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ORIGINAL ARTICLE

Long-term effectiveness of a reminder system for postpartum glucose intolerance screening in gestational diabetes

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Abstract

Background and aims Women with a history of gestational diabetes (GDM) have an increased risk of developing type 2 diabetes later in life. We evaluated the long-term feasibility and effectiveness of a regionally implemented GDM recall register to stimulate postpartum screening and assess (pre)diabetes prevalence up to 10 years postpartum.

Methods We evaluated the "Sweet Pregnancy" GDM recall register, implemented in the northern part of Belgium, from 2009 to 2025. Women with a history of GDM received annual reminders for screening with a fasting plasma glucose in primary care. Response rates, self-reported screening uptake, and cumulative incidence of (pre)diabetes were analyzed.

Results 27,173 women were registered with a mean follow-up of 4.4 years. The yearly response rates (among both responders and non-responders combined) varied from 48.4% (11,048) after the first year to 34.3% (4,116) after the fifth year, and 27.6% (1,190) after 10 years. Among responders, during the follow-up period of 3 and 5 years, 80.4% and 81.9% received at least one screening test, respectively. Non-responders were more often under 30 years of age (45.4% vs. 42.0%, $p<0.001$) and obese (32.6% vs. 24.8%, $p<0.001$) compared to responders. After 10 years, the cumulative incidence of diabetes was 11.0% and of impaired fasting glucose 34.7%.

Conclusion This large-scale register implemented in normal routine, up to 10 years of follow-up, indicates a feasible and effective reminder system to stimulate postpartum diabetes screening in women with prior GDM. The high cumulative incidence of (pre)diabetes underscores the importance of long-term follow-up and targeted interventions to prevent progression to type 2 diabetes in this high-risk population.

Keywords Gestational diabetes mellitus · Type 2 diabetes · Prediabetes · Screening · Registry · Reminders

Introduction

The prevalence of gestational diabetes mellitus (GDM) is increasing worldwide, in part due to the increased prevalence of obesity in women of reproductive age and due to more effective screening strategies [1, 2]. The prevalence of GDM varies between 7.1% and 27.6% depending on ethnicity and screening strategy, with an estimated average global prevalence of 14.0% [3]. Women with a history of GDM have a 10-fold higher risk to develop type 2 diabetes

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(T2DM) later in life compared to women with normal glucose tolerance in pregnancy [4]. Studies have shown that the risk of T2DM increases with longer follow-up. A meta-analysis reported a cumulative incidence of T2DM within 1 to 5 years of 9.2% (95% CI 7.2 to 11.3), between 5 and 10 years of 12.1% (95% CI 11.6 to 12.5), and after 10 years of 16.2% (95% CI 15.8 to 16.5) after the index pregnancy [4]. Moreover, women with a history of GDM and prediabetes after delivery progress more rapidly to T2DM compared to people with prediabetes but without a history of GDM [5]. The risk of developing prediabetes is 3.7 times higher in women diagnosed with GDM compared to controls [6], and results in a lifelong risk for T2DM of 50–60% [4, 7]. In addition, women with a history of GDM are also at increased risk for cardiovascular disease and metabolic syndrome [3, 8].

Postpartum screening following GDM provides an opportunity to detect glucose intolerance early. It also offers an opportunity to implement preventive strategies to delay or prevent progression to T2DM [5, 9, 10]. The American Diabetes Association (ADA) therefore recommends screening women with a recent history of GDM between 4 and 12 weeks postpartum using a 2-hour 75-gram oral glucose tolerance test (OGTT), with long-term screening for (pre) diabetes every 1 to 3 years [11]. However, in normal routine, adherence to postpartum screening is often suboptimal, with studies reporting screening rates ranging from 9% to 71%, and substantial variation between countries [12–14]. Adherence declines further with time, with only approximately 18% of women attending follow-up screening 4 to 6 years after the index pregnancy [15].

Reminder systems (e.g. email, phone call, short message service (SMS)) may improve attendance at postpartum screening. Several studies have demonstrated that, once such systems are implemented, attendance rates increase [16–19]. However, most interventions remain limited in both duration and scope, lacking long-term continuity and integration within healthcare systems. Since 2009, the GDM recall register "Sweet Pregnancy" has been established in the northern part of Belgium (Flanders) [19]. Women enrolled in this program receive annual reminders to stimulate screening with fasting plasma glucose (FPG) in primary care, facilitating timely detection of glucose intolerance (prediabetes or diabetes). We previously reported the results of this GDM recall register for a maximal follow-up period of 6 years, indicating that this stimulates sustained postpartum screening for glucose intolerance [19]. The aim of this analysis was to evaluate the long-term feasibility and efficacy of the GDM recall register from its initiation in October 2009 through the end of 2025, including women with up to 10 years of follow-up. As part of this extended evaluation, the prevalence of diabetes and impaired fasting glycaemia (IFG) is also assessed.

