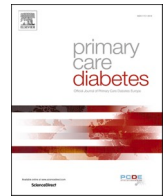


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Primary Care Diabetes

journal homepage: www.journals.elsevier.com/primary-care-diabetes

Diabetes type 2 prevalence is rising among young residents in Malmö, Sweden

Magdalena Annersten Gershater^{a,1,*}, Margareta Rämgård^a, Cecilia Nagorny Holmberg^b, Mathias Grahn^c, Mats Andersson^d, Christina Jonsson^e, Slobodan Zdravkovic^a

^a Department of Care Science, Faculty of Health and Society, Malmö University, Jan Waldenströms gata 25, Malmö 20602, Sweden

^b Novo Nordisk Scandinavia AB, Carlsgatan 3, Malmö 211 20, Sweden

^c Avdelningen för analys och hållbarhet, Enheten för Statistik och Analys, Stadskontoret, Malmö stad August Palms plats 1, Malmö 205 80, Sweden

^d Region Skåne, Avd. för Hälso, och sjukvårdsstyrning, Koncernkontoret, Dockplatsen 26, Malmö 21119, Sweden

^e Enheten för dataanalys och registercentrum, Tunavägen 22, Lund 223 63, Sweden

ARTICLE INFO

Keywords:

Diabetes Complications
Diabetes Mellitus
Epidemiology
Home Care
Migration
National Diabetes Register
Outcome
Prevalence
Prevention
Primary Care

ABSTRACT

Aim: Type 2 diabetes is becoming more prevalent in many parts of the world. Malmö's population has increased in recent years mainly because of migration from other parts of Sweden and the world in addition to increased birth rates. We aimed to explore diabetes prevalence in Malmö in 2011–2018 as well as the achieved treatment targets for selected diabetes-related outcomes.

Method: The current study is a part of the Cities Changing Diabetes Malmö project. Prevalence data were retrieved from the region's primary care and hospital diagnosis register, and data on treatment targets were collected from the National Diabetes Register. The inclusion criteria were either being a resident of Malmö or using a primary healthcare centre located in Malmö.

Results: The prevalence of type 2 diabetes in 2018 doubled from 2011 in the entire Malmö population. During the same period, the prevalence of type 1 diabetes remained stable at 0.49 %. In 2011, the type 2 diabetes prevalence was 2.46 % (2.76 % for males and 2.28 % for females), and in 2018, it was 4.26 % (4.84 % for males and 3.82 % for females). The increase was 139 % for residents aged 0–29 years, 119.6 % for residents aged 30–39 years, 96.2 % for residents aged 40–49 years, 102 % for residents aged 50–59 years, 98.2 % for residents aged 60–69 years, and 115.5 % for those aged 70–79 years. Finally, the increase was 60.9 % for those aged 80–84 years and 90.7 % for residents 90 years of age and older. The National Diabetes Register reported that during 2019, 58 % of all patients with diabetes using primary care in Malmö reached HbA_{1c} <52 mmol/mol, 20 % had albuminuria, 36 % had retinopathy, and 21 % had not had their feet inspected by a healthcare professional during the last year. The median HbA_{1c} was 52.6 mmol/mol, and 17 % were registered as active smokers.

Conclusion: Diabetes prevalence in Malmö has increased markedly in recent years, exacerbated by a rise in type 2 diabetes mainly in the younger population. Targets regarding p-glucose lowering treatments were not met by 42 %. One patient out of three had microvascular complications in the eye, one out of five had impaired kidney function, one out of five had not had their feet inspected, and one out of five was an active smoker. Active diabetes treatments need to be improved to reduce the number of younger patients developing microvascular complications. Preventive activities need to target younger populations to counteract even more residents developing type 2 diabetes.

* Corresponding author.

E-mail addresses: magdalena.gershater@mau.se (M.A. Gershater), margareta.ramgard@mau.se (M. Rämgård), ccnh@novonordisk.com (C.N. Holmberg), mathias.grahn@malmo.se (M. Grahn), mats.g.andersson@skane.se (M. Andersson), Christina.F.Jonsson@skane.se (C. Jonsson), slobodan.zdravkovic@mau.se (S. Zdravkovic).

