

# BMJ Open Applications for social security benefits related to diabetes in the working age in Italy between 2009 and 2019: a nationwide retrospective cohort study

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## ABSTRACT

**Objectives** The aim of this study is to estimate the average number of claims for social security benefits from workers with diabetes-related disability.

**Design** Nationwide retrospective cohort study.

**Setting** The database of the Italian Social Security Institute (INPS) was used to analyse the trends and the breakdown of all claims for social security benefit with diabetes as primary diagnosis from 2009 to 2019.

**Participants** We selected all the applications with the 250.xx International Classification of Diseases, Ninth Revision-CM diagnosis code from 2009 to 2019.

**Primary and secondary outcome measures** The ratio between accepted or rejected claims for both ordinary incapacity benefit (OIB) and disability pension (DP) and total submitted claims over a 10-year period was computed.

**Results** From 2009 to 2019, 40 800 applications for social security benefits were filed with diabetes as the principal diagnosis, with an annual increase of 30% per year. Throughout the study decade, there was a higher rate of rejected (67.2%) than accepted (32.8%) applications. Among the accepted requests, most of them (30.7%) were recognised as OIB and the remaining 2.1% were recognised as DP. When related to the total number of claims presented per year, there was a 8.8% decrease of rejected applications, associated with a 20.6% increase of overall acceptance rate. In terms of time trends, the overall rise of submitted requests from 2009 to 2019 resulted in an increase in both rejected (+18%) and accepted (+61% for OIB, +11% for DP) applications. The higher rate of accepted requests was for workers aged 51–60 years, with 52% of admitted applications.

**Conclusions** Between 2009 and 2019, the number of applications for social security benefits due to diabetes in Italy increased significantly, and so did the number of applications approved, mainly represented by the OIBs.

## INTRODUCTION

Diabetes-related complications, including acute myocardial infarctions, strokes and lower extremity amputations, increased by

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This is the first study that evaluates the number of social security claims with diabetes as the main diagnosis in Italy.
- ⇒ A long period was used for data collection at national level (11 years).
- ⇒ People with diabetes who applied for a social security benefits were divided according to age and work class to determine which age or working class group is most affected by diabetes.
- ⇒ The distinction between the two types of social security benefits provided in Italy allowed to estimate the degree of disability associated with diabetes (disability between 67% and 99% for the ordinary incapacity benefit or disability equal to 100% for the disability pension).
- ⇒ An important limitation of this study is the lack of information on diabetes-related complications or risk factors that lead workers to apply for social security benefits.

25% between 2010 and 2015 among young adults (aged 18–44 years) and middle-aged adults (aged 45–64 years) in the USA.<sup>1</sup> Accordingly, diabetes is associated with high rates of morbidity and disability due to chronic complications, particularly in the working-age population.<sup>1,2</sup> Between 1995 and 2017, Global Burden of Diseases data showed that diabetes moved from seventh to fourth place in Italy in terms of disability-adjusted life years, which represent the number of years lost to disease, disability and premature death.<sup>3</sup>

Diabetes negatively affects productivity and economic costs through reduced work capacity.<sup>4,5</sup> The Italian social security system (SSS) is characterised by a dual structure that provides social assistance and civil disability benefits as well as social security benefits (SSBs) in the strict sense. Regarding the

latter, the SSS provides economic benefits to workers with disabilities and chronic physical and/or mental disabilities, financed primarily by their contributions. In particular, all workers registered with the National Institute of Social Security are entitled, on application, to one of the following two SSBs: the ordinary incapacity benefit (OIB) is granted to persons whose ability to work is reduced to less than one-third (disability between 67% and 99%), and the disability pension (DP) is granted to persons who are permanently and absolutely unable to work (100%).<sup>6</sup> Italian Law No. 222/84<sup>7</sup> specifies the conditions for access to OIB and DP (online supplemental table S1). Both OIB and DP provide income protection for persons who become unable to work before they are entitled to an old-age pension.