Methods

In October 2009, the "Sweet Pregnancy" project was launched in the northern part of Belgium by the Flemish Diabetes Liga, an independent association representing people living with diabetes and diabetes-related healthcare professionals. The "Sweet Pregnancy" project was an automated recall registry for women with a history of GDM. The main objective was to raise awareness of the long-term risks associated with GDM and to stimulate postpartum screening in primary care to enable timely detection of glucose intolerance. Each year, women included in the register received a reminder advising them to receive screening with FPG by their general practitioner (GP). The register promoted annual FPG measurement, as this was considered more practical and achievable than recommending an OGTT. In addition, women were offered a free subscription to a magazine and newsletters which informed and encouraged a healthy lifestyle to prevent T2DM. Women were also offered free participation in online group sessions on healthy nutrition delivered by a dietician, to support the integration of a healthy, varied diet into their daily lives. The "Sweet Pregnancy" project was funded by the Flemish Government and supported by the Flemish association of family doctors and the Flemish association of obstetricians and gynecologists. Ethical committee approval was not required for this study, as it involved the analysis of a fully anonymized existing database with no identifiable patient information, and the study was conducted in accordance with the Declaration of Helsinki.

Participants

Since October 2009, the "Sweet Pregnancy" project was introduced to all 66 obstetrical centers in Flanders. Belgium has approximately 11.8 million inhabitants, and 29.9% are women aged 18–64 years, and 58% reside in Flanders. The background prevalence of diabetes in adults aged 20–79 years in Flanders is 7.6%. A large Belgian study has indicated that the prevalence of GDM in Flanders was around 10% in 2018 [20]. Prior to the publication of the Flemish consensus on GDM screening in 2019, the most used screening strategy in Flanders was a two-step approach consisting of a 50-gram glucose challenge test followed by a 100-gram OGTT, using the Carpenter and Coustan criteria [21]. Since 2019, the Flemish consensus recommends using the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) criteria to diagnose GDM between 24 and 28 weeks of pregnancy [21]. Since 2024, early screening for GDM with a 75-gram OGTT before 20 weeks of gestation is recommended for pregnant women with risk factors (obesity and/or history of GDM) [22].

Registration

Figure 1 provides an overview of the recruitment and follow-up on the GDM recall register. All women diagnosed with GDM residing in Flanders or the Brussels-Capital Region were offered the opportunity to voluntarily enroll in the GDM recall register. During recruitment, women received an information brochure, a registration form, and a prepaid return envelope. Completed registration forms were returned to the Diabetes Liga project coordinator. In case of duplicate registrations, only the initial reference record was retained. Since 2013, women could also register online. At the project's initiation in 2009, registration and communication were provided exclusively in Dutch; since 2023, they were also available in English and French. The registration form included informed consent for the collection and registration of participant data and requested personal contact information, contact details of the woman's family doctor, expected date of birth, self-reported pregestational weight and height. Consent was also given on this form for