¹ ORCID 0000-0003-4395-2522

<https://doi.org/10.1016/j.pcd.2024.06.005>

Received 30 January 2024; Received in revised form 14 May 2024; Accepted 2 June 2024

Available online 4 June 2024

1751-9918/© 2024 The Author(s). Published by Elsevier Ltd on behalf of Primary Care Diabetes Europe. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The prevalence of type 2 diabetes is increasing in many parts of the world. It has been estimated that in Europe the prevalence was 8.9 % in 2019 and is projected to increase to 10.3 % in 2045 [1]. Malmö’s population has increased in recent years due to migration from other parts of the country and abroad in combination with high birth rates. The median age of Malmö’s population was 38.9 years in 2011 and 38.4 years in 2018, revealing a young population [2]. No information has, to our knowledge, been published regarding the diabetes situation in the city, in spite of the fact that Malmö City Council is responsible for a home-care organization with 10 000 caretakers and in close collaboration with the County Council’s primary care. Nevertheless, this study highlights the importance of obtaining a broader picture of diabetes in the city as a whole entity, focusing on differences in age and the extent to which treatment targets of selected diabetes outcomes have been achieved. To explore the future implications of type 2 diabetes for the growing population in Malmö, this study aimed to explore (a) diabetes prevalence in Malmö between 2011 and 2018 and (b) achieved treatment targets for selected diabetes-related outcomes in primary care in 2019.

2. Methods

2.1. Study design

This is a quantitative descriptive register study.

2.2. Setting

This study took place in Malmö, Sweden (with a population of 338,762 in 2011 and 356,814 in 2018). Malmö is characterised by a young population (the median age was 36 years in 2011 and 37 years in 2018, see Fig. 1) [2] with roots of origin in 186 different countries [3]. The 20 most common countries of birth in 2013 were Sweden, Iraq, former Yugoslavia, Denmark, and Poland. Changes in population by country of birth are presented in Table 1.

In Malmö, patients with type 2 diabetes are mainly taken care of by primary healthcare centres where general practitioners work in teams with registered nurses, physiotherapists, psychologists, and social workers. Registered nurses in the team have taken a shorter course in diabetes nursing. We identified 32 healthcare centres located in Malmö reporting to the National Diabetes Register in 2019.