Diabetes has received relatively little attention as a reason for claiming SSB in the working-age population, despite its importance for both health surveillance and social policy. Indeed, there are very few studies examining the rate of SSB provided by the National SSS due to diabetes. This is relevant for several reasons. First, the provision of SSB contributes to the increase in indirect costs related to diabetes, estimated at about 10 billion euros in Italy.<sup>8</sup> In addition, it might be useful to track the number of applications for SSB over time to evaluate the impact of diabetes on a person's ability to work; this would also allow an indirect evaluation of the effectiveness of diabetes treatment. Finally, evaluating the number of applications for SSB filed by people with diabetes over time could be used to improve the social security assessment process.

The aim of this study is to estimate the number of applications for SSB filed by Italian workers with diabetes-related work disability from 2009 to 2019. Data from the SSS of each region were collected and presented as a whole.

## METHODS

### Study design and data source

This is a retrospective cohort study using data from the National Institute of Social Security (Istituto Nazionale della Previdenza Sociale, INPS) database. The database contains all claims submitted for each benefit and the associated judgments (approval or rejection) by medical officers. It contains the indication of the principal diagnosis and all secondary diagnoses using the International Classification of Diseases, Ninth Revision (ICD9-CM).<sup>9</sup> In order for an application to be accepted or denied, INPS medical legal centres make an overall assessment of the applicant's physical and mental health. The assessment is based solely on medical forensic criteria and does not consider other socioeconomic factors.

### Case definition

In this study, we examined all applications received by the INPS for recognition of a social security benefit with diabetes as the principal diagnosis. In this case, all claimants suffering from diabetes with diagnosis code 250.xx ICD9-CM were selected.

### Analyses by sociodemographic characteristics

Based on these claims, the study analysed trends and breakdowns of all claims from 2009 to 2019. Further descriptive analyses were performed using additional data from the claims, such as claimant age, which was used to categorise claims by different age groups, gender and occupational class. Specifically, diabetes claimant age was used to categorise accepted claims into five age groups: <30 years, 30–40 years, 41–50 years, 51–60 years and >60 years. The purpose of this analysis was to determine which age groups are most affected by diabetes. As a result of this analysis, we were able to determine at what stage of their working lives workers and patients with diabetes are most likely to receive a SSB.

Based on the main groups protected by the INPS, a breakdown of the accepted claims by occupational category was generated. These include: (1) legislators, entrepreneurs and top managers, (2) intellectual, scientific, highly specialised occupations, (3) technical professions, (4) executive desk job occupations, (5) commercial activities and services occupations, (6) artisans, special workers and farmers, (7) plant operators, stationary and moveable machinery staff and drivers of vehicles, (8) unskilled occupations.

### Descriptive statistics

Descriptive analyses were conducted to provide a framework for better understanding the characteristics of diabetics and those seeking SSB. Based on the total number of claims filed by judgement for each study year, the percentage distribution was calculated. Specifically, we calculated the ratio of approved applications (separately for both SSB) to total applications filed in the same year. We also calculated the ratio of denied applications. The purpose of these ratios was to examine the evolution of rejected and approved applications for SSB in diabetes over time, after taking into account the evolution of total applications, which certainly influenced the evolution of the absolute number of approved and rejected applications. In this analysis, we were able to observe the evolution of both the approval and denial rates over time.

This study was conducted in accordance with the REporting of Studies Conducted Using Observationally Collected Health Data (RECORD) statement.<sup>10</sup> The checklist RECORD is provided in (online supplemental table S2).

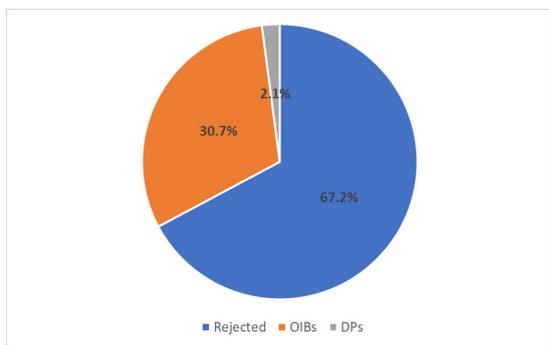
### Patient and public involvement

We did not involve patients or the public in the planning, conduct, reporting or dissemination of our research.