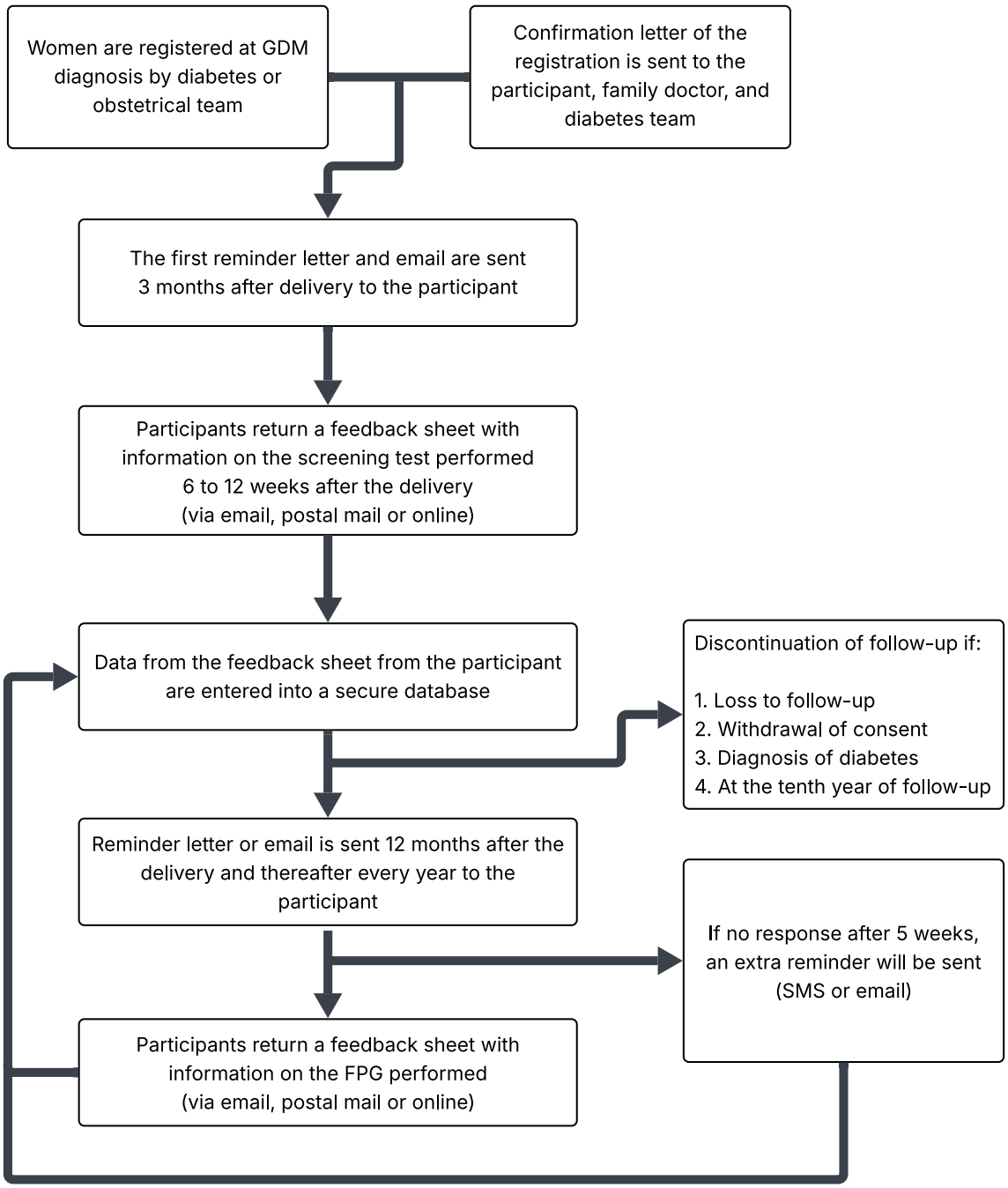


Fig. 1 Overview of the recruitment and follow-up on the GDM recall register. *GDM* gestational diabetes, *FPG* fasting plasma glucose

the participant's GP to be informed of their enrolment on the register. GPs were invited to actively support the project by completing a feedback form. Since April 2016, the diabetes team also received confirmation of the registration of women in the project. GPs were informed through their personal eHealth mailbox since 2023. Previously, this communication was conducted by postal mail.

Follow-up

Three months after the expected delivery date, all participants received both a letter and an email providing information about the importance of diabetes prevention and early detection. The mailing included a copy of the magazine with information on healthy and active living and an information leaflet offering online dietary group sessions. Participants were also asked to complete a feedback sheet confirming their contact details and whether they underwent diabetes screening 6–12 weeks postpartum. Responses could be submitted by prepaid postal mail or by email, and since May 2023, online via a unique link or QR-code. Participants could also change the communication method on each feedback form. If a participant indicated that she had been diagnosed with diabetes, she was informed that she would no longer receive annual reminders for postpartum screening.

Unless diabetes is diagnosed, subsequent follow-up letters and emails were sent to the registrants 12 months after delivery and yearly thereafter, with the advice to visit their GP to check their FPG, and to send the FPG results from each GP visit to the register's coordinator by post, email or online.

If no response was received within 5 weeks, an additional reminder was sent by email and/or telephone to encourage a response. Due to the large number of women registered in the project, before May 2023, telephone calls were used for the first and fifth years after registration. Since May 2023, this was replaced by an SMS text message. Non-responders were defined as registrants who have never returned a response sheet to the coordinator of the register. Registrants who enrolled in 2025 and had not responded at the time of analysis were excluded from classification as either responders or non-responders, as a response remained possible in 2026.

There were four reasons for discontinuation of follow-up: (1) loss to follow-up when the participant could no longer be contacted, (2) explicit withdrawal of consent by the participant, or (3) notification by the participant of a diabetes diagnosis. If a participant was diagnosed with diabetes, she received a letter with detailed information about the Flemish Diabetes League and the available support services. And finally, (4) at the tenth year of follow-up, participants were notified that structured follow-up within the project will be discontinued, but they were encouraged to remain vigilant regarding diabetes prevention.

Categorization of postpartum glucose testing results

Using the ADA criteria, we defined women with a FPG < 100 mg/dl as normal, 100–125 mg/dl as IFG, and ≥ 126 mg/dl as having diabetes [23].

Feedback and benchmarking

To monitor registration trends and provide feedback, each center receives an anonymous overview of the number of registrations per center every six months. This allows centers to compare their recruitment performance with that of other centers, providing valuable opportunities for benchmarking.

Financial aspects

The cost structure of the GDM register contains three main components: (1) the follow-up system, which covers printing and mailing costs (registration forms, letters, envelopes), courier and transport expenses, SMS notifications, IT support and database management, internet and hosting fees, application development and adaptation costs, and investments in hardware and software; (2) awareness-raising activities, including website development and maintenance, design and layout of campaign materials, and printing of promotional and educational content; and (3) personnel costs, representing staff-related expenditures.

Statistical analyses

The effectiveness of the GDM recall register was evaluated by analyzing the recruitment to the register, the proportion of women returning the feedback sheet (the number of responders), and the proportion of women reporting a screening test. Survival analysis techniques for time-to-event outcomes were used to analyze diabetes and prediabetes. Outcomes were defined as the time between delivery and the first assessment of prediabetes or diabetes. The cumulative risk of diabetes was estimated using the Kaplan-Meier method, whereas for prediabetes, estimation was based on the cumulative incidence function. Diabetes without earlier prediabetes was then considered as a competing risk. Patients without prediabetes were censored at the last follow-up. The independent contribution of participant characteristics (age, BMI) and occurrence of postnatal screening for (pre)diabetes was analyzed using cause-specific Cox proportional hazards models. The postnatal screening variable referred exclusively to the guideline-recommended early postpartum

screening performed 6–12 weeks after delivery. Competing events were treated as censored. The results are presented as hazard ratios (HR) with 95% confidence intervals. The chi-square test was used to test the association between responder/non-responder and participant characteristics. A p-value of <0.05 (two-tailed) was considered significant unless stated otherwise. Analyses were performed using SAS software (version 9.4 of the SAS system for Windows, 2023).

Results

The number of registrations over time and per region

Since the beginning of the register in October 2009 until 31 December 2025, 27,173 women have registered. Based on 60.000 births per year in Flanders and an estimated GDM prevalence of around 5–10%, we estimate that approximately 45.000 to 90.000 women may have had GDM during the 16-year study period. The registry captured therefore roughly one third to one-half of the eligible post-GDM population.