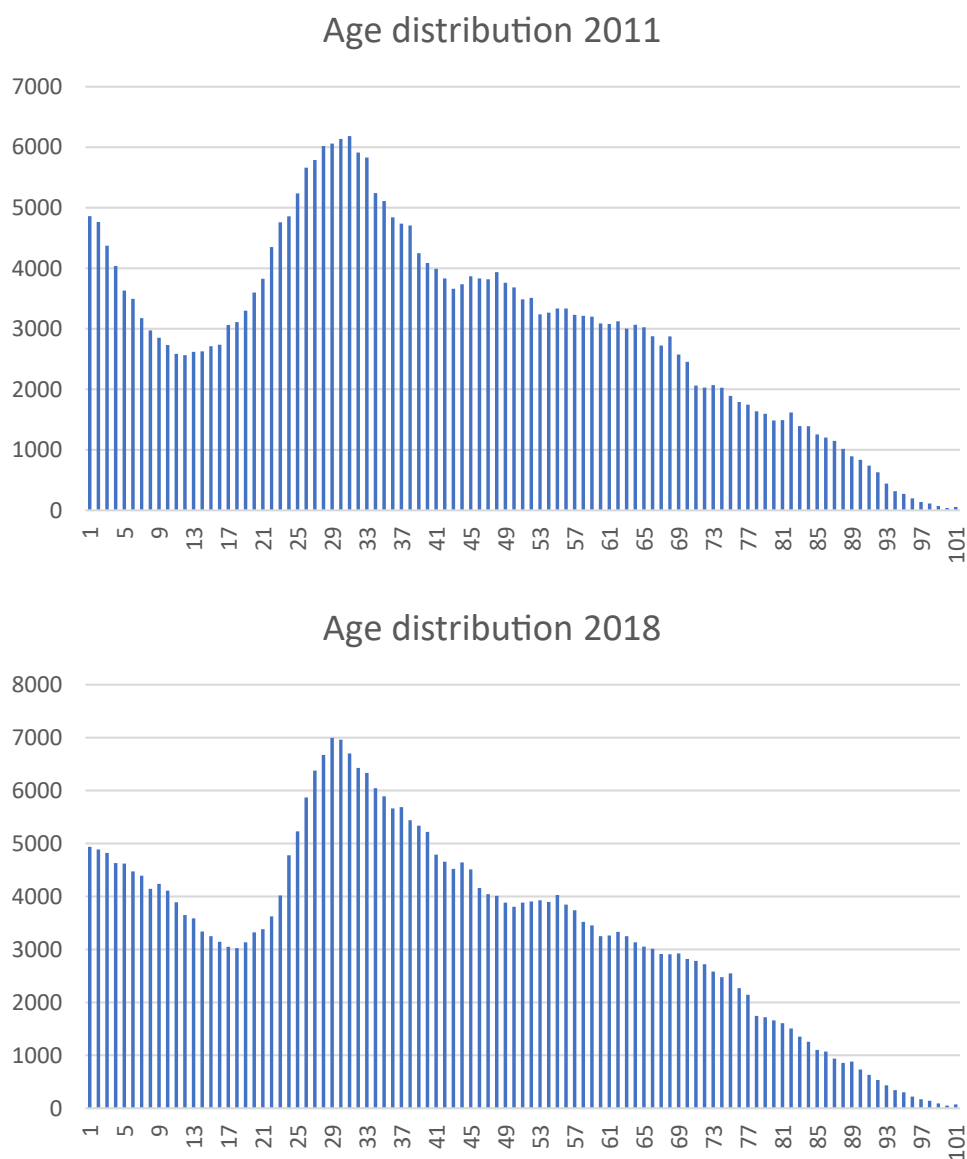


Fig. 1. Age distribution of Malmö’s population in 2011 and 2018.

Table 1
The most common countries of birth for residents in Malmö in 2013 and 2018.

		2013	2018	Difference
1	Sweden	215,674	224,541	8867
2	Iraq	10,843	11,790	947
3	Yugoslavia	8262	7721	-541
4	Denmark	8166	7446	-720
5	Poland	7055	6912	-143
6	Bosnia and Herzegovina	6184	6403	219
7	Lebanon	4064	4376	312
8	Iran	3559	4061	502
9	Afghanistan	2582	4004	1422
10	Romania	2223	2479	256
11	Turkey	2401	2463	62
12	Somalia	1975	2422	447
13	Hungary	1884	1677	-207
14	Finland	1625	1559	-66
15	Pakistan	1506	2066	560
16	Germany	1896	2033	137
17	Chile	1386	1338	-48
18	Vietnam	1372	1701	329
19	Syria	1366	7440	6074
20	Macedonia	1281	1652	371

2.3. Participants

The inclusion criteria were either being a resident of Malmö or using a primary healthcare centre located in Malmö during 2011 and/or 2018.

2.4. Variables

A resident in Malmö was defined as any person recorded in the census register for a minimum of one day during 2011 and/or 2018. The data were retrieved from the local census registers 20111231 and 20181231, respectively [2].

Diabetes was defined as an entry registered in the region’s primary care and hospital diagnosis register (PASIS) with the diagnosis codes *E10P* or *E11* or *E13* or *E14*.

2.5. Data sources

Prevalence data were retrieved from Region Skåne’s administrative register of care and treatment (PASIS) on an individual basis, and the data on treatment targets were collected from the National Diabetes Register, to which 32 healthcare centres located within Malmö city reported their 2019 results [4]. Demographic data were retrieved from Malmö Statistical Unit [3]. See Fig. 2.

