

## Unmet needs of women with GDM

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**Unmet needs of women with gestational diabetes mellitus (GDM): a health needs assessment in Sandwell, West Midlands**

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## **Abstract**

### **Background**

GDM affects over 4% of pregnancies in England. We investigated GDM epidemiology within ethnically diverse population and the current offer of services to women with previous GDM to reduce their Type 2 Diabetes Mellitus (T2DM) risk.

### **Methods**

1) Analysis of routinely collected maternity records data examining GDM incidence and risk factors; 2) Local Authority self-assessment questionnaire on public health interventions targeting women with previous GDM; 3) service development discussions regarding the current pathway and areas for improvement.

### **Results**

Of 9390 births between 2014-2018, 6.8% had a record of GDM. High BMI, maternal age, and ethnicity (South Asian and some mixed ethnic backgrounds) were independent predictors of GDM. There were no public health commissioned services specifically targeting women with previous GDM. Weaknesses in transition from secondary to primary care, and areas for improvement when screening for GDM were identified.

### **Conclusions**

GDM burden in this population was high. Awareness should be raised on the importance of regular glucose testing and lifestyle modification to delay or prevent progression to T2DM, particularly within high risk groups. The potential for health visitors to contribute to this should be explored. Commissioners should review evidence to develop a flexible lifestyle services model to meet the specific needs of these women.

## Introduction

Diabetes Mellitus (DM) is a leading cause of preventable blindness, cardiovascular disease, stroke, kidney failure and non-traumatic limb amputations.<sup>1</sup> It is predicted to become the seventh leading cause of death by 2030.<sup>2</sup> Gestational Diabetes Mellitus (GDM) affects approximately 4.5% of pregnancies in England and Wales and testing for GDM is recommended in pregnant women between 24-28 weeks of pregnancy if they have at least one of the following risk factors: Body Mass Index (BMI) above 30kg/m<sup>2</sup>, previous large baby, previous GDM, family history of DM, minority ethnic family origin with high prevalence of diabetes. The diagnosis is made using the 2-hour 75g oral glucose tolerance test (OGTT) if a fasting plasma glucose level is 5.6mmol/litre or above or a 2-hour plasma glucose level is 7.8mmol/litre or above.<sup>3</sup>

GDM can lead to significant maternal and neonatal complications including prolonged labour, perinatal tears, post-partum haemorrhage, shoulder dystocia and birth trauma.<sup>4,5</sup> There are also long-term effects for mothers who had GDM, even if their blood glucose levels return to normal after the birth, and their children. Women who have had GDM are over seven times more likely to develop Type 2 Diabetes Mellitus (T2DM) and are at twice the risk of cardiovascular disease independently of other risk factors.<sup>6,7</sup> Children born to mothers with GDM have an increased risk of becoming overweight or obese by adolescence and also have an increased risk of developing T2DM.<sup>8,9</sup>

Evidence suggests that development of T2DM can be prevented or delayed with behaviour and lifestyle changes, including diet and exercise.<sup>10,11</sup> For women with GDM whose blood glucose levels return to normal after the birth, the national guidance on diabetes in pregnancy also recommend offering a fasting plasma glucose test 6 to 13 weeks after the birth or an HbA1c test (if a fasting plasma glucose test is not possible) after 13 weeks. In women, who have a negative postnatal test for diabetes, an annual HbA1c test should then be offered.<sup>3</sup> Postpartum testing for diabetes has been found to be low in studies conducted in different healthcare systems in different countries, but there is emerging evidence that it can be increased using system based approaches, education and reminder systems.<sup>12</sup>

Sandwell in the West Midlands has an ethnically diverse population with approximately 21% being Asian, Black African or Black Caribbean, and higher levels of obesity and physical inactivity than the England average.<sup>13,14</sup> The Local Authority has a co-operative working

arrangement with the National Health Service (NHS) reflecting the commitment of both organisations, as public bodies, to work together to achieve shared public health outcomes. By assessing the GDM epidemiology and identifying gaps in service provision, this health needs assessment aims to inform these and other organisations serving multi-ethnic populations in the UK and internationally to improve early detection and interventions for women with GDM.