## RESULTS

Between 2009 and 2019, a total of 40 800 claims for SSB were filed with diabetes as the principal diagnosis. This represents an average of more than 3700 claims per year and an annual increase of 30%.

Figure 1 illustrates the overall rate of social security claims based on the final judgement. During the study

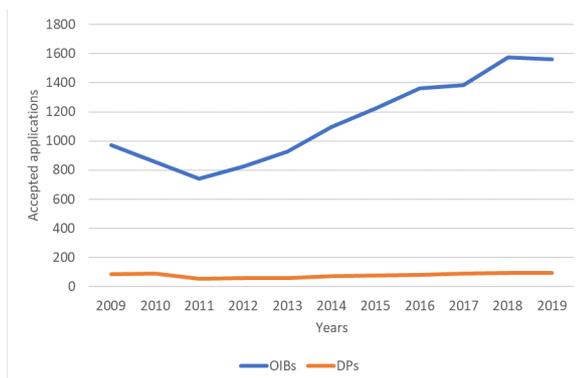


**Figure 1** Percentage distribution of claims for social security benefits per final judgement with diabetes as primary diagnosis in Italy between 2009 and 2019. DP, disability pension; OIB, ordinary incapacity benefit.

decade, more applications were denied than granted. Specifically, 67.2% of applications were denied, or an average of about 2500 denied applications per year. The majority (32.8%) of accepted applications (30.7%) were approved as OIB, while only 2.1% were approved as DP. This results in an average number of approved applications per year of more than 1100 for OIB and about 80 for DP. Looking over time, the overall increase in applications submitted from 2009 to 2019 resulted in both an increase in applications denied (+18%) and applications accepted (+61%) (figure 2).

Table 1 shows the percentage distribution of applications by final judgement from 2009 to 2019. An 8.8% decrease in denied applications was accompanied by a 20.6% increase in approval rates. In terms of the type of SSB, there was a 23% increase in accepted applications for OIB and a 14.8% decrease in accepted applications for DP.

We looked at the following specific age groups to determine application acceptance: <30 years, 30–40 years, 41–50 years, 51–60 years and >60 years (figure 3). Workers aged 51–60 accounted for the largest percentage of accepted applications, with 52% of accepted applications, or approximately 600 accepted applications per



**Figure 2** Time trend of accepted applications for social security benefits (OIB and DP) with diabetes as primary diagnosis in Italy between 2009 and 2019. On the vertical axis, number of accepted applications; on the horizontal axis, years. DP, disability pension; OIB, ordinary incapacity benefit.

year between 2009 and 2019. Workers over the age of 60 were the second largest age group, accounting for 32% of accepted applications and approximately 360 accepted applications per year, followed by workers aged 41–50, accounting for 13% of accepted applications and approximately 150 accepted applications per year. Applications from workers younger than 30 were not accepted.

The number of accepted applications was higher for men (971 per year) than for women (245 per year); however, between 2009 and 2019, the number of accepted applications increased by 58% for men and 51% for women (online supplemental table S3).

When analysed by working class (online supplemental table S3), ‘unskilled occupations’ (29% of total accepted claims) were the most important groups in terms of accepted claims, followed by ‘artisans, skilled workers and farmers’ (27% of total accepted claims). Both ‘plant operators, stationary and moveable machinery staff and drivers of vehicles’ and ‘commercial activities and services professions’ had a weight of 15% among the overall accepted applications. Finally, the working classes with the lowest weight in terms of accepted applications were ‘executive desk job professions’, ‘technical professions’, ‘legislators, entrepreneurs and top managers’ and ‘intellectual, scientific and highly specialised professions’ (7%, 4%, 2% and 1%, respectively, of the total accepted claims).