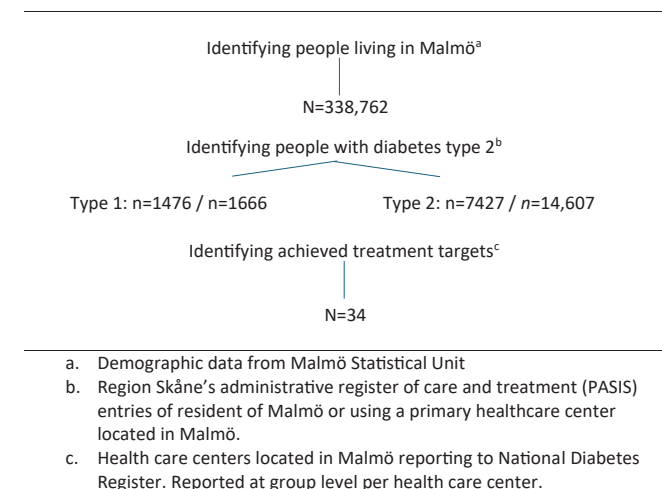


Fig. 2. Data retrieval.

2.6. Bias

There are no data available regarding how many persons are residing in Malmö without a Swedish residence permit. Oral communication with persons representing charity organisations for undocumented persons reported that they were not aware of any persons with diabetes among their care recipients. Persons not residing in Malmö but listed at a healthcare centre within Malmö were included in the NDR. We do not know how many they are, nor do we know how many residents of Malmö are listed at a healthcare centre located in municipalities outside of Malmö.

There were 3000 patients recorded in PASIS as having both type 1 and type 2 diabetes at different visits to the healthcare centres or the hospital (age range 5–101 years, median 73). This group was sorted to the best of our knowledge using the register data, and we made a likelihood estimation to rule out persons with type 1 diabetes. Our priorities were as follows: Cases of persons who were estimated as having type 2 with a diagnosis code of obesity and a diagnosis of type 2 diabetes recorded by a dietician, doctor, or nurse at the Department of Endocrinology or Paediatrics had priority over those with a diagnosis made by general practitioners, and cases where the patients’ age made type 2 diagnosis unlikely were ruled out. In 78 cases, it was not possible to determine a type 2 diagnosis, so these cases were excluded. The remaining cases were included in the result as having diabetes type 2. Country of birth was available from 2013 onwards [3].

2.7. Study size

This is a total survey of all persons residing in Malmö with a diabetes diagnosis registered in the public healthcare administrative diagnosis system and of all persons registered in the National Diabetes Register who are receiving primary care at centres (both public and private) located in Malmö City in the years 2011 and 2018.

2.8. Statistical methods

This study employed descriptive statistics.

The current study is a part of the Cities Changing Diabetes Malmö, a research project for exploring the drivers of type 2 diabetes and its complications in urban settings through partnership between Malmö University, Malmö City Council, Region Skane, and Novo Nordisk. The project is part of the Cities Changing Diabetes, a global partnership programme initiated by Novo Nordisk [5].

The study was approved by the Swedish Ethical Review Authority (Dnr 2020–03357).

3. Results

3.1. Prevalence of diabetes

The prevalence of type 2 diabetes in the entire Malmö population increased from 2.46 % (n=7427) in 2011–4.26 % (n=14,607) in 2018, an increase by 96.7 % (n=7180). The increase was 102.3 % in males and 90.1 % in females. See Table 2. During the same period, the prevalence of type 1 diabetes remained stable (0.49 %) with n=1476 in 2011 and n=1666 in 2018 (ns).

3.2. Achieved treatment targets

Data reported to the National Diabetes Register from 32 primary healthcare centres located in Malmö revealed that during 2019, 58 % of all patients with type 2 diabetes achieved HbA_{1c} <52 mmol/mol, 20 % had albuminuria, 36 % had retinopathy, and 21 % had not had their feet inspected by a healthcare professional during the previous year. The median HbA_{1c} was 52.6 mmol/mol, and 17 % of the patients were registered as active smokers. See Table 3.