As shown in Fig. 2, the number of registered women with GDM has steadily increased. Since 2020, over 2,000 cases have been registered each year, rising to more than 3,000 in 2025. Participation in the register was generally similar across all provinces, with the highest rates of registration in Limburg and West Flanders with respectively, 467 and 401 registrants per 100,000 inhabitants, followed by Antwerp and Flemish Brabant, with respectively, 301 and 286 registrants per 100,000 inhabitants. The lowest number of registrants was observed in East Flanders with 224 registrants per 100,000 inhabitants. 94.6% of all registrants reported height and weight on the feedback sheet, and 97.3% provided correct contact information. The mean age was 31.8 years, 28.5% was overweight, and 28.1% had obesity.

Number of responses over time

Of all registrants, 60.7% (16,482) responded to the letter sent three months after the delivery, 58.3% (9,617) of responders indicated that they had received a screening test to detect glucose intolerance in early postpartum, and 2.8% (357) reported having diabetes based on the early postpartum screening test.

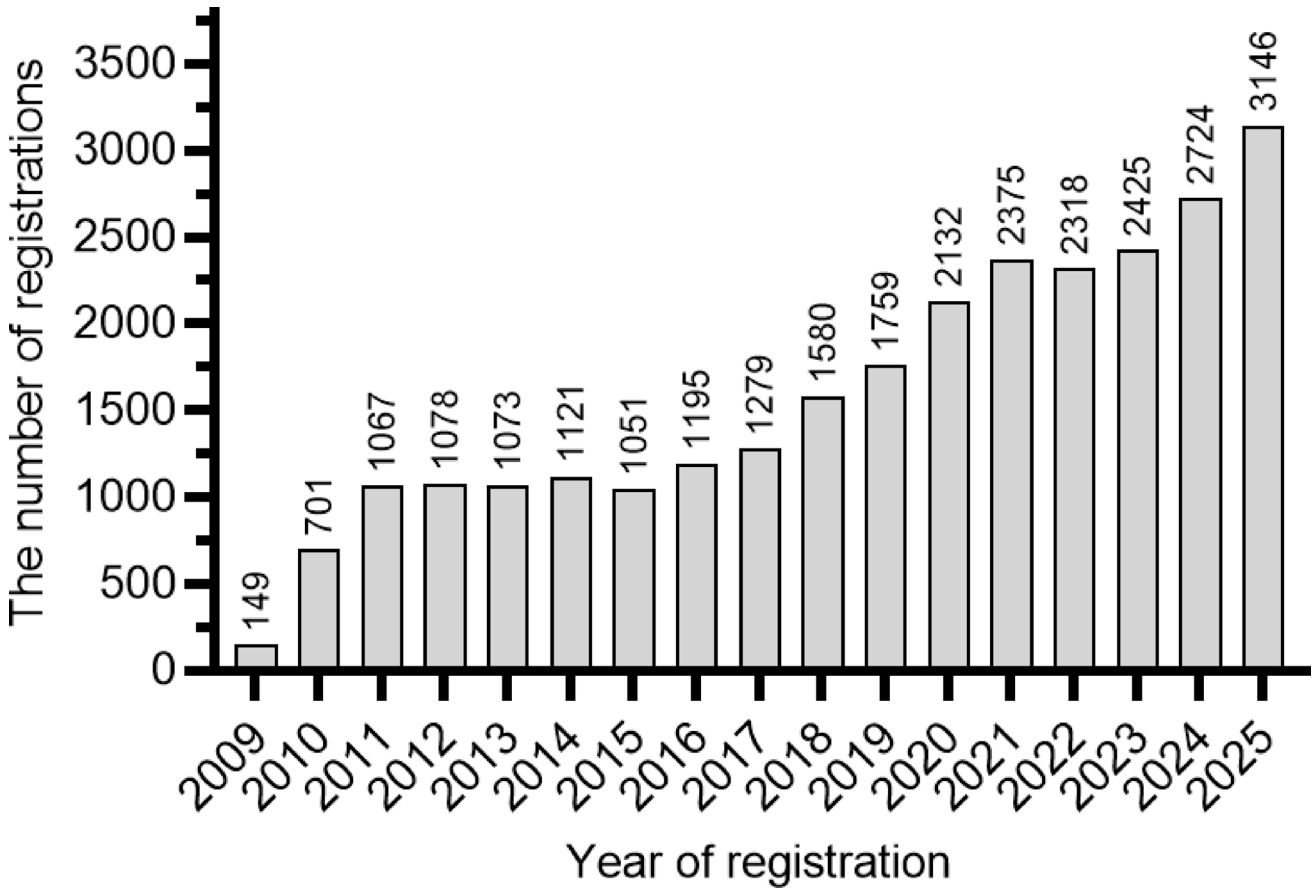


Fig. 2 Overview of the number of registrations per year in the register since the start in October 2009

Since the start in 2009, a total of 120,015 yearly reminder letters/emails were sent, with an average response of 35.4%. Of all registrants, 46.4% (12,598) responded at least once to reminder letters. Table 1 gives an overview of the number of responses and the number of responders who received a screening test by each year of follow-up until a maximum of 10 years after the index pregnancy. Yearly response rates varied from 48.4% after the first year to 27.6% after the tenth year. Among responders, during a follow-up period of 3 and 5 years, 80.4% and 81.9% received at least one screening test, respectively. Among responders with a minimum follow-up of 3 and 5 years, at least one screening test by a GP was performed in 84.8% (9,693/11,435) and 84.8% (7,471/8,812), respectively. Of all women who received a follow-up letter and responded, 74.6% reported a screening test after the first year, 80.0% after the third year, 79.3% after the fifth year, and 91.0% after the tenth year.