## **Methodology**

The study was designed to include the three approaches to health needs assessment (epidemiological, comparative and corporate) as described by Stevens et al.<sup>15</sup>

### **Epidemiological approach**

#### Study design

Analysis of anonymised data from BadgerNet, the electronic record system of maternity care, was undertaken to investigate the incidence and risk factors associated with GDM.

#### Study setting and population

The study population was identified as women who resided in Sandwell, were aged <46 years, had no pre-existing diagnosis of DM and gave birth in the main hospital serving the area between May 2014 (when the electronic record system was introduced) and February 2018.

#### Definition of GDM

The outcome of interest was a diagnosis of GDM which was diagnosed by 75g OGTT test with glucose concentration measurements determined by a mainframe analyser in a laboratory.

#### Risk factors

Data on age, ethnicity, BMI, smoking status, pregnancy induced hypertension and Index of Multiple Deprivation IMD (deprivation indicator at a ward level) were derived from the

electronic recording system. Ethnicity was defined based on the nationally recommended list of ethnic groups used in BadgerNet.<sup>16</sup>

### Analysis plan

Descriptive analysis was used to summarise the sociodemographic and maternal health related characteristics according to the presence of the record of GDM diagnosis during pregnancy. Categorical variables were summarised using counts and percentages, the mean and standard deviation (SD) were calculated for continuous variables (maternal age at delivery). We determined the incidence of GDM as a proportion of all births for the calendar year excluding those with pre-existing diagnosis of diabetes mellitus.

A univariate logistic regression was used to calculate unadjusted odds ratios and a multivariate logistic regression was used to calculate adjusted odd ratios for each of the risk factors (maternal age, ethnicity, deprivation, BMI at antenatal booking, smoking status before pregnancy and at antenatal booking, pregnancy repeated hypertension) against the GDM outcome. These covariates were identified as risk factors on the basis of biological plausibility and their association with the outcome of interest in previous studies.<sup>3,17,18,19</sup> The significance level was set at  $p < 0.05$ . The statistical analysis was undertaken using Stata 14.<sup>20</sup>

### **Comparative approach**

A self-assessment questionnaire (Supplementary File 1) for service commissioners in the region was e-mailed to all 14 Directors of Public Health in the local authorities (including Sandwell) in the West Midlands to understand the level and nature of public health interventions in the region targeting women with GDM. It was short in design to encourage a higher response rate and used a mixture of closed and open questions. The questionnaire sought to identify: any services specifically targeting women who have had GDM or where GDM was a risk factor or access criterion; whether any records were held of women with a history of GDM using services; details of any referral routes from secondary or primary care into Public Health services and any service developments being planned that would target women who have had GDM. The questionnaire was piloted with Sandwell public health staff.

## **Corporate approach**

Service development discussions were undertaken with the local NHS Trust to clarify the current pathway from secondary to primary care for women who have had GDM, and consider any opportunities for improvements to interventions and detection strategies to delay or reduce the risk for these women developing T2DM. The approach involved face-to-face meetings and discussions with strategic and clinical leads for both midwifery and health visiting services, as well as email exchanges and telephone calls.

Ethical approval for this study was given by the University of Birmingham Ethics Committee (reference number ERN\_18-0816).

## **Results**

### **Epidemiology of GDM in Sandwell**

A total of 9390 births met the inclusion criteria and were included in the analysis (Fig.1.), of which 6.8% (642/9390) had a record of GDM. The characteristics of the study population are detailed in Table 1. On average, women with GDM were older than women without GDM diagnosis. The incidence of GDM was highest in women aged over 30 years: 19.6% (52/265) in women aged 40 years and above, 13.0% (160/1230) in women aged 34-39 years and 9.0% (236/2635) in women aged 30-34 years.

The largest proportion of the study population was White British (29.2%, 2740/9390) followed by Indian (15.8%, 1485/9390), other White background (9.9%, 932/9390) and Pakistani (9.4%, 885/9390). GDM incidence was the highest in women of Bangladeshi (16.2%, 63/388), Pakistani (12.0%, 106/885), White/Black African (17.1%, 7/41), other Asian (10.5%, 18/172) and Indian (9.9%, 147/1485) ethnicity.