Table 2
Prevalence of type 2 diabetes in 2011 and 2018 by age groups.

	2011	2018	Difference
0–17	4	3	–1 (25 %)
18–29	28	67	39 (139.3 %)
30–39	148	325	177 (119.6 %)
40–49	503	987	484 (96.2 %)
50–59	1227	2478	1251 (102.0 %)
60–69	2023	4010	1987 (98.2 %)
70–79	1930	4160	2230 (115.5 %)
80–89	1359	2186	827 (60.9 %)
90–99	203	384	181 (89.2 %)
100–109	2	7	5 (250.0 %)
Type 2 ALL	7427	14,607	7180

Table 3
Selected endpoints from the National Diabetes Register 2019–12-31, N=12,464.

	All 18+	18–64	65+
	N=12,464	n=5576	n=6884
HbA _{1c} ≤52 mmol/mol	7216 (57.9 %)	3095 (55.5 %)	4096 (59.5 %)
Median HbA _{1c}	52.6 mmol/mol	53.9	51.8
Albuminuria	2492 (20 %)	842 (15.1 %)	1632 (23.7 %)
Retinopathy	4487 (35.9 %)	2024 (36.3 %)	2026 (36.7 %)
Foot inspection last year	9847 (79 %)	4450 (79.8)	5459 (79.3 %)
Active smoker	2119 (17 %)		

4. Discussion

Prevalence of type 2 diabetes in Malmö doubled between 2011 and 2018 but is still lower than an age-adjusted estimation from Sweden of 5 % made by International Diabetes Federation [1]. This low number can be attributed to the relatively young population. However, type 2 diabetes has increased in the younger adults in this multicultural city. This trend has also been seen in other cities around the world [6]. The development of diabetes complications is related to diabetes duration. Therefore, it is alarming that the increase in prevalence is four to seven times larger for residents younger than 49 years. These younger people carry the risk of having diabetes complications before the age of retirement, with the risk of early retirement and shorter life expectancy [7,8].

For residents 50–79 years of age, the prevalence was more than doubled, implicating that the primary healthcare centres located in Malmö needed to cover for the diabetes management and diabetes-related care needs of 5468 more patients in 2018 than in 2011. Factors such as the organisation of primary healthcare centres with team-based work including GP- and diabetes-educated registered nurses, time spent with the registered nurses, and group education have shown a positive impact on HbA_{1c} for patients with type 2 diabetes [9]. To become a certified primary care diabetes unit, a healthcare centre in Malmö is required to have at least one full-time diabetes nurse who is responsible for a maximum of 400 patients per year [10]. Hence, additional general practitioners, registered nurses with diabetes education, and other healthcare professionals are needed to maintain the status quo. For the oldest residents, namely those aged 80–109 years, the increase in cases may be attributed to the improvements in diabetes treatments over the past 20 years, which have raised their chances of surviving into old age. This might add to the burden on the home care organisation and assisted living facilities because they need further diabetes education for staff to cater to the increasing number of diabetic patients [11].

During 2019, two out of five patients did not reach the goal for metabolic control with existing treatments. This carries a risk for further development of diabetes complications, which to some extent are already present in this study [11]. This is particularly worrying because the residents older than 65 years had a worse metabolic control than the older residents. This further emphasises the need to reach the different

populations with type 2 diabetes who are in a working age with intensified treatment options and patient education to help them to understand and improve their situation. Patients who have an HbA_{1c} above the general recommended HbA_{1c}-level (52 mmol/mol) might need an individually set treatment target due to comorbidities and adverse life situation.

The fact that almost one out of four residents in Malmö with type 2 diabetes suffer from albuminuria is alarming. Albuminuria is an indicator of future end-stage renal disease, the most expensive diabetes complication. It is also an indicator of future cardiovascular disease and mortality [12]. Albuminuria can be prevented by good metabolic control and control of hypertension; this requires a proactive strategy from the healthcare centres with regular follow up and the prompt initiation of proper medication. Moreover, retinopathy was reported in 36 % of the cases: more than 4000 residents of Malmö have diabetes retinopathy, with different degrees of visual impairment. Diabetes retinopathy is a well-known cause of disability and reduced selfcare skills [13], and it has implications for the municipality's home care organisation, as people with impaired vision need more support.

