted.

#### Aggregate National Direct Costs

Among the 23 studies conducted for direct costs, 15 sources present estimates of the total national direct cost of obesity for populations in Australia, Canada, France, Germany, Spain, Sweden, the UK, and the US. Data collection ranging from 1992 to 2005 (Table 2). National cost estimates were calculated from those calculated at the point of view of national health services or those based on extrapolation of costs to a national population. Ten of the 15 studies report the proportion of national health care expenditures attributable to obesity, ranging from 5.2% to 7.0% for the US and from 2.5% to 2.6% for the other countries. The 15 studies providing an estimate of the national direct cost of obesity. It studied the calculation of the cost-related obesity-disease using an etiologic fraction approach. Obesity increases the relative risk of certain disease states (e.g., type 2 diabetes, cardiovascular disease, hypertension). The etiologic fraction is the portion of a case of a specific disease that is directly attributable to obesity. Summing the etiologic attributable costs of all diseases associated with obesity gives the overall cost of obesity. The number of disease states included in the cost-of-illness studies considered in this review is provided in Table 1.

Five of the 15 studies most included in the etiologic fraction studies include type-2 diabetes, cardiovascular disease (including coronary artery disease, hypercholesterolemia, hypertension, and certain cancers (including postmenopausal breast cancer, endometrial cancer, and colon cancer). Five of the 15 studies included data from non-English searches were not conducted on databases indexed in English, French, German, Italian, Spanish, and Swedish; these non-English searches were not exhaustive but did represent information from key language and regulatory authorities.

#### Survey Analyses of Direct Costs by BMI Category

Of the 25 direct cost studies, 8 studies analyzed cost data collected by survey and correlated with BMI category. Two US studies described increased total medical costs for obese persons compared with persons of normal weight. Andreyeva and colleagues found that total medical costs increased as the degree of obesity increased, with extremely obese (BMI ≥ 40) individuals having double the total medical costs of normal-weight persons. Stumf et al. found that obesity increases health care costs by 36% and medication costs by 77% compared with being of normal weight.

Two German studies based on the same cross-sectional survey data (Cooperative Health Research in the Region of Augsburg/CoHRA) [1996 and 1998/2001]) found the following:

- Average total medical costs and prescription drug costs were significantly higher for severely obese people (BMI ≥ 35) compared with normal-weight people (BMI 18-24.9).
- Severely obese people were more likely to visit a general practitioner and have longer hospital stays than normal-weight people.

An Italian study and a Swedish study focused on the effects of obesity and obesity-related disease on prescription drug costs.

- Both studies found higher prescription costs for obese persons than for the normal-weight reference groups.
- The Swedish study found that, compared with the general population, obese persons had higher use of prescription drugs for diabetes, cardiovascular disease, and asthma, as well as nonsteroidal anti-inflammatory drugs.

#### Indirect Costs

Obesity, disability, and lost productivity due to premature death were the most common measures of the indirect costs of obesity. Costs on indirect costs were more limited than direct costs and did not include indirect costs collected since 1995 were found for France, Italy, or Spain. Aggregate indirect costs, with conversion to 2007 US dollars, are for the other countries considered in this literature review are shown in Table 3.

### Results

Survey Analyses of Direct Costs by BMI Category

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### Conclusions

- Obesity has a substantial economic impact because of its high prevalence and association with multiple chronic diseases, increased levels of disability and absenteeism, and premature mortality. The total cost of obesity and its negative health consequences has been estimated at 0.7% to 7.0% of national health expenditures worldwide. In this review of cost data from nine countries, and costs. This literature review was undertaken to determine the costs associated with obesity both at the aggregate level for each country and the per capita level, where available. Also of interest was the impact of increasing degrees of obesity on costs. This literature review includes data from nine countries: Australia, Canada, France, Germany, Italy, Spain, Sweden, the United Kingdom (UK), and the United States (US).
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### Table 3: National Annual Indirect Costs of Obesity

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost in Local Currency (Yearly Totals)</th>
<th>Cost Adjusted to 2007 USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>$1.7 billion</td>
<td>$1.7 billion</td>
</tr>
<tr>
<td>France</td>
<td>€2.2 billion</td>
<td>$2.4 billion</td>
</tr>
<tr>
<td>Germany</td>
<td>€2.1 billion</td>
<td>$2.8 billion</td>
</tr>
<tr>
<td>Italy</td>
<td>€2.3 billion</td>
<td>$3.0 billion</td>
</tr>
<tr>
<td>Spain</td>
<td>€2.6 billion</td>
<td>$3.3 billion</td>
</tr>
<tr>
<td>Sweden</td>
<td>SEK 0.9 billion</td>
<td>$0.4 billion</td>
</tr>
</tbody>
</table>

### References

- Please refer to printer handout.
- ISPOR 13th Annual International Meeting | May 3-7, 2008, Toronto | Ontario, Canada

### Limitations

- This review includes only country-specific economic information published in the literature and indexed in MEDLINE. Please refer to printer handout.
- No indirect cost estimates in several countries highlights the need for further work to describe the economic burden of obesity.

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REFERENCES


Burden of Obesity: 10-Year Review of the Costs in Nine Countries

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