One-year response rates stratified by year of inclusion are presented in Table 2, ranging from over 80% in the earliest registration years to 26.6% among registrants included in 2024. Among women who responded at their first-year reminder after registration, the proportion reporting screening test results varied by year of inclusion, with higher proportions in more recent registration years, reaching up to 82.4% in 2024.

Comparison of the reminder between email and postal mail

Between May 2023 (the implementation date of the new system allowing to choose between conventional mail and email yearly reminders) and August 2024 (the latest inclusion for receiving full 1-year data), 3,132 women received a reminder after one year. 63.3% (1,982) opted for regular postal mail, where 36.7% (1,150) chose for email. The response rate at one year was 19.8% (393) in those who chose for regular mail, and 44.3% (510) in women who opted for e-mail.

The characteristics of nonresponders compared to responders

Compared to women who responded at least once to a reminder, those who never responded were more often younger than 30 years (45.4% vs. 42.0%, $p<0.001$) and more often obese (32.6% vs. 24.8%, $p<0.001$).

The number of responders with (pre)diabetes over time

The cumulative risk after 1 year for diabetes and IFG was, respectively, 3.9% (CI 3.6%–4.3%) and 5.7% (CI

Table 1 An overview of the number of responders and screening tests per year of follow-up

	1 year of follow-up	2 years of follow-up	3 years of follow-up	4 years of follow-up	5 years of follow-up	6 years of follow-up	7 years of follow-up	8 years of follow-up	9 years of follow-up	10 years of follow-up
The number of yearly reminders sent (*n*)	22,820	19,822	17,085	14,489	12,007	9,719	7,966	6,468	5,327	4,312
% number of responders (n)	48.4 (11,048)	38.1 (7,549)	33.9 (5,797)	31.8 (4,601)	34.3 (4,116)	28.2 (2,743)	27.7 (2,208)	26.8 (1,736)	27.3 (1,456)	27.6 (1,190)
% number of responders who received a screening test (n)	74.6 (8,243)	75.3 (5,685)	80.0 (4,640)	83.6 (3,847)	79.3 (3,262)	90.0 (2,468)	91.4 (2,019)	92.9 (1,613)	92.7 (1,349)	91.0 (1,083)
Result *screening tests (n)*	Diabetes	Diabetes	Diabetes	Diabetes	Diabetes	Diabetes	Diabetes	Diabetes	Diabetes	Diabetes
% self-reported	0.9 (76)	1.1 (61)	0.73 (34)	1.0 (39)	1.0 (31)	1.3 (31)	1.5 (30)	1.0 (16)	0.9 (12)	1.1 (12)
	Prediabetes	Prediabetes	Prediabetes	Prediabetes	Prediabetes	Prediabetes	Prediabetes	Prediabetes	Prediabetes	Prediabetes
	8.4 (692)	9.1 (518)	9.5 (441)	10.1 (390)	10.2 (334)	10.8 (267)	11.8 (238)	13.9 (224)	14.9 (201)	12.9 (140)

The number of responders is the number of registrants who returned a response sheet. The number of responders who received a screening test is the number of responders who have indicated that they received a screening test in primary care in the past year. The number with diabetes is based on self-reporting of the result of the screening tests received after 1 year

Table 2 Response rate at one year, stratified by year of initial registration

Year of registration	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
The number of reminders sent (n)	145	683	1,011	1,035	1,050	1,091	1,023	1,174	1,250	1,516	1,706	2,032	2,295	2,257	2,339	2,613
Number of responders (%)	80.7	84.9	76.5	72.8	63.7	67.6	65.4	54.9	57.8	47.2	49.1	46.9	32.3	35.6	30.2	26.6
Number of responders (n)	117	580	773	753	669	738	669	645	723	715	837	954	742	803	707	695
Number of responders who received a screening test (%)	63.2	67.6	66.6	69.2	76.8	68.4	66.2	67.6	69.8	73.8	76.6	79.7	84.2	70.1	85.0	82.4
Number of responders who received a screening test (n)	74	392	515	521	514	505	443	436	505	528	641	760	625	563	601	573

5.3%–6.1%). After 3 years, the cumulative risk for diabetes and IFG was, respectively, 5.1% (CI 4.7%–5.5%) and 13.2% (CI 12.5%–13.9%), after 5 years the cumulative risk for diabetes and IFG was, respectively, 6.5% (CI 6.0%–7.0%) and 19.2% (CI 18.3%–20.0%) and after 10 years, the cumulative risk for diabetes and IFG increased to, respectively, 11.0% (CI 10.1%– 12.0%) and 34.7% (CI 33.1%–36.4%) (Fig. 3).

Predictors for (pre)diabetes

In the univariable analyses, predictors for diabetes and prediabetes were increasing age, BMI, and the fact that women received a screening test within 3 months after the delivery (Table 3a). In the multivariable analyses, age, BMI, and screening test within 3 months after the delivery remained independent predictors of prediabetes and diabetes (Table 3b).