Nearly half (48.3%, 310/642) of all women with GDM diagnosis were overweight or obese compared with 34.4% (3007/8748) of women without GDM. Most births in Sandwell were to mothers who resided in wards with high levels of deprivation, with 70.0% (449/642) of births to mothers with GDM living in wards falling into the two lowest deprivation quintiles compared to 65.5% (5734/ 8748) without GDM.

The overall GDM incidence increased from 5.7% to 7.6% between 2014 and 2017 (Fig.2.). There was a marked increase in the number of women with GDM aged 40 years and above over time, although most women with GDM diagnoses were between 25-39 years old.

In the adjusted analysis, significant predictors of GDM were: the age of 30 years and above (Adjusted Odds Ratio (OR) with 95% Confidence Interval (CI) values 3.78 (95% CI 1.64-8.67), 5.37 (95% CI 2.32-12.44) and 10.20 (95% CI 4.23-24.63) for 30-34 year olds, 35-39 year olds and 40 and above year olds respectively), South Asian ethnicity (OR=4.40 (95% CI 2.95-6.54), 2.82 (95% CI 2.00-3.96) and 2.16 (95% CI 1.57-2.96) for Bangladeshi, Pakistani and Indian family origin respectively), mixed ethnicity (OR=4.00 (95% CI 1.16-13.71), 3.17 (95% CI 1.30-7.72) for White/Asian and White/Black African background, respectively), unspecified other Asian background (OR=2.38, 95% CI 1.33-4.25) and any other unspecified ethnic group (OR=2.10, 95% CI 1.40-3.16), being overweight (OR=1.60, 95% CI 1.24-2.08) and obese (OR=2.39, 95% CI 1.84-3.11).

### **Results of the service commissioner survey**

The response rate was 71.4% (10/14). Questionnaires were completed by either Public Health Consultants or Public Health Programme Leads. None of the Local Authorities commissioned services where a history of GDM was an access criterion. No respondents stated they had any services that identified and held records of women with previous GDM, although one stated that their NHS Health Check programme<sup>21</sup> asked about a history of GDM.

Several respondents mentioned that there were referral routes from primary or secondary care into public health services for women with previous GDM. Subsequent open question responses, however, clarified that these were generic lifestyle services and not specifically targeted at women with a history of GDM. One of the respondents stated that they had a Public Health midwife who provided weight management advice postpartum, but any referrals for interventions were still to generic lifestyle services.

The vast majority (90.0%, 9/10) of the Local Authorities stated that GDM was not specifically part of the access criteria to the National Diabetes Prevention Programme (NDPP) which aims to provide evidence-based behaviour change interventions for people at high risk of developing T2DM.<sup>1</sup>



Several respondents planned to develop services for women who have or have had GDM. These proposals were around extending weight management services to these women or improving information within primary and secondary care services.

### **Summary of service development discussions**

Discussions revealed that the current provider's guidelines for management of diabetes in pregnancy include some additional risk factors prompting testing for GDM (polycystic ovary syndrome, long term steroid use and previous unexplained stillbirth or three recurrent miscarriages), but do not list ethnicity and BMI 30.0-34.9 kg/m<sup>2</sup> as recommended by the national guidelines.<sup>3</sup> For women diagnosed with GDM, their antenatal care was in line with the guidance. There is a Diabetes Specialist Midwife and antenatal care is provided via a joint antenatal and diabetes service.

