Global Estimates of Type 1 Diabetes Incidence and Prevalence in Children

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Aim
To construct global estimates of the number of children (<15 years) with type 1 diabetes.

Methods
The methods have been previously described. Briefly, a systematic literature review for type 1 diabetes prevalence and incidence in children was conducted using Ovid, PubMed, congress proceedings, and references. Incidence rates were primarily derived from registries of newly diagnosed cases. Prevalence rates were derived from age-stratified incidence rates and UN World Population Projections. A prevalence-to-incidence conversion factor was used if age-stratified rates were not available. Extrapolation from a similar neighbouring country was conducted if no data were available for a particular country (Figure 1).

Results
Coverage
Countries were stratified by IDF regional classification (Figure 2). Worldwide, 88 countries (41%) had incidence or prevalence rates available. The coverage was lowest in the Africa region, with only 8% of countries having appropriate data, followed by the Western Pacific region, with data available for 25% of countries.

Figure 1. Study design and data flow

Figure 2. IDF regions

Incidence
In countries with available data, the annual incidence ranged from 0.1 per 100,000 in Papua New Guinea and Venezuela to 57.6 per 100,000 in Finland (Figure 3).

Figure 3. Annual incidence of type 1 diabetes per 100,000 children (<15 years) by country, 2013

The incidence tended to be lower in the 0-4 and 5-9 year age groups and usually increased in the 10-14 year age group. The median incidence was 9.1 per 100,000 (interquartile range 2.6 to 16.7) in these 88 countries.

When compared to the other five IDF regions (Figure 2), the two IDF regions of Europe and North America and the Caribbean had the highest incidence of children with type 1 diabetes (Figure 4).

Figure 4. Annual incidence of type 1 diabetes per 100,000 children (<15 years) by IDF region, 2013

Prevalence
The estimated highest incidence rates were in Finland at 84.5 per 100,000 children in 2013. Five of the top ten countries with the highest incidence of type 1 diabetes were located in Europe (Figure 5). The population-based Diabetes Mondiale (DIAMOND)6 and Europe and Diabetes (EURODIAB)7 registries suggest that incidence is rising by 3% annually.

Figure 5. Top ten countries for the annual incidence of type 1 diabetes per 100,000 children (<15 years), 2013

The United States of America had the largest global prevalence, with 85,600 children estimated to be living with type 1 diabetes in this country (Figure 7). This high figure is due to a combination of relatively high prevalence, a large population, and low diabetes-related mortality.

Figure 6. Total estimated prevalence of children (<15 years) with type 1 diabetes, 2013

Conclusions
This study estimated that a total of 497,100 children aged under 15 years had type 1 diabetes in 2013, equal to 0.03% of the world’s population of this age group. There were an estimated 79,000 new cases each year, out of a total population of 1.9 billion children aged under 15.

Only 41% of countries had incidence or prevalence rates available. Information for many low- and middle-income countries is missing, incomplete or out-dated. Variability between countries may be due to differences in risk factors, misdiagnosis, or study methodology. Prevalence estimates may not properly adjust for the higher rates of mortality in some resource-constrained countries.

References
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