Cost estimates of the "Sweet Pregnancy" project

From the start of the project in 2009 until the end of 2025, the total estimated cost is €1,717,413.

The costs contain three main components; the follow-up system (41.6%), awareness-raising activities (5.1%), and personnel costs (53.3%), which are presented in Table 4.

Discussion

This study, which included over 27,000 women with a maximum follow-up of 10 years, is the first to report on the long-term effectiveness of a large-scale, structured GDM recall register in Belgium. Our findings confirm that such a register can be maintained over a prolonged period, with sustained growth and continued engagement, supporting both scalability and real-world applicability. This extends previous findings from the earlier phase of this project [19], demonstrating for the first time the feasibility and participation over a full decade.

General consensus recognizes the importance of timely postpartum detection and treatment of glucose intolerance in women with GDM. However, testing rates in routine clinical practice often remain low [8, 24, 25]. Accordingly, only 58.3% of respondents in our register reported undergoing postpartum screening within three months after the delivery. Low participation in follow-up screening delays diabetes detection and represents a missed opportunity for early intervention, lifestyle modification, and management of cardiovascular risk factors [26]. Various strategies have been implemented to boost postpartum diabetes screening rates among women with a history of GDM, including reminder systems (postal, email, or phone), educational

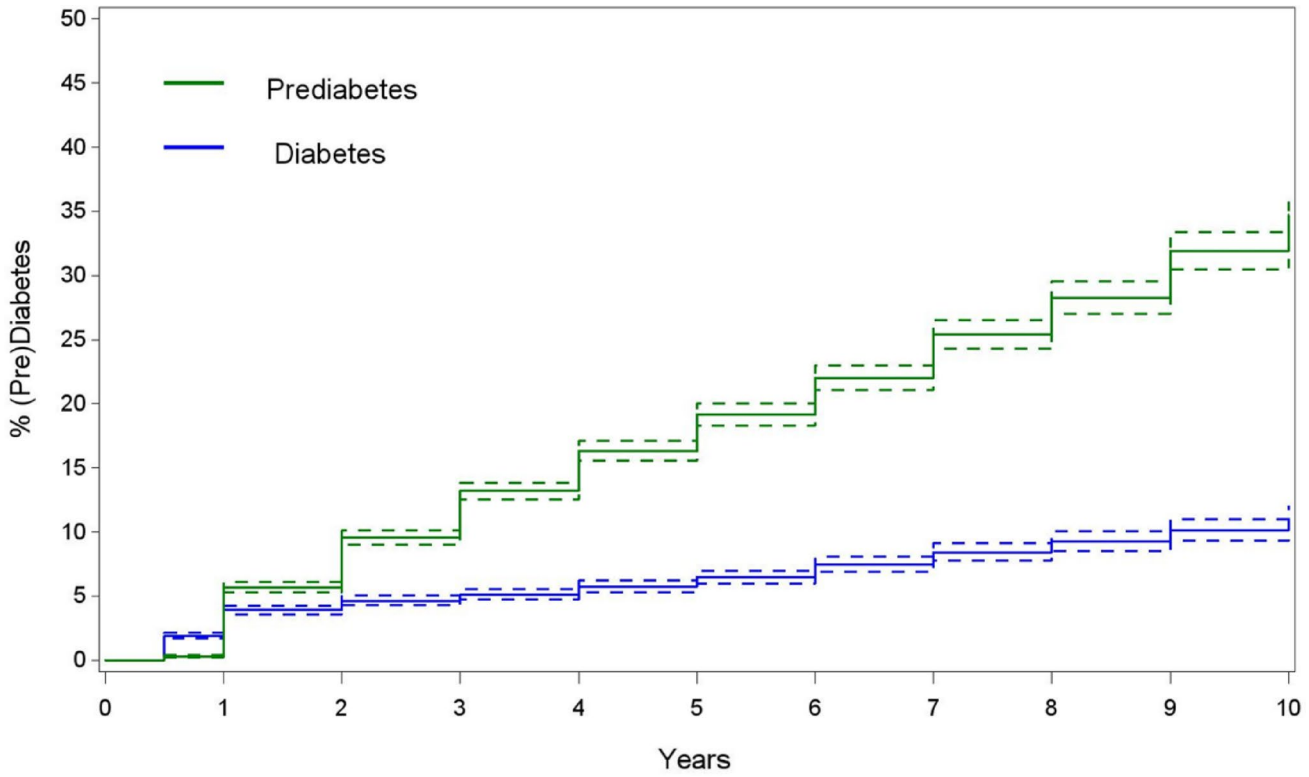


Fig. 3 Cumulative risk of diabetes and prediabetes over time since the delivery (+95% CI). Prediabetes was only registered at long-term yearly follow-up with the general practitioner