## DISCUSSION

To the best of our knowledge, this is the first study to estimate the number of people with diabetes who applied for SSB in Italy from 2009 to 2019. Data were collected at national level, taking into account claims in which diabetes was the main diagnosis. The overall number of claims submitted increased during the decade considered, with the majority of claims (67.2%) being rejected. However, the number of rejected claims submitted per year has decreased, and the number of accepted claims has increased in favour of OIB rather than DP.

The National Institute of Social Security is responsible for assessing the incapacity for work of persons applying for SSBs, relying exclusively on medical and legal criteria and not on income-related conditions. It is noteworthy that most of the applications were made by persons aged 51–60, suggesting that diabetes is not unique to older workers, the second most prevalent group. In addition, the majority of claimants were men, suggesting that women with diabetes-related disabilities are more likely than men to have irregular work schedules or to be inactive. In addition, the most appropriate categories of workers with accepted claims were classified as ‘unskilled professions’ and ‘craftsmen, skilled workers and farmers’, all of which require physical strength and coordination.

Diabetes continues to be considered a relevant cause of morbidity and disability in workers, as shown by the increase in total applications for SSBs between 2009 and 2019. This is also confirmed by the increase in the number of claims approved over time, especially in the

**Table 1** Percentage distribution by judgement and trend of applications presented for social security benefits with diabetes as primary diagnosis

Year	Rejected/ submitted (%)	OIBs/submitted (%)	DP/submitted (%)	Accepted/ submitted (%)
2009	70.0	27.6	2.4	30.0
2010	71.0	26.3	2.7	29.0
2011	71.6	26.5	2.0	28.4
2012	69.2	28.7	2.0	30.8
2013	70.9	27.4	1.7	29.1
2014	69.3	28.8	1.8	30.7
2015	65.8	32.1	2.0	34.2
2016	62.3	35.5	2.1	37.7
2017	63.2	34.6	2.2	36.8
2018	66.0	32.1	1.9	34.0
2019	63.8	34.1	2.1	36.2
% variation 2009–2019	–8.8	23.7	–14.8	20.6

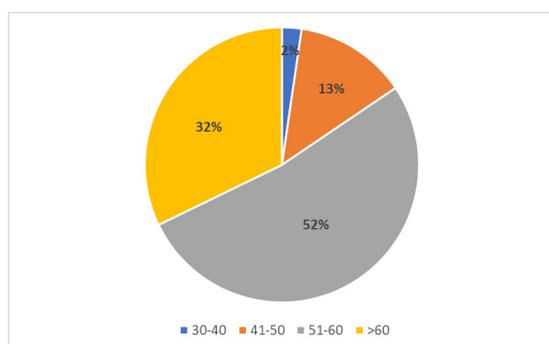
DP, disability pension; OIBs, ordinary incapacity benefits.

area of OIB, which also reflects an improved knowledge of the diagnosis of diabetes-related complications.

These results could be explained by a number of factors. First, the incidence of type 2 diabetes, which accounts for approximately 90% of all diabetes cases, is increasing worldwide,<sup>11</sup> with a rising prevalence in those under 45 years of age due to the global spread of unhealthy lifestyles and cardiometabolic risk factors,<sup>12</sup> leading to significant and premature morbidity. Second, diabetes is associated with macrovascular and microvascular complications that lead to disability and poor quality of life in affected individuals.<sup>13–15</sup> The risk of macrovascular complications (coronary heart disease, stroke, peripheral artery disease) is largely influenced by other cardiometabolic risk factors such as smoking, obesity, hypertension and hyperlipidaemia.<sup>16</sup> The microvascular complications of diabetes are closely related to hyperglycaemia and affect three of the classic target tissues (eye, kidney and peripheral nervous system). However, the brain, myocardium,