For 2617 Malmö residents with type 2 diabetes, foot status had not been recorded in primary care during 2019. Identifying the at-risk foot is regarded as the most important care measure to prevent diabetic foot ulcers and future amputation [14]. Accordingly, patients whose feet are at risk should receive education about performing regular inspections of the feet, wearing of appropriate socks and footwear, and visiting chiropody regularly. In addition, for patients who are unable to perform selfcare, education for family members and healthcare staff is necessary. Early treatment of risk factors for ulceration is recommended [14]. As 21 % of the residents with type 2 diabetes in Malmö had not had their feet inspected, these preventive actions cannot be performed. Diabetic foot disease is a source of major suffering and financial costs for the patient, and it also places a considerable burden on the patient's family, the healthcare organisation, and society in general [14]. Malmö's home care organisation needs to prepare care takers to deal with more cases of diabetic foot ulcers and amputation within their work assignments in the near future.

The primary healthcare organisation in Malmö needed to treat twice as many persons with type 2 diabetes in 2018 than in 2011. Diabetes patients are younger than before, which can be demanding for the multidisciplinary diabetes care team; specifically, treatment regimens need to be adapted to different lifestyles and age groups, and pedagogical methods need to be adopted as part of the person-centred care to address other everyday issues [15,16]. To which extent this has already been done is not known and needs to be explored further. However, as the quality of care in primary care centres is measured by the National Diabetes Register, our results indicate that they have not managed to meet the increasing care needs of all residents with diabetes in Malmö. The fact that 17 % of the residents with type 2 diabetes in Malmö are active smokers and that 21 % do not have their feet inspected is an indication that primary care does not have the resources to fully meet the needs of the patients to prevent diabetes complications. Primary healthcare centres need to strengthen their diabetes team: they need general practitioners with expertise in diabetes treatments working in teams with skilled registered nurses, and they need cultural competency to provide the best possible diabetes care for persons with type 2 diabetes [9].

Migration to Malmö in combination with employment difficulties because of low education levels are socioeconomic factors that play an important role for the residents and their health status. Previous studies have pointed out some major concerns; for instance, McGavock et al. [17] emphasised that type 2 diabetes in young people is largely a disease of poverty, and that young-onset type 2 diabetes is strongly associated with relative socioeconomic deprivation. The described risk factors for young persons with type 2 diabetes were [1] glycaemic control, the main modifiable risk factor for the classical microvascular complications of diabetes; [2] albuminuria and obesity, risk factors for kidney disease in

diabetes; and [3] a cardiovascular risk factors, such as dyslipidemia, hypertension, glycaemic control, smoking, and albuminuria. The striking observation was that all these risk factors were significantly and progressively associated with increasing degrees of social deprivation, and that these associations held regardless of the type of diabetes [18]. Unfortunately, Malmö has developed towards increased segregation, with 24 % of the children living in relative poverty [19]. To prevent further increase in incidence of type 2 diabetes in young people, the municipality needs to take substantial socio-economic actions. A further analysis of these socioeconomic factors will be presented in a separate paper.

Type 2 diabetes is more prevalent in the counties of origin of Malmö's migrant residents: Iraq (9.1 %), Syria (9.9 %), Denmark (5.6 %), the Balkans (Bosnia-Herzegovina [7.5 %], Serbia [7.7 %], Croatia [5.2 %], Slovenia [7.5 %], Montenegro [7.7 %]), Poland (9.0 %), Lebanon (19.6 %), Afghanistan (7.6 %), Iran (11.1 %), Turkey (7.9 %), and Romania (7.7 %) [1]. The increase in diabetes prevalence in the present study could be attributed to the influx of people from these countries.

