Introduction: Diabetes is one of the largest global health emergencies of the 21st century. There is a global increase in the number of people living with diabetes resulting in significant increase in mortality and health expenditures. In 2015, the International Diabetes Federation reported that there were 415 million adults aged 20 to 79 with diabetes, and this number is expected to increase to 642 million in 2040. However, the number did not include diabetes in people older than 80, and there are some countries that report high diabetes prevalence in people older than 80, therefore, new estimations were made for an expanded age group from 18 to 99 years.

Methodology: The method of the country level diabetes prevalence estimation is the same as described in the methodology chapter of IDF Diabetes Atlas 7th Edition (1). Approximately, 27% of data sources reported diabetes prevalence in ages lower than 20, and about 15% of data sources reported diabetes prevalence in age older than 80. (Figure 1). Data sources were selected according to study quality; only data sources high in quality were selected for analysis. A generalized linear model was used to estimate the country level age-dependent diabetes prevalence per data sources. The main methodological change introduced was the expansion of age groups considered, from 20-79 years to 18-99 years. For countries without any data sources, extrapolation was used based on studies from similar countries in respect to their geography, economic classification, and ethnicity. (Figure 2)

Results: The diabetes prevalence was estimated to be 8.8% from ages 20 to 79 years in 2015 by IDF. (1) After age expansion to 18 to 99 years, the diabetes prevalence was estimated to be 8.7% and the total number of people living with diabetes from age 18 to 99 years was estimated to be approximately 440 million in 2015, which was 25 million more than the number of people with diabetes from age 20 to 79 years.

The total number of people with diabetes, aged 18-99 years, in the seven IDF regions were estimated to be: 162 million in Western Pacific (WP); 80 million in South East Asia (SEA); 66 million in Europe (EUR); 49 million in North America and Caribbean (NAC); 36 million in Middle East and North Africa (MENA); 32 million in South and Central America (SACA); and 16 million in Africa (AFR). (Figure 3) The number of people living with diabetes was 11% higher when the age range was expanded from 20-79 to 18-99 years in Europe, which was the largest percentage increase among all seven IDF regions. South East Asia had the smallest percentage increase (3%) among all seven IDF regions. (Figure 3)

Table 1: Top 10 countries of most people living with diabetes

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country (18-99)</th>
<th>Number of People with Diabetes (18-99)</th>
<th>Country (20-79)</th>
<th>Number of People with Diabetes (20-79)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>114.1 million</td>
<td>China</td>
<td>109.6 million</td>
</tr>
<tr>
<td>2</td>
<td>India</td>
<td>70.2 million</td>
<td>India</td>
<td>69.2 million</td>
</tr>
<tr>
<td>3</td>
<td>US</td>
<td>32.8 million</td>
<td>US</td>
<td>29.3 million</td>
</tr>
<tr>
<td>4</td>
<td>Brazil</td>
<td>15.4 million</td>
<td>Brazil</td>
<td>14.3 million</td>
</tr>
<tr>
<td>5</td>
<td>Russia</td>
<td>12.6 million</td>
<td>Russia</td>
<td>12.1 million</td>
</tr>
<tr>
<td>6</td>
<td>Mexico</td>
<td>11.9 million</td>
<td>Mexico</td>
<td>11.5 million</td>
</tr>
<tr>
<td>7</td>
<td>Indonesia</td>
<td>10.2 million</td>
<td>Indonesia</td>
<td>10 million</td>
</tr>
<tr>
<td>8</td>
<td>Japan*</td>
<td>8.2 million</td>
<td>Japan*</td>
<td>7.8 million</td>
</tr>
<tr>
<td>9</td>
<td>Egypt*</td>
<td>8.1 million</td>
<td>Egypt*</td>
<td>7.2 million</td>
</tr>
<tr>
<td>10</td>
<td>Germany*</td>
<td>7.8 million</td>
<td>Bangladesh*</td>
<td>7.1 million</td>
</tr>
</tbody>
</table>

*The countries which ranks are changed after age expansion.

Figure 1: Age group distribution among all data sources

Figure 2: Work flow of diabetes estimating procedure

Country level data from:
- Peer reviewed journals
- National Health Survey
- WHO STEPS survey
- Unpublished personal communication

High quality data sources selected through analytic hierarchy process

Country-level gender-specific diabetes prevalence estimates by urban/rural 5 year age group

High quality data

Generalized linear model applied

Extrapolation based on data from similar countries*

Low quality data or no data

UN Population estimates 2015 applied

Figure 3: Number of people with diabetes by IDF region

Figure 4: Prevalence of Diabetes by age groups

Figure 5: Prevalence of Diabetes by economic classification

Conclusion: In the year 2015, the estimated total number of people aged 18-99 years living with diabetes was 440 million. Work is needed in order to implement action plans for the prevention and control of diabetes and related complications to reduce the social and economic burden.

References:
2. Presented at the American Diabetes Association 77th in the category ED-1- Epidemiology-other, presentation number 1723-P
3. The 7th Edition of the IDF Diabetes Atlas was supported by the following sponsors: Lilly Diabetes, Merck and Co., Inc., Novo Nordisk A/S supported through an unrestricted grant by the Novo Nordisk Changing Diabetes® Initiative, Pfizer, Inc., and Sanofi-Diabetes

The prevalence of diabetes in the world population increased from age 19 until 74 years, with age group 70-74 years having the highest prevalence (19.4%) among all age groups. After the 70-74 year age-group, however, diabetes prevalence slightly decreased. (Figure 4)

Figure 5 shows that Low-income countries (LIC) had the lowest diabetes prevalence at all age groups, while Middle-income countries (MIC) had the highest diabetes prevalence at age 18-64 years, and high income countries (HIC) had the highest prevalence for ages over 64 years. The prevalence of diabetes peaked in the 55-59 year age-group (7.1%) in LICs, at the 65-69 year age group (10.6%) in MICs, and at the 75-79 year age-group in HICs (21.5%). (Figure 5)