Midwifery service provides postnatal care for up to 14 days after the birth. Guidance is provided by midwives on the future risk of developing T2DM, the need for annual testing and healthy lifestyle advice. On discharge from the midwifery service a request is sent for an appointment for an OGTT for between 6-13 weeks from discharge. Test results are placed on the patient record and sent to their general practitioner (GP) who have the responsibility to review the result. The midwifery service does not review the results as the woman has been discharged from their service, and there is no monitoring as to whether women attend and take the blood test by midwifery. A discharge letter is sent to the woman's GP including the fact that the woman had GDM. From this point the responsibility for annual review is with the GP in line with National Institute for Health and Social Care Excellence (NICE) guidance which states 'Offer an annual HbA1c test to women who were diagnosed with gestational diabetes who have a negative postnatal test for diabetes'.<sup>3</sup>

Local Authority Public Health Department commissions the health visiting service which delivers the 0-5 years component of the Healthy Child Programme providing the framework for children and young people's good public health.<sup>22</sup> There are five mandated health reviews undertaken by the health visiting service, the first of which is whilst the woman is still under the midwifery care. Although the primary focus of the health visiting service is children's health, it is a public health commissioned service that maintains contact with the mother and child until at least 2-2.5 years following birth, and potentially up to 5 years. Discussions with senior managers revealed the potential of health visiting service in maintaining awareness of

risks and encouraging women with GDM history to request annual testing from their GP if an invite is not received, for example as part of the Making Every Contact Count (MECC) model - an approach endorsed by Public Health England and NHS England which maximises the routine contact health and care professionals have with people for a brief discussion on health and wellbeing matters.<sup>23</sup>

## **Discussion**

### **Main finding of this study**

The recorded incidence of GDM in this multi-ethnic population in the West Midlands is above the national<sup>3</sup> and European average<sup>24</sup> and has increased over time. We found independent and statistically significant relationships between GDM and increasing maternal age (30 years and above), increasing BMI, and ethnicity (particularly those from South Asian and mixed ethnic backgrounds).

The testing criteria for GDM during pregnancy locally did not include some of the risk factors recommended by NICE, which were also identified as significant predictors of GDM in this study. As the result of this health needs assessment, ethnicity has now been added to the GDM testing criteria applied by the local NHS Trust. There were no public health commissioned diabetes prevention programmes in the West Midlands that targeted specifically women who have had GDM. While the local care pathway from secondary to primary care was in line with national guidance, there were missed opportunities with regards to increasing the uptake and follow-up of postpartum and annual blood glucose testing in women with previous GDM.

### **What is already known on this topic**

The factors associated with developing GDM in our population are in line with previous literature.<sup>25,26,27,28</sup> According to a review of 126 maternity units in England, uptake of the national guidance regarding GDM testing based on risk factors was 83%.<sup>29</sup>

Postpartum and long-term follow up testing for women who have had GDM is known to be suboptimal.<sup>6,12,30</sup> Generic health and lifestyle services may not be structured to meet the specific needs of new mothers and may not be offered at a time when the women are most likely to engage.<sup>31,32,33,34,35,36,37</sup>

## **What this study adds**

The high GDM incidence and identified local risk factors together with high levels of obesity and populations from minority ethnic groups, highlight the importance of the review of the GDM testing criteria to reflect the needs of pregnant women.

Lifestyle interventions were available for women with previous GDM, however these were generic population-based services. Discussions with service commissioners also identified the potential of wider public health workforce working with mothers and children in supporting early detection and prevention of T2DM in women with previous GDM.

## **Limitations of this study**

Our study makes use of local information, highlighting its strengths in informing local decision-making. This, however, limits the generalisability to other areas. The principles of this needs assessment, nevertheless are applicable and can be replicated in other areas looking to identify and address the needs of women who have had GDM.

## **Conclusion and recommendations**

GDM burden in this multi-ethnic population in the UK was high and increasing. Women with well recognised GDM risk factors were not always offered testing during pregnancy, and women with diagnosed GDM were not systematically followed up postpartum and offered testing annually thereafter. The health and lifestyle services were not tailored to meet the specific needs of women with previous GDM after giving birth and transfer from hospital to primary care.

It is paramount to raise awareness of the importance of postnatal testing and annual HbA1c afterwards in women who have had GDM and reinforce the importance of lifestyle changes to delay or prevent progression to T2DM. This should include targeting high risk ethnic groups. It is also important to work with GPs and other health professionals to ensure maximum uptake of the postnatal tests, and to promote annual testing to enable early detection. Antenatal testing for GDM should include all the high risk factors and suitable public health interventions need to be available for women that are flexible to meet their needs.

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