The results showed that the prevalence of type 1 diabetes was stable over the studied period, as the proportion did not change between 2011 and 2018. However, the number of Malmö residents with type 1 diabetes increased due to the increased general population.

A weakness in the present study is the that entries in the diagnosis register PASIS often recorded incompatible types of diabetes. We have tried to compensate for this by sorting them to the best of our knowledge based on the information available. Furthermore, the country of origin and immigration status were not recorded in the National Diabetes Register, nor were any other socioeconomic factors that might have affected the increase in diabetes incidence. This study is the first step to further analyse these factors. Country of birth data were not available for 2011–2012, so data from 2013 onwards were used instead.

4.1. Interpretation and recommendations

Type 2 diabetes has doubled in Malmö in 2011–2018, especially for the working age population. Moreover, the primary healthcare centres did not manage to treat this increasing number of patients and help them achieve their treatment goals. This situation constitutes a challenge for healthcare organisations, which not only have to treat twice as many patients in a short time but also deal with an estimated increase in diabetes complications. In addition, the municipal home care organisation needs to become actively involved as it may face an increase in patients dependent on home care due to diabetes complications. Preventive actions focusing on the younger residents of Malmö could help primary healthcare centres to mitigate the increasing number of patients. Improved treatments and patient education with patient involvement in a multi professional approach is needed.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors'.

CRedit authorship contribution statement

Substantial contributions to the conception and design of the work; acquisition, analysis, and interpretation of data: MAG, MR, CNH, MG, MA, CJ, SZ. Drafting the work and reviewing it critically for important intellectual content: MAG, MR, CNH, MG, MA, CJ, SZ. Final approval of the version to be published: MAG, MR, CNH, MG, MA, CJ, SZ. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: MAG, MR, CNH, MG, MA, CJ, SZ.

No Artificial Intelligence was used in this study or preparation of

manuscript.

Declaration of Competing Interest

None

Data Availability

The datasets generated for this study are available on reasonable request to the corresponding author.