Table 3 Predictors for diabetes and prediabetes

Variable	Contrast	Diabetes	Diabetes *p* value		Prediabetes	Prediabetes *p* value	
		Hazard ratio (95% CI)	Contrast	Global	Hazard ratio (95% CI)	Contrast	Global
(a) Results of univariable analyses							
Age category (years)	30–40 versus < 30	1.32 (1.13;1.53)	0.0003	< 0.0001	1.39 (1.26;1.52)	< 0.0001	< 0.0001
	> 40 versus < 30	2.02 (1.48;2.74)	< 0.0001		2.08 (1.71;2.53)	< 0.0001	
	25–30 versus < 25	1.53 (1.14;2.06)	0.0048		1.50 (1.25;1.81)	< 0.0001	
BMI category (kg/m^2)	25–30 versus < 25	1.82 (1.53;2.17)	< 0.0001	< 0.0001	1.68 (1.53;1.84)	< 0.0001	< 0.0001
	> 30 versus < 25	2.18 (1.83;2.61)	< 0.0001		2.09 (1.90;2.29)	< 0.0001	
	> 30 versus 25–30	1.20 (1.00;1.43)	0.0481		1.24 (1.13;1.37)	< 0.0001	
Received screening in early postpartum	Yes	3.09 (2.51;3.80)	< 0.0001	< 0.0001	1.47 (1.34;1.61)	< 0.0001	< 0.0001
(b) Results of multivariable model							
Age category (years)	30–40 versus < 30	1.27 (1.07;1.49)	0.0050	0.0002	1.32 (1.21;1.44)	< 0.0001	< 0.0001
	> 40 versus < 30	1.90 (1.36;2.66)	0.0002		1.74 (1.43;2.12)	< 0.0001	
	25–30 versus < 25	1.50 (1.08;2.08)	0.0143		1.32 (1.09;1.60)	0.0040	
BMI category (kg/m^2)	25–30 versus < 25	1.68 (1.39;2.02)	< 0.0001	< 0.0001	1.61 (1.46;1.77)	< 0.0001	< 0.0001
	> 30 versus < 25	2.07 (1.72;2.50)	< 0.0001		2.04 (1.84;2.26)	< 0.0001	
	> 30 versus 25–30	1.24 (1.02;1.49)	0.0290		1.27 (1.14;1.41)	< 0.0001	
Received screening in early postpartum	Yes	2.94 (2.37;3.63)	< 0.0001	< 0.0001	1.44 (1.31;1.58)	< 0.0001	< 0.0001

Received screening in early postpartum: between 6 and 12 weeks after the delivery; HR: hazard ratio; CI: confidence interval; p values: global for the variable as a whole; contrast for difference between 2 categories; HR > (<)1 means higher (lower) risk for the first category

Table 4 Costs associated with the "Sweet Pregnancy" project

	2009–2012	2013–2015	2016–2018	2019	2020	2021	2022	2023	2024	2025
Costs of the follow-up system (€)	94.180	36.892	73.894	56.728	43.809	46.540	78.267	79.925	105.466	99.573
Average costs per year (€)	28.978	12.297	24.631	56.728	43.809	46.540	78.267	79.925	105.466	99.573
Cost of awareness-raising activities (€)	29.346	11.904	7.956	1.773	2.058	2.855	5.852	13.809	5.511	6.523
Average costs per year (€)	9.030	3.968	2.652	1.773	2.058	2.855	5.852	13.809	5.511	6.523
Total personnel costs (€)	182.046	102.051	111.471	62.055	40.418	95.200	92.033	73.767	75.765	79.746
Average personnel costs per year (€)	56.014	34.017	37.157	62.055	40.418	95.200	92.033	73.767	75.765	79.746
Total average yearly cost (€)	94.022	50.282	64.440	120.556	86.285	144.595	176.152	167.501	186.742	185.842

initiatives, alternative screening approaches, policy adjustments, antenatal group sessions, and integrated multimodal interventions [18, 27].

Our registry is widely implemented as part of routine care. Despite declining response rates over time, a substantial proportion of women continued to participate in follow-up screening up to 10 years after delivery. The highest response rate was achieved in the first year (48.4%), and more than 1 in 4 women (27.6%) still responded in the tenth year. The screening rates (combining both responders and non-responders) remained generally stable between the second and last (10th) year of follow-up, ranging from 27.6% to 38.1%. However, among the group who responded, the percentage who underwent screening remained very high (74.6%-92.9%). The response rate to the reminders in the first year was markedly lower in the most recent years, averaging 33.8% between 2020 and 2024, compared to 75.7% between 2009 and 2013. During the 16-year period, this decline in response can be attributed to changes in the follow-up methodology, particularly a shift from labor-intensive telephone contact for non-responders to predominantly digital reminder systems (SMS, e-mail).

Our findings are consistent with international evidence demonstrating that reminder systems can improve postpartum screening rates. Although studies have heterogeneous effectiveness depending on their intensity and type of intervention. Telephone-based interventions consistently demonstrate substantial improvements, with absolute increases of approximately 15–30%, resulting in screening rates of up to 60–80% in some studies [28–31]. Postal and email-based reminder interventions show modest improvements in postpartum screening uptake. Across studies, screening rates in control groups ranged from 14% to 33%, increasing to 28% to 76% following intervention [17, 32–35]. However, the magnitude of effect varied substantially between studies, suggesting that written reminders alone may not be sufficient to ensure consistently high screening adherence. In contrast, the low-intensity SMS-based reminders showed no effect [36, 37]. Indicating that minimal-contact approaches may be insufficient to change behavior in this population. Notably, many of the more effective interventions combined reminders (telephone and post/email) with additional components, such as patient education and/or healthcare provider involvement, highlighting the potential added value of multicomponent strategies. Importantly, most studies are limited to short-term follow-up periods and outcomes are typically reported within 6–12 months postpartum. Our results are in line with previous studies showing that reminder systems can increase postpartum screening rates, yet our register is unique in its duration, population reach, and integration in routine care. To our knowledge, a structured long-term recall system such as the "Sweet Pregnancy" project in Belgium, only also exists in Australia (National Gestational Diabetes Register [NGDR]). In the NGDR, women receive yearly reminders, information on how to maintain a healthy lifestyle and minimize the risk of T2DM and access to the Australian national diabetes services scheme (NDSS) support services and programs. The last published update from 2018 concluded that there was little evidence of recall letters did result in an increased screening rate at 12 months follow-up [38], although data describing long-term results have not been published. During the duration of the "Sweet Pregnancy" registry, the follow-up methodology has been changed towards a digital approach for financial, labor-intensive and practical reasons. The system must continuously adapt to the evolving healthcare landscape and emerging possibilities of digitalization, acknowledging that such change is both necessary and accompanied by inherent risks and opportunities. A new example for predicting risk of T2DM is the Interactive Voice Response (IVR) system; a type of computer-linked telephone intervention system, which showed a good prediction of T2DM in 71% of male and 66% of female T2DM cases [39]. Such new techniques can be a potential scalable screening method in long-term postpartum screening.