skin and other tissues are also affected.<sup>17</sup> Effective glycaemic control and aggressive treatment of cardiometabolic risk factors can prevent both macrovascular and microvascular diabetic complications. Achieving these goals remains a challenge,<sup>18</sup> considering that intensive glycaemic control is associated with only a significant 9% reduction in major cardiovascular events (MACE), implying that there remains some ‘residual vascular risk’ that persists despite achieving near-normal glycosylated hemoglobin (HbA1C) targets.<sup>19</sup> Interestingly, a number of longitudinal cohort studies have shown that diabetes is associated with twice the risk of developing DP,<sup>20 21</sup> with obesity<sup>20</sup> and cerebrovascular disease<sup>21</sup> being the largest contributors. Third, despite the availability of glucose-lowering drugs which have been shown to be safe (dipeptidyl peptidase-4 inhibitors) or protective (glucagon-like peptide 1 receptor agonists and sodium glucose cotransporters-2 inhibitors) against MACE in people with diabetes at high risk for vascular complications,<sup>22–24</sup> these drugs remain underused in less than 15% of total diabetic population treated.<sup>18 25 26</sup>

There is a lack of studies examining whether a person with diabetes may be able to receive an SSB in their working years. An analysis of a random sample of Finnish nonretired persons aged 18–64 years found that older age increased the likelihood of both applying for and receiving a pension, whereas lower socioeconomic status was associated with a greater likelihood of applying for a DP but also a lower likelihood of receiving it.<sup>27</sup> Participants aged 50–65 years from three large observational studies indicated that both self-reported disability and the prevalence of disability varied considerably across countries in Europe or the USA.<sup>28</sup> There are a number of factors that influence the use of SSB, including health

**Figure 3** Percentage weight of age groups in terms of applications accepted for social security benefits with diabetes as primary diagnosis in Italy in the period 2009–2019.

and sociodemographic factors as well as national policies that determine the generosity of the Social Security Institution.

The strengths of this study include the extended time-frame analysed (11 years), the collection of data at the national level, the differentiation of benefits between the two types of social security schemes in Italy, and the consideration of different age groups or occupational class of workers claiming SSBs. The main limitation concerns the lack of information on diabetes-related complications or risk factors that led workers to apply for social security benefits. In addition, we could not compare the total number of SSB claims for diabetes with claims for noncommunicable chronic diseases during the same period. Compared with data from a study describing the economic and social costs of breast cancer in Italy,<sup>29</sup> the average number of benefits granted annually for diabetes was lower than that for breast cancer. In both cases, the majority of approved claims refer to OIB rather than DP. For diabetes, the percentage of approved claims is 61%, and for breast cancer, the percentage is 14%. Finally, the economic burden associated with accepted applications for SSB provided by the INPS has not been analysed. Two studies calculated the costs associated with the evaluation of the acceptance of applications related to schizophrenia<sup>30</sup> and breast cancer<sup>29</sup> in Italy. They concluded that the monthly rate assigned to patients depends only on the type of social security benefit (OIB or DP), which is based on the patient's degree of disability, regardless of the disease. Nevertheless, a study estimating the economic burden of SSBs for diabetes in Italy identified an expenditure of 715.3 million euros (about 120 million euros per year) between 2014 and 2019.<sup>31</sup>

Although recent evidence on the occupational risk of people with diabetes is conflicting, policies that exclude diabetic workers are both unnecessary and harmful in most occupations. Because people with diabetes are at high risk of developing disease-related disabilities, assessing occupational risk is crucial to identify potentially critical conditions in the workplace (eg, risk of hypoglycaemia, effectiveness of treatment and so on); for these reasons, efforts should be made to improve and prolong the work ability of people with diabetes, including, if necessary, providing alternative employment opportunities.

## CONCLUSIONS

This is the first study to document that the number of applications for SSB due to diabetes in Italy increased significantly from 2009 to 2019, with an increase in the number of applications granted, mainly under the OIB. Because diabetes complications can be prevented by strict glycaemic control and improvement of cardiovascular risk factors, there would be substantial health and social benefits if effective secondary prevention could improve the prognosis for the many people with diabetes. Although some population-based cohort studies suggest that cardiorenal protection by new antihyperglycemic

agents may act in addition to that of optimal glycaemic control, randomised controlled trials are needed to clarify this issue.

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