References

- [1] International Diabetes Federation Diabetes Atlas 10th ed. 2021. (<https://diabetesatlas.org/atlas/tenth-edition/>).
- [2] Statistics Sweden 2019 (https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START_BE_BE0101_BE0101B/BefolkningMedelAlder/).
- [3] Statistics Sweden (2023) Total Population Register (www.scb.se).
- [4] B. Eliasson, S. Gudbjörnsdóttir, Diabetes care – improvement through measurement, Diabetes Res. Clin. Pract. Volume 106 (Supplement 2) (2014) S291–S294, [https://doi.org/10.1016/S0168-8227\(14\)70732-6](https://doi.org/10.1016/S0168-8227(14)70732-6).
- [5] A.D. Napier, J.J. Nolan, M. Bagger, et al., Study protocol for the cities changing diabetes programme: a global mixedmethods approach, BMJ Open 7 (2017) e015240, <https://doi.org/10.1136/bmjopen-2016-015240>.
- [6] C. Jefferies, P. Carter, P.W. Reed, et al., The incidence, clinical features, and treatment of type 2 diabetes in children <15 yr in a population-based cohort from Auckland, New Zealand, 1995–2007, Pedia Diabetes 13 (4) (2012 Jun) 294–300, <https://doi.org/10.1111/j.1399-5448.2012.00851.x>.
- [7] G. Waernbaum, J. Blohmé, G. Östman, J.W. Sundkvist, H.J. Eriksson, J. Arnqvist, L. Bolinder, Nyström Excess mortality in incident cases of diabetes mellitus aged 15 to 34 years at diagnosis: a population-based study (DISS) in Sweden, Diabetologia 49 (2006) 653–659, <https://doi.org/10.1007/s00125-005-0135-x>.
- [8] M.I. Constantino, L. Molyneaux, F. Limacher-Gisler, et al., Longterm complications and mortality in young-onset diabetes: type 2 diabetes is more hazardous and lethal than type 1 diabetes, Diabetes Care 36 (2013) 3863–3869, <https://doi.org/10.2337/dc12-2455>.
- [9] R. Husdal, A. Rosenblad, J. Leksell, B. Eliasson, S. Jansson, L. Jerdén, J. Ståhlhammar, L. Steen, Ti Wallman, A.M. Svensson, E. Thors Adolfsen, Resources and organisation in primary health care are associated with HbA1c level: A nationwide study of 230 958 people with Type 2 diabetes mellitus, Prim. Care Diabetes 12 (2018) 23–33, <https://doi.org/10.1016/j.pcd.2017.09.003>.
- [10] Region Skåne (2019) (<https://vardgivare.skane.se/contentassets/e06b5ee2adce4590b7dab08bb5338585/certifiering-av-diabetesmottagning-2019.pdf>).
- [11] American Diabetes Association Standards of Medical Care in Diabetes—2022 Abridged for Primary Care Providers Clin Diabetes cd22as01 <https://doi.org/10.2337/cd22-as01>.
- [12] N. Marx, M. Federici, K. Schütt, D. Müller-Wieland, R.A. Ajjan, M.J. Antunes, R. M. Christodorescu, C. Crawford, E. Di Angelantonio, B. Eliasson, C. Espinola-Klein, L. Fauchier, M. Halle, W.G. Herrington, A. Kautzky-Willer, E. Lambrinou, M. Lesiak, M. Lettino, D.K. McGuire, W. Mullens, B. Rocca, N. Sattar, ESC Scientific Document Group, 2023 ESC Guidelines for the management of cardiovascular disease in patients with diabetes, Eur. Heart J. 44 (39) (2023) 4043–4140, <https://doi.org/10.1093/eurheartj/ehad192>.
- [13] J.K. Leksell, G.E. Sandberg, K.F.J. Wikblad, Self-perceived health and self-care among diabetic subjects with defective vision: a comparison between subjects with threat of blindness and blind subjects, Diabetes Complicat. 19 (1) (2005) 54–59, <https://doi.org/10.1016/j.jdiacomp.2004.04.002>.
- [14] N.C. Schaper, J.J. van Netten, J. Apelqvist, S.A. Bus, R. Ritridge, F. Game, M. Monteiro-Soares, E. Senneville, IWGDF Editorial Board, Practical guidelines on the prevention and management of diabetes-related foot disease (IWGDF 2023 update), Diabetes Metab. Res Rev. (2023) e3657, <https://doi.org/10.1002/dmrr.3657> (Epub ahead of print.).
- [15] S. Kunasegaran, J. Beig, M. Khanolkar, et al., Adherence to medication, glycaemic control and hospital attendance in young adults with type 2 diabetes, Intern. Med. J. 48 (2018) 728–731, <https://doi.org/10.1111/imj.13808>.
- [16] S. Kalirai, J. Ivanova, M. Perez-Nieves, J. Stephenson, I. Hadjiyianni, M. Grabner, R. Daniel, D.R. Pollom, C. Geremakis, B.L. Reed, L. Fisher, Basal insulin initiation and maintenance in adults with type 2 diabetes mellitus in the United States, Diabetes Metab. Syndr. Obes. 13 (2020) 1023–1033, <https://doi.org/10.2147/DMSO.S237948>.
- [17] J. McGavock, B. Wicklow, A.B. Dart, Type 2 diabetes in youth is a disease of poverty, Lancet 390 (2017) 390, [https://doi.org/10.1016/S0140-6736\(17\)32461-3](https://doi.org/10.1016/S0140-6736(17)32461-3).
- [18] A.R. Khanolkar, R. Amin, D. Taylor-Robinson, et al., Inequalities in glycemic control in childhood onset type 2 diabetes in England and Wales-A national population-based longitudinal study, Pedia Diabetes 20 (2019) 821–831, <https://doi.org/10.1111/pedi.12897>.
- [19] Rädna Barnen Barnfattigdom i Sverige Årsrapport 2021 (<https://resourcecentre.savethechildren.net/pdf/Barnfattigdom-i-Sverige-211206UPDATED.pdf>) ISBN: 91-7321-378-0.