Prevalence of glucose intolerance and diabetes in women with a history of GDM varies according to the population and the method of GDM diagnosis. In our registry, over a 10-year period, the cumulative risks for diabetes and IFG are 11.0% and 34.7%, respectively. This is comparable to previous studies reporting a cumulative incidence of diabetes of 12.06% after 10 years [13]. The Flemish guideline recommends FPG over a 75-gram OGTT for long-term screening, as it is more practical in primary care [22]. FPG is easier and less time-consuming, which may increase screening rates and support better lifelong follow-up. However, by using

only the FPG, a substantial number of women with prediabetes or diabetes can be missed, compared to the 75-gram OGTT [40–42]. To illustrate, data from a recent study from our group demonstrated that, in the early postpartum period in women with a recent history of GDM, assessment with FPG alone resulted in lower detection rates of prediabetes and diabetes (13.2% and 0.1%, respectively) compared with a 75-gram OGTT (26.2% and 1.8%, respectively), according to ADA criteria [43]. The 2026 ADA guidelines suggest performing ongoing evaluation with any recommended glycemic test (e.g., annual HbA1c, annual fasting plasma glucose, or triennial 75-gram OGTT using thresholds for nonpregnant individuals), as there is currently insufficient evidence to recommend a specific test [11]. There is limited evidence that continuous glucose monitoring might also be useful to detect (pre)diabetes postpartum [44], but larger studies are ongoing (CORDELIA study [NCT06310356], PREDISPOSE [NCT04972955] [45]).

The financial analysis demonstrates that the "Sweet Pregnancy" project, with a total investment of €1,717,413 over sixteen years, is feasible within the Flemish healthcare context. Although personnel costs account for the largest share of the budget, the scale of the program and the transition to digital reminders offer opportunities for further cost savings without compromising effectiveness. These expenditures should be weighed against the potential healthcare savings achieved through timely detection and prevention of diabetes and its complications following GDM. Structural funding and integration with existing digital health systems could further enhance the sustainability and cost-effectiveness of the program.

Strengths of our register are the large number of participating centers across a large region and a long follow-up. In addition, the registry is widely implemented in routine care. There is a structured follow-up and non-responders receive a new reminder by email or SMS. Limitations include the limited clinical data available in the register and the recorded data are self-reported by the registrants. Although responders were asked to return the actual FPG results from their GP rather than only reporting whether screening had occurred, screening uptake was not verified through linkage with laboratory or medical records and therefore remains susceptible to some misclassification. However, due to the very large numbers in the registry, this will most likely have limited effect on the general conclusions. Other studies have indicated that self-reporting of diabetes (for instance the Nurses' health studies) have in general a good correlation with laboratory results [46, 47]. No data is collected on ethnicity. As a result of potentially selecting the most engaged women, the self-reported screening test results might have been overestimated. Using FPG instead of a 75-gram OGTT may underestimate the incidence of (pre) diabetes. In addition, combining HbA1c and FPG could potentially improve diagnostic sensitivity, but this would also increase costs and complexity. In Belgium, HbA1c is not reimbursed for screening for diabetes. Data on HbA1c were therefore not available in the registry. Women who did not respond were more often younger and more often obese, suggesting bias in the responses received. Previous studies have shown that overweight and socially disadvantaged women are less likely to participate in screening programs, partly due to fear of being diagnosed [30]. Women with obesity may also experience additional barriers such as weight-related stigma and socioeconomic challenges. Furthermore, younger women may perceive themselves to be at lower risk of future diabetes and therefore be less likely to participate in long-term preventive screening [48]. It was also not possible to determine whether the missed tests were due to the doctor's lack of order or to the woman's failure to visit the doctor. For the non-responders, there is no information on whether they received a screening test. In addition, no data are available on the group of women who did not register in this project. As this registry is implemented in normal routine, no control group is available to compare the screening uptake with. Therefore, the study was designed to evaluate the long-term feasibility and implementation of the reminder system rather than its clinical effectiveness in reducing the incidence of type 2 diabetes. Finally, over time, the methods of the registry have changed from telephone reminders to electronic reminders, which could potentially have influenced participation in the annual follow-up.

In conclusion, this large-scale, decade-long recall system proved feasible and effective in stimulating postpartum diabetes screening in women with a history of GDM. Future efforts should focus on further integration with electronic health records, tailored approaches for high-risk groups, and innovative strategies to maximize engagement and screening uptake in diverse populations.

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Declarations

Conflict of interest Authors have no potential conflicts of interest relevant